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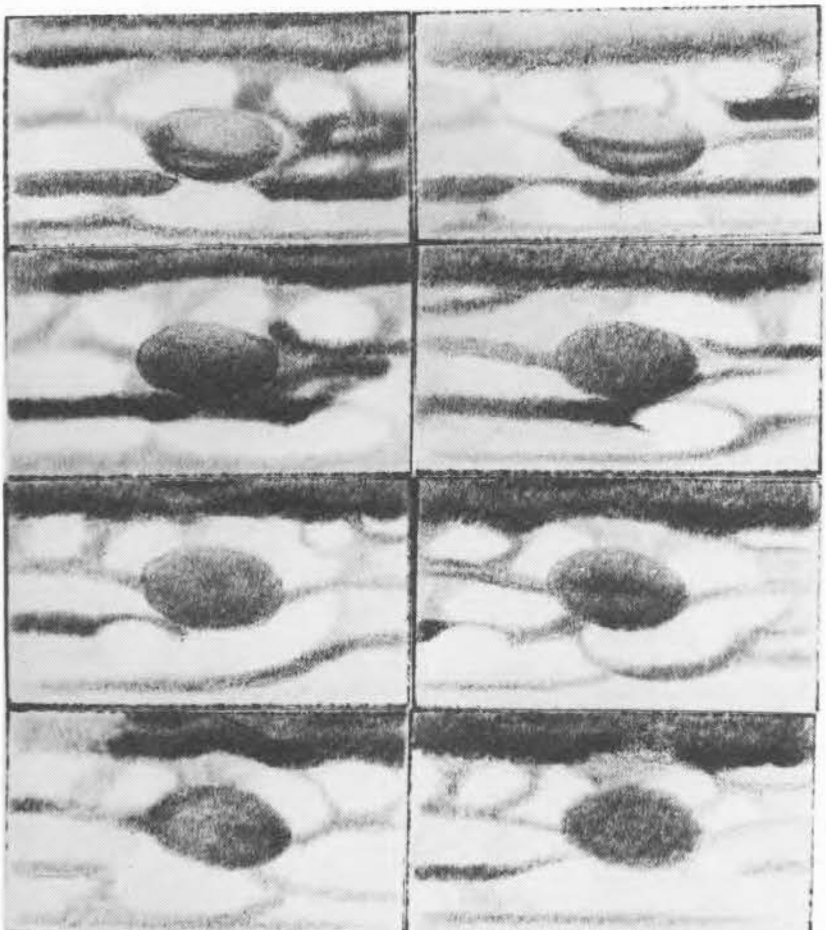

Drawings of the Great Red Spot on Jupiter and its vicinity by Professor Jean Dragesco of Orcines, France. Made in 1975 with a 10-inch reflector. These are simply inverted views with south at the top.

THE STROLLING ASTRONOMER
Box 3AZ
University Park, New Mexico
88003

Residence telephone 522-4213 (Area Code 505)
in Las Cruces, New Mexico

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IN THIS ISSUE

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JUPITER IN 1974-75: ROTATION PERIODS

By: Phillip W. Budine, A.L.P.O. Jupiter Recorder

Introduction

The highlights of the 1974-75 apparition were: the observation of both fast and slow currents in the North Equatorial Current, the presence of North Tropical Currents A and B, and the presence of North North Temperate Current B. Jupiter was at opposition on September 5, 1974, when the planet's declination was -8° and its equatorial diameter was 49".5.

This report is based on 2323 visual central meridian transit observations submitted by 53 observers of the A.L.P.O. When plotted on graph paper, 1497 transits form usable drifts for 51 Jovian spots distributed in 10 different atmospheric currents. The contributing observers are listed below by name and number of transits submitted, along with the station of observation and telescope(s) employed.

Akabane, Yukihiko, Chiba-ken, Japan, 8-in. refl., 1 transit.
Barnett, John *, Richmond, Va., 7-in.* & 8-in. refrs. Descriptive Report.
Bartlett, James C., Jr., Baltimore, Md., 3-in. refr. Descriptive Report.
Budine, Phillip W., Walton, N.Y., 3 1/2-in. Catadioptric & 4-in. refr. 506 transits.
Davis, Darryl, Fresno, Calif., 10-in. refl., 18 transits.
Doel, Ron, Evanston, Ill., 16-in. refl.** & 18 1/2-in. refr.**, 481 transits.
Eastman, Jack, Englewood, Colo., 5-in. refr. & 12 1/2-in. refl., 65 transits.
Ebishumoto, Nobuko, Tokyo, Japan, 3-in. refr., 4 transits.
Fukui, Osamu, Tokyo, Japan, 6-in. refl., 28 transits.
Gomez, J.M., Spain, 8-in. refr. Strip Sketches.
Gordon, Rodger W., Nazareth, Pa., 3 1/2 in. Cat. and 6-in. refr., 114 transits.
Haas, Walter H., Las Cruces, N.M., 12 1/2-in. refl., 66 transits.
Hull, Richard *, Richmond, Va., 4-in. & 7-in. refrs*. 12-in. refl. Descriptive Photos.
Irie, Masayuki, Hiratsuka-shi, Japan, 8-in. refr., 4 transits.
Ishii, Masataka, Tokyo, Japan, 5 1/2-in. & 6-in. refls., 63 transits.
Kaneko, Kenichi, Hiratsuka-shi, Japan, 4-in. refl., 18 transits.
Kato, Junichi, Yokahama-shi, Japan, 3 1/2-in. & 6-in. refls., 71 transits.
Kato, Koji, Tokyo, Japan, 6-in. refl., 36 transits.
Kayomori, Yoko, Chiba-ken, Japan, 6-in. refr., 4 transits.
Kimura, Hideo, Kawasaki-shi, Japan, 6-in. refl., 4 transits.
Kimura, Osamu, Kawasaki-shi, Japan, 3-in. refr., 1 transit.
Kittsukawa, Toshiyuki, Kanagawa-ken, Japan, 8-in. refl., 10 transits.
Matsuoka, Asami, Tokyo, Japan, 6-in. refl., 11 transits.
Morichi, Yutaka, Hiratsuka-shi, Japan, 8-in. refr., 3 transits.
Nagasaka, Hiroshi, Tokyo, Japan, 2.4-in. refr. & 6-in. refl., 98 transits.
Nemoto, Mitsuaki, Kawasaki-shi, Japan, 4-in. & 6-in. refls., 28 transits.
Neve, Chris *, Richmond, Va., 6-in. refl. & 7-in. refr.* Descriptive Report.
Ogasawara, Masahiro, Tokyo, Japan, 3-in. refr. & 6-in. refl., 56 transits.
Oki, Hiroshi, Chiba-ken, Japan, 8-in. refl., 2 transits.
Olivarez, Jose, Hutchinson, Kan., 4-in. refr., 4 transits.
Ono, Kaoru, Chiba-ken, Japan, 8-in. refl., 1 transit.
Ota, Ryo, Chiba-ken, Japan, 6-in. refl., 4 transits.
Prideaux, Jean, Richmond, Va., 12-in. refl. Descriptive Report.
Reginaldo, R., Spain, 8-in. refr. Descriptive Report and Strip Sketches.
Rouse, James, Naples, Florida, 8-in. refl. Descriptive Photos.
Sashihata, Yoshiharu, Hiratsuka-shi, Japan, 2.4-in. refr., 15 transits.
Sherrod, Clay, N. Little Rock, Ark., 5-in. refr., 202 transits.
Shindo, Yashunobu, Tokyo, Japan, 4-in. refl., 20 transits.
Smith, J. Russell, Waco, Texas, 8-in. & 16-in. refls.***, 40 transits.
Suzuki, Tatsuhiko, Tokyo, Japan, 6-in. & 8-in. refls. 85 transits.
Suzuki, Toshiyuki, Tokyo, Japan, 6-in. refl., 9 transits.
Tada, Yoshikazu, Hiratsuka-shi, Japan, 8-in. refl., 8 transits.
Takano, Shushumu, Kawasaki-shi, Japan, 6-in. refl., 2 transits.
Tanaka, Ritsuko, Tokyo, Japan, 3-in. refr., 14 transits.
Tanaka, Toshibumi, Kawasaki-shi, Japan, 4-in. refl., 3 transits.
Tanaka, Toshitsugu, Kawasaki-shi, Japan, 6-in. refl., 5 transits.
Tateyama, Toshiharu, Tokyo, Japan, 4-in. refl., 23 transits.

Tatum, Randy *, Richmond, Va., 6-in. & 10-in. refls. Strip Sketches.
Taylor, Walter, Fresno, Calif., 6-in. refr., 7 transits.
Tokitomo, Toyohiko, Tokyo, Japan, 6-in. refl. & 8-in. refr., 133 transits.
Yamazaki, Masuo, Kawasaki-shi, Japan, 3-in. refr. and 4-in. refl., 8 transits.
Yamazaki, Yoshikazu, Hiratsuka-shi, Japan, 8-in. refr., 5 transits.
Yamazaki, Yuichi, Kanagawa-ken, Japan, 3-in. refr. and 6-in. refl., 31 transits.

* Richmond Astronomical Society (R.A.S.)
** Lindheimer Astronomical Research Center.
*** Skyview Observatory.

All the Japanese observers are from the A.U.U., The Planet Section. The distribution of transit observations by months is as follows:

1974, April	46	August	413	November	117
May	188	September	438	December	68
June	109	October	648	1975, January	14
July	282				

In the tables which follow the first column gives an identifying number or letter to each object. The second column indicates whether the object was dark (D) or bright (W) and whether the preceding end (p), center (c), or following end (f) was being observed. The third column gives the first and last dates of observation; the fourth column, the longitudes on those dates. The fifth column gives the longitude at opposition, September 5, 1974. The sixth column gives the number of transits of the object. The seventh column indicates the number of degrees in longitude which the marking drifted in 30 days relative to System I or System II, negative when the longitude decreased with time. The eighth column shows the rotation period in hours, minutes, and seconds.

South Temperate Current (S. edge STB, STeZ). System II.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
D	Wp	May 23 - Jan. 6	123° - 348°	60°	66	-17°53	9:55:17
1	Wc	May 23 - Jan. 6	128 - 355	67	72	-17.27	9:55:17
E	Wf	May 23 - Jan. 6	135 - 3	75	47	-17.92	9:55:16
2	Wp	Jun. 1 - Oct. 11	192 - 108	132	27	-19.09	9:55:15
3	Wc	Jun. 1 - Oct. 24	194 - 105	136	52	-18.35	9:55:15
4	Wf	Jun. 1 - Nov. 27	196 - 94	142	30	-17.14	9:55:17
F	Wp	May 28 - Dec. 6	288 - 177	235	41	-17.34	9:55:17
5	Wc	May 28 - Dec. 6	292 - 183	240	54	-17.03	9:55:17
A	Wf	May 28 - Dec. 18	295 - 183	245	39	-15.91	9:55:19
6	Dp	Jun. 4 - Aug. 1	322 - 287	---	8	-15.22	9:55:20
B	Wp	Apr. 27 - Dec. 22	355 - 224	291	42	-16.69	9:55:17
7	Wc	Apr. 27 - Dec. 22	3 - 228	299	58	-17.20	9:55:17
C	Wf	Apr. 27 - Nov. 30	10 - 248	306	31	-17.18	9:55:17
					Mean Rotation Period:		9:55:17

The long-enduring white ovals of the SteZn continued to be observed during the 1974-75 apparition. Oval DE was usually recorded as the brightest and was larger than the other two white ovals of this current. On May 23rd DE had a length of 12°; by January 6th, 1975 its length was 15°. Oval FA was 7° in length on May 28th and had increased to 10° by December 6th, 1974. Oval BC on April 27th had a length of 15°, and by December 22nd the length was 14°. Oval BC was usually recorded to be fainter than DE and FA. On April 27th the center of BC was near conjunction with the preceding end of the Red Spot at 5° (II). The center of DE was in conjunction with the center of the Red Spot on November 18th at 21° (II). Drift-lines for the three long-enduring ovals and Nos. 2-4 are shown in Figure 1.

Much interest was created as long-enduring oval DE approached conjunction with the Great Red Spot. The oval was accelerated in mid-August when it had a period of 9:55:15. It was watched very closely as its preceding end approached the following end of the Red Spot. The movement was quite rapid up until October 11th

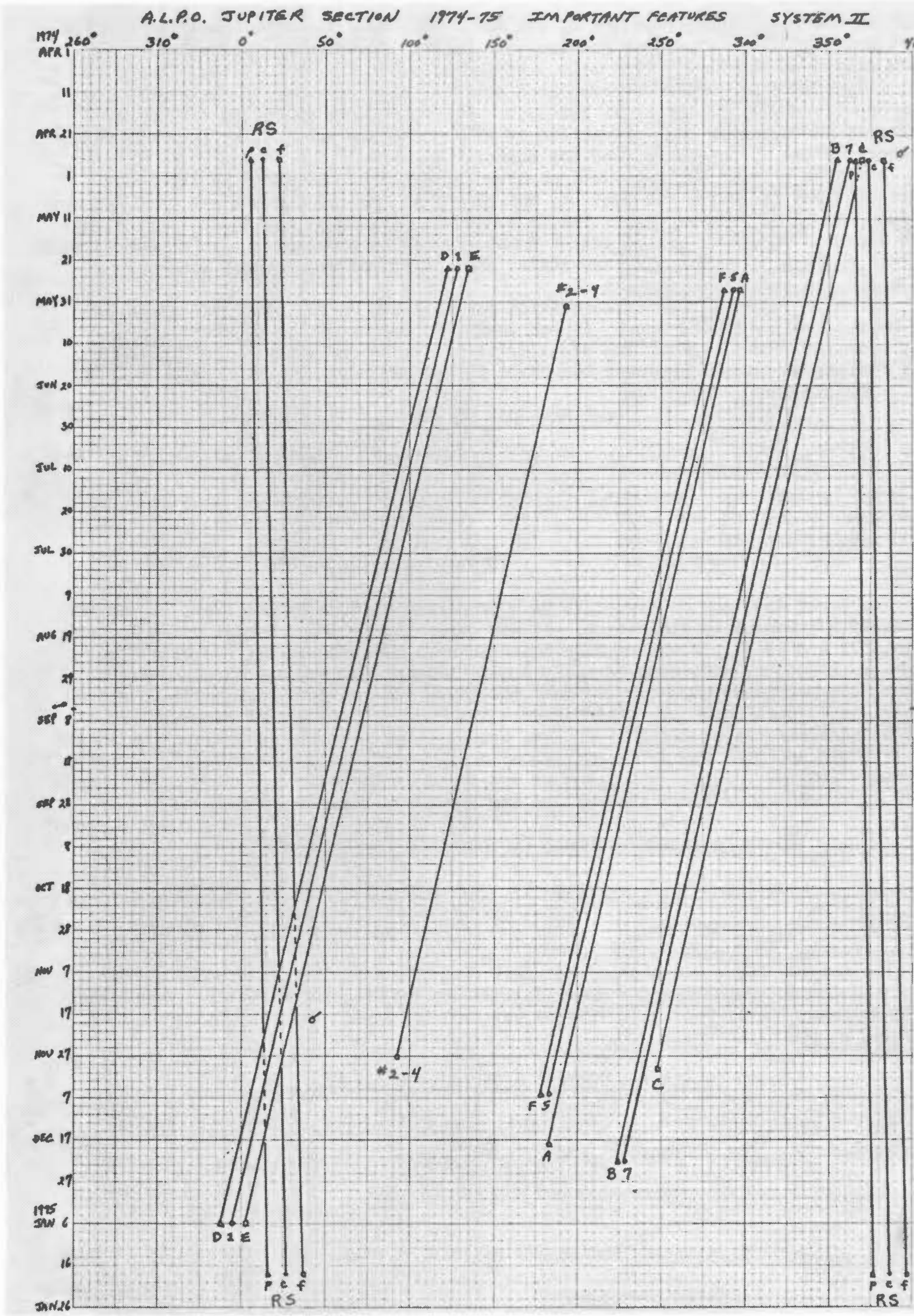


Figure 1. Drift lines, longitude vs. time, for selected features on Jupiter in System II as observed by the ALPO Jupiter Section during the 1974-75 apparition. Chart prepared and contributed by Phillip W. Budine. See also text of article by Mr. Budine on page 129 <u>et seq</u>. of this issue.

when the oval was highly repelled by the Red Spot. As a matter of fact the oval DE had a drift of only -4°.0 from October 11th to 26th, 1974, when the preceding end moved only from 35° to 33° (II) with a period of 9:55:35. This is the first time that A.L.P.O. members have observed such a strong physical reaction between a long-enduring STeZ oval and the Great Red Spot. Special thanks go to the following observers who observed the interaction of DE and the Red Spot: Clay Sherrod, Rodger Gordon, the R.A.S. observers, and the author.

A bright rift or oval was well observed by A.L.P.O. observers in the South Temperate Belt following the oval DE. Nos. 2 - 4 in the table above are this feature. During the period from September 1st to October 5th this oval was moving more slowly with a period of 9:55:21. The active group from Japan provided valuable observations of this feature. The R.A.S. group stated that this spot was fainter than DE and was about the same brightness as BC.

No. 6 is a dark streak-feature which was observed in the STeZ just south of the center portion of the zone. It was moving in the direction of decreasing longitude, and the preceding end had a drift of -15°.22 and a period of 9:55:20. This feature was located between the ovals FA and BC.

Great Red Spot. System II.

Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
RSp	Apr. 27-Jan. 18	5° - 16°	12°	138	+1°.39	9:55:43
RSc	Apr. 27-Jan. 18	13 - 27	20	162	+1.77	9:55:43
RSf	Apr. 27-Jan. 18	22 - 37	29	155	+1.90	9:55:43
				Mean Rotation Period		9:55:43

The Great Red Spot continued to be a prominent feature of the Giant Planet for the twelfth consecutive apparition. It was generally recorded as not quite so dark as in 1972 and 1973. It was usually observed with a darker border and with some interior structure. Starting in early August, observers recorded dark pointed ends to the Red Spot; also, a very dark following end was seen, and tails developed at both the preceding and following ends. The Red Spot had a mean length of 22° in longitude for the apparition. During the early part of the apparition the length was 17°, and near the end of the period of observation the length was 21°. A.L.P.O. observers usually recorded the color as red-orange. The average intensity of the RS was 2.9 on a scale of zero (shadows) to ten (most brilliant features).

South Equatorial Current (S. edge SEB_n, SEB Z). System II.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Dc	Aug. 23-Oct. 29	0° - 5°	5°	18	+2°.17	9:55:44

The marking above was a prominent dark projection on the south edge of the SEB_n, and connected to it was a prominent festoon running into the SEB Z preceding the Red Spot. The life of this feature was over 60 days. This object was well observed by the Japan group.

South Equatorial Current A (N. edge SEB_n, EZ_s). System I.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Dc	Jul. 26-Oct. 6	95°-132°	144°	9	+15°.10	9:50:50
2	Dc	Oct. 7-Oct. 26	276-276	-	5	0.00	9:50:30
					Mean Rotation Period		9:50:40

No. 1 is well illustrated on the strip sketch of Aug. 23rd - 27th, 1974 (Figure 2).

North Equatorial Current (NEB_s, EZ_n). System I.

Table I

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Dc	Sep. 30 - Nov. 3	12° - 12°	-	9	0°.00	9:50:30

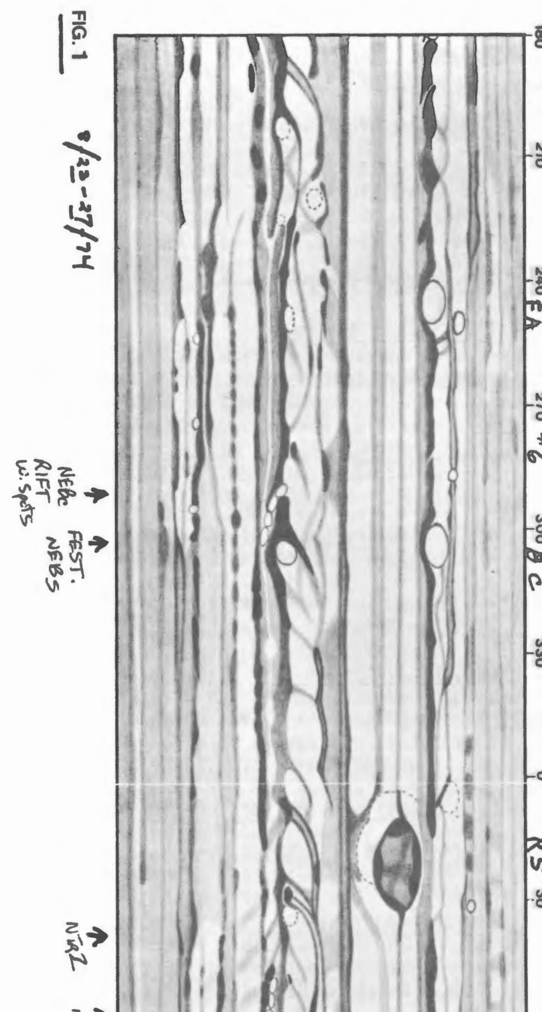


Figure 2. Strip sketch of features on Jupiter by José M. Gomez in Spain with an 8-inch refractor, August 23-27, 1974.

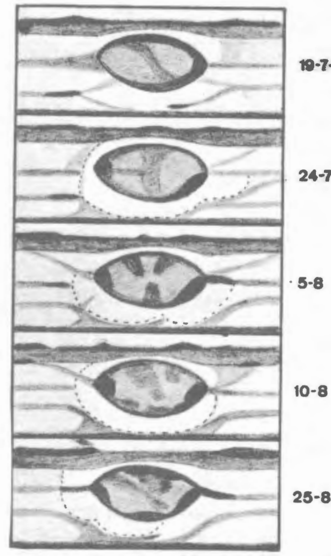


Figure 3. Sketches of Great Red Spot and vicinity by José M. Gomez, 8-inch refractor. July 19 to August 25, 1974.

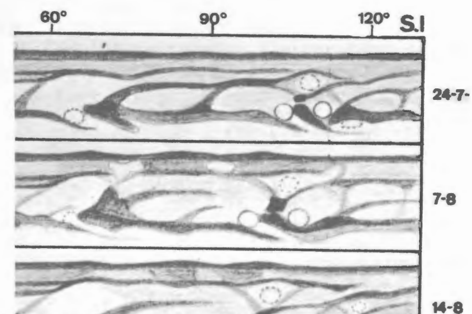


Figure 4. Strip sketches of Equatorial Zone Great Festoon No. 1 by José M. Gomez, 8-inch refractor. July 24 to September 13, 1974. See also text.

North Equatorial Current (NEB_s, EZ_n). System I. Table I. (cont.)

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
2	Dc	Aug. 1 - Sep. 19	14° - 15°	15°	9	+0°.59	9:50:31
3	Wc	Jul. 21 - Sep. 7	15 - 20	20	8	+2.94	9:50:34
4	Dc	May 22 - Sep. 2	60 - 59	-	23	-0.29	9:50:30
5	Dc	Jul. 21 - Sep. 3	70 - 71	-	11	+0.67	9:50:31
6	Dc	Jul. 21 - Aug. 4	146 - 150	-	5	+8.00	9:50:41
7	Wc	Sep. 1 - Oct. 24	166 - 153	166°	13	-7.23	9:50:20
8	Dc	Sep. 1 - Oct. 24	172 - 166	172	18	-3.34	9:50:26
				Mean Rotation Period			9:50:30

North Equatorial Current (NEB_s, EZ_n). System I.

Slow Current

Table II

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Dp	Sep. 30 - Oct. 28	350° - 9°	-	6	+19°.00	9:50:56
2	Wc	Jul. 21 - Aug. 14	53 - 61	-	6	+9.41	9:50:43
3	Wc	Jul. 21 - Aug. 14	57 - 64	-	5	+8.24	9:50:41
4	Dc	Oct. 2 - Oct. 27	331 - 345	-	9	+16.47	9:50:52
5	Wc	Oct. 2 - Oct. 27	336 - 354	-	8	+21.18	9:50:59
				Mean Rotation Period			9:50:50

North Equatorial Current (NEB_s, EZ_n). System I.

Fast Current

Table III

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Wc	Jun. 26 - Oct. 28	107° - 56°	86°	24	-12°.14	9:50:14
2	Dc	May 27 - Sep. 30	129 - 86	92	36	-10.24	9:50:16
3	Wc	Aug. 22 - Sep. 7	135 -125	127	9	-16.67	9:50:08
4	Dc	Aug. 9 - Sep. 1	235 -222	-	7	-16.25	9:50:08
5	Dc	Jul. 31 - Oct. 16	311 -262	295	25	-18.15	9:50:06
6	Wc	Jul. 31 - Oct. 26	320 -264	299	32	-18.67	9:50:05
				Mean Rotation Period			9:50:10

In Table I No. 2 was a double festoon feature projecting from the south edge of the NEB. It was moving in the direction of increasing longitude. No. 3. was a bright oval in the northern portion of the EZ and was moving under the festoon and in the same direction. No. 4 was a prominent festoon preceding a great festoon in the EZ_n. It was connected to the south edge of the NEB. No. 5 was a very dark festoon attached to a dark condensation on the south edge of the NEB. No. 7 was a large bright oval in the northern part of the EZ.

In Table II Nos. 2 and 3 are two bright spots of a group and were observed moving from the south edge of the NEB into the interior portion of the NEB through the center of the belt and on to the NEB_n. They actually moved under the dark festoon No. 5 above. All the bright spots were moving in the direction of increasing longitude. All the objects in Table II were moving in the slow current of the North Equatorial Current.

In Table III No. 1 of the fast moving current of the North Equatorial Current was a large bright oval preceding the Great Festoon #1. No. 2 was the Great Festoon #1 and was a very striking dark feature on the south edge of the NEB. There was also a large bright oval following the Great Festoon which was moving with the period of the Great Festoon (9:50:16). No. 4 was a very dark elongated and elevated projection which projected into the EZ_n. No. 5 was the Great Festoon #2, which was larger and darker than the Great Festoon #1. No. 6 was a large bright oval, which followed the Great Festoon #2.

Insertion by Editor. The reader interested in how the Jovian rotation periods given in this article are determined can do no better than to read and study B. M. Peek's book, The Planet Jupiter. He will also find in its pages a wealth of historical information on the behavior of the various atmospheric currents at the visible surface of the Giant Planet. The ALPO, the BAA, and other groups have used these methods extensively in their studies of Jupiter; and up to about 15 years ago almost all our knowledge of the rotation of surface features on Jupiter had been derived from such reductions of visual observations by persevering amateurs.

Middle NEB. System II.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Wc	Aug. 4 - Aug. 30	106° - 50°	-	15	-62°22	9:54:16
2	Wc	Aug. 4 - Aug. 27	110 - 66	-	10	-55.00	9:54:25
3	Dc	Oct. 2 - Oct. 24	96 - 65	-	9	-38.75	9:54:48
4	Wc	Sep. 17 - Oct. 25	297 - 240	-	18	-43.85	9:54:41
5	Wc	Oct. 10 - Oct. 28	342 - 315	-	6	-38.57	9:54:48
6	Wc	Oct. 10 - Oct. 28	353 - 329	-	5	-34.29	9:54:54
					Mean Rotation Period		9:54:39

Nos. 1, 2, and 4 were bright spots near the center of the NEB moving near the same longitudes as the Great Festoons in System I. Nos. 5 and 6 were bright rift spots in the middle of the NEB.

North Tropical Current A (N. edge NEB, NTrZ). System II.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Dc	Jul. 29 - Aug. 23	53° - 37°	-	6	-17°78	9:55:16
2	Dc	May 22 - Jul. 14	141 - 120	-	18	-11.67	9:55:25
3	Dc	Aug. 22 - Sep. 8	156 - 153	154°	9	- 5.00	9:55:34
4	Dc	Jul. 31 - Nov. 27	170 - 121	156	37	-12.25	9:55:24
5	Dc	Jul. 31 - Oct. 5	192 - 161	175	29	-13.48	9:55:22
				Mean Rotation Period			9:55:24

No. 3 is a new Red Spot feature located in the southern portion of the NTrZ. The feature formed a bay in the northern edge of the NEB. The new Red Spot was stationary from August 25th to August 31st relative to System II and then had a period of 9:55:41, similar to that of the Great Red Spot. Observational studies continue to support evidence of the New Red Spot's in the North Tropical Current being very similar in shape and behavior to the very famous feature in the South Tropical Current in Jupiter's southern hemisphere. Nos. 4 and 5 are very dark elongated condensations lying on the northern edge of the NEB and projecting into the southern part of the NTrZ.

North Tropical Current B (N. edge NEB, NTrZ). System II.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Wc	Sep. 17 - Oct. 10	316° - 266°	-	12	-27°78	9:55:03

North North Temperate Current B (NNTB, NNTeZ). System II.

No.	Mark	Limiting Dates	Limiting L.	L.	Transits	Drift	Period
1	Dc	Sep. 20 - Oct. 9	285° - 232°	-	7	-75°71	9:53:57

A special thanks must go to the following observers who contributed a substantial number of accurate transits and valuable detailed reports for the 1974-75 apparition: Clay Sherrod, Ron Doel, the Japanese observers, Richard Hull, and the other observers of the Richmond Astronomical Society.

THE APPEARANCE OF JUPITER IN 1974

By: Paul K. Mackal, A.L.P.O. Jupiter Recorder

The appearance of Jupiter in 1974 was in no way a recapitulation of its appearance in 1972 or 1973. Opposition occurred at 8 hours, Universal Time on Sept. 5, 1974. Conjunction with the Sun took place on March 21, 1975. (The Observer's Handbook of the R. A. S. Canada for 1974, pp. 46-47; and for 1975 as well, pp. 36-37.) Our observers this year included:

1. Matal Alecsescu, Bucharest, Romania;
2. James C. Bartlett, Jr., Baltimore, Maryland, U.S.A.;
3. Phillip W. Budine, Unadilla, N. Y., U.S.A.;
4. Charles F. Capen, Flagstaff, Arizona, U.S.A.;

5. Ron Doel, Evanston, Illinois, U.S.A.;
6. David L. Dorff, Des Moines, Iowa, U.S.A.:
7. Jean Dragesco, Orcines, France;
8. Alan W. Health, Nottingham, U.K.;
9. Reiichi Horiguchi, Tokyo, Japan;
10. Paul K. Mackal, Milwaukee, Wisconsin, U.S.A.;
11. Michael J. Morrow, Ewa Beach, Hawaii, U.S.A.;
12. José Olivarez, Hutchinson, Kansas, U.S.A.;
13. Toshihiko Osawa, Nara, Japan;
14. Pioneer #11 and the Palo Alto, Calif. headquarters of N.A.S.A.;
15. Richmond Astronomical Society, Richmond, Virginia, U.S.A.;
16. Gary C. Seaman, Big Bear, Calif., U.S.A.;
17. Clay Sherrod, North Little Rock, Arkansas, U.S.A.;
18. J. Russell Smith, Waco, Texas, U.S.A.;
19. Toyohiko Tokitomo, Tokyo, Japan;
20. Sandor Toth, Hungary; and
21. George Viscardy, St. Martin-de-peille, France.

Installment One:

This segment of the report will deal exclusively with morphological change in the extreme northern hemisphere of the planet Jupiter.

On May 2 Budine called the NTeZ white, the NNTeZ yellow, and the NNTB gray at 21° II. On May 4 Doel observed the NPR to be a gray mottled surface at 357°II with a white hazy spot just past the CM. On June 13 and 15 Sherrod discovered a white oval in the NTeZ, the first observation at 179°I (p.end) and second observation at 181°I (f.end). "This particular oval was quite conspicuous against the darker NTrZ which appeared bright brown-yellow." On all occasions the NTB was seen double, faint thin north and south components being clearly separable in every longitude. On June 16 Osawa observed a dusky NPR at 283°II with no indication of either the NNTeZ or the NNTB. The NTB was faint and single in this longitude, as well. An NTrZ oval was also observed by Osawa, as well as a column connecting the NTB to the NEB at about 260°I. On June 28 the NTB was faint, however; while on June 29 Dorff also showed a dark NNTB and flushed NPR at 95°II. The NTB was there strong.

On July 1 Mackal observed colors in the northern hemisphere at 12°II: the NPR was a faded brown, the NNTB brown, and the NTB grayish brown. Both the NTeZ and the NTrZ were seen to be cream colored. On July 2 Sherrod recorded a center of a large white NTrZ oval (having a circular shape) at 179°II. On July 3 Osawa recorded a shaded region flanked by two leaning columns (north preceding) forming a darkish corridor between the NPR and the NNTB, its preceding end at 279°II. The NNTB was faint in the following direction, and the NTB was a mere whispy line across the entire disc. On July 4 Morrow caught a gap in the NTB at 202°II. (Seeing was poor, however.) On July 7 Sherrod timed the preceding end of a large white oval in the NTrZ at 217°II. On July 15 he said: "I have looked over my observations of Jupiter this year, and just now have realized that the white ovals in the NTrZ and festoons seemingly related to them are not in System II, but rather, rotating in System I..." Photos of these NTrZ ovals were wonderfully recorded by Seaman on July 7 in white, blue, and yellow light near 239°II. The conclusion appears to be that these ovals and festoons were not caused by any revival of the NTB. The NTB looked stronger to Mackal on July 29 at 165°II. However, according to Osawa it was still weak at 269°II. On July 12 Dragesco saw a white spot in the NTrZ at 44°II at 3:52 UT.

Quoting Toth's translation of the August observations of Jupiter by Hungarian observers: "The NTrZ was empty enough, but the NTB was recorded as a sure object, except for a short region. The NNTB was strong and conspicuous. The two northern belts and the NTeZ showed fine contrast." In a letter of August 8 Sherrod noted that "The regions north of the NTrZ seem to be becoming brighter, or clearer than before. The NNTB has become easy, and the NTeZ has become brighter, sort of dull yellow. Also, I have had a few hints of the NNTeZ when seeing has been good." On August 3 Osawa showed a gap in the NNTB, its preceding end beginning at 289°II and extending across the disc in the following direction. On August 4 Osawa showed the NNTB to be wholly gone, as well, at 321°II! On August 7 Dragesco saw an oval in the NTrZ of white color at 73°I.

Brilliantly executed photographs in white, yellow, and blue light by Seaman taken on August 9 at 194°II suggested the total absence of NTrZ ovals and a somewhat faded duskier northern hemisphere on Jupiter. The NTB was clearly captured in blue light, though. On August 11 Horiguchi took a photograph of the region of longitude preceding the Red Spot and confirmed the faintness of the NTB as suggested on Osawa's drawing. On August 12 Dragesco noted these belts in the northern hemisphere--the NTB, $NNTB_s$, $NNTB_n$, and NNNTB! Three extra drawings by Osawa form a fine sequence. At 23°II he showed a stronger NTB coming into view with a preceding end nearly on the CM. The NPR was very dark. At 87°II the NTB was active and nodulated, while the NNTB was faintly visible underneath a dusky haze extending from the NPR into the NTeZ. At 144°II the NTB was a single solid component. whilst the NNTB had a raised detached segment, independent of the NPR, whose preceding end was just on the CM. On August 16 Sherrod confirmed the Recorder's analysis of Seaman's August 9 photo sequence: "I have not seen any indication of these ovals again, but I am continuing to observe many fine festoons within the NTrZ coming from the NEB (e.g.; 358°I, 18°I, and 40°I)." On August 23 Morrow confirmed the strength of Osawa's NTB at 74°II, as well as a hint of the NNTB on the CM. Also, on the same day Sherrod noted a "bright clearing in [the] NNTeZ" at 2°II. On August 25 Sherrod talked of "the clearing in the northern hemisphere--there is very good belt and zone detail visible now, including a very diffuse and wide NTB--it is dark tan, and of uniform thickness." It appeared to be more intense at 230°II, as well. The preceding end of the NTB, however, was placed at about 36°II by Osawa on August 29. Here too the NNTB looked a bit more obvious than it had been heretofore. On August 30 Vitous recorded a fawnish cast in the northern hemisphere's zones, a steel gray NTB, and an iron colored NPR, all at 188°II. On September 6 Vitous suggested a rose color in the NTrZ, while the NTeZ remained fawn, at 159°II. The NTB was also visible. A strong, inactive NTB was noticed by Osawa on September 7 at 16°II and on September 9 at 206°II and 228°II.

The NTB was seen to be very conspicuous by Morrow on September 15 at 278°II and at 35°II in blue light! On September 16 Vitous continued to record the NTB as a steel gray line on Jupiter at 176°II. Osawa showed it to be vigorous at 212°II on the same date. On September 28 Doel recorded a dark brown (as contrasted to a steel gray appearance seen by Vitous) NTB at 197°II, using a large 16-inch reflector at Lindheimer Astronomical Research Center, in Evanston, IL. However, he recorded a gray remnant of the NNTB and NNNTB, plus a bit of a gray NTB_n. A point of eruption for the northern piece of the NPR taking the place of a distinct NNTB was also seen with material radiating out from it. A double NTB was again evident, according to Osawa, on September 30 at 151°II! Also, terrific NTrZ activity was noticed, including a large white (elliptical) oval at 356°I. It cannot be a mere coincidence that this NTrZ activity was concurrent with a revived NTB, as was the case earlier in the apparition according to Sherrod, though he emphasized the revival of the NEB as a major causative agency, and turned out to be wrong in his supposition of a protracted NEB revival.

Thus on October 3, Doel, using a 16-inch reflector, again showed the NTB to be considerably darker and wider just preceding and following the CM, with the NNTB's preceding end distinct at 35°II. The whole region north of the single NTB was tan, while the NTrZ appeared to him to be grayish or blue. However, on October 24 Osawa showed the NTB undaunted or strong at 113°II. A gray NTB was recorded by Vitous at 214°II on October 27 with the same zonal color scheme of the prior observation. A dark single NTB was also seen by Budine on October 28 at 28°II and on November 7 at 14°II by Dorff. By November 24 Osawa stated that the "NTB was hardly visible" at 34°II.

Installment Two:

This segment of the report will deal exclusively with morphological change in the North Equatorial Belt and in the southern portion of the Equatorial Zone.

On May 2 Budine considered the NEB to be red-brown in color at 153°I. On May 4 Doel confirmed this color impression at 145°I. The NTrZBd was faintly visible on the preceding side of Jupiter. Mackal found a dark NEB at 120°I on May 27, which was also of normal intensity at 190°I. A more spectacular eruption was seen by Osawa on June 2 at 349°I, consisting of a large white oval flanked on the preceding side by a large festoon traversing the EZ_n with three columns on the following side. Another large white oval was seen by Osawa on June 16 at 41°I flanked by a curvilinear festoon on the preceding side with two small hooks on the following side. The belt was normal, however, on June 6, according to Osawa at 259°I. Reobservation of the June 2 features took place on June 14 at 103°I by Osawa and again on June 24 at 223°I. Usually, two or three months of continuous activity at many eruption points (the exact number has yet to be determined) of both components of the NEB is required for a full scale disturbance of the sort we were so well aware of in the apparitions of 1972 and 1973. On July 1 Mackal saw the NEB_n a brown color and the NEB_s a swarthy brown color at 241°I. The two components of the belt were recorded as normal by Osawa on July 3 at 166°I. A large white oval was seen flanked on both sides by dark festoons. Photographs in white, blue, and yellow light by Seaman showed the NEB no darker than the EB-SEB_n complex on July 7 at 151°I. However, Alecsescu noted an active NEB at 205°I on July 7. Quoting his July 19 letter: "[The] NEB is very interesting and complicated, and it is difficult for an owner of a telescope of a small aperture to observe the complicated figure of the NEB." On July 20 Osawa drew a dark NEB at 323°I, a medium-sized white oval with festoon roof on the CM supporting the view of Sherrod. Another observation of July 20 at 347°I showed festoons in the EZ extending from the NEB_s. The actual preceding end of the minor disturbance was located by the Recorder at from 24°I to 247°I on July 29. This object had been observed by Alecsescu on July 28 at 214°II. At this longitude the NEB certainly did exceed in darkness and complexity the EB-SEB_n complex.

Two large white ovals were observed in the EZ by Osawa on July 30 at 2°I. Hungarian observers agreed with the Recorder that "The NEB was similar to the SEB, perhaps with lower contrasts. The NEB_s was more active,..." Tremendous activity in the NEB was seen on August 3 by Osawa at 60°I with ripples in both the NEB_s and the NEB_n and a giant white oval, with two festoons preceding same and one festoon following same. The normal aspect was seen by Osawa on August 4 at 91°I, however. White and yellow light photographs of Jupiter by Seaman on August 9 at 2°I showed a dark NEB but a faded EB-SEB_n complex. A blue photo positioned at 353°I on the same date showed both the NEB and the EB-SEB_n complex of equal strength. The belt as a whole did not appear visibly disturbed because of the lack of correlation of the few points of eruption in the two separate components. There were simply not enough points of eruption for the requisite correlation of activity in the NEB_s and the NEB_n. No single aspect was manifested, as is usually the case when the belt as a whole is disturbed. A photograph of August 4 by Horiguchi certainly showed the NEB_s darker than the NEB_n at 173°I. This fact was confirmed on a drawing of August 14 by Osawa at 173°I and on another one at 230°I. E.g., Dragesco noted the following end of a "barge" in the NEB_s on August 15 at 236°I. Consequently, the minor disturbance was confined for the most part to the NEB_s, its activity influencing the NEB_n, and the latter's activity in turn influencing the zone to the north, with dark matter spilling out into same. NEB_n activity independent of the NEB_s in August occurred elsewhere, contributing more forcefully to observed NTrZ activity, but died out completely by mid-August. On an August 14 disc by Osawa at 295°I these assertions are amply demonstrated by the noticeable reduction of NEB activity. On another disc of the same date at 352°I the NEB_n was clearly shown as a fragment, while the NEB_s possessed two festoon pairs, some dusky patches, and a large white oval in the EZ just behind the CM. In a letter of August 16 Sherrod said: "...rather than a major disturbance, I think we experienced a 'minor disturbance,' which, at the time, could or could not have developed into a major activity area. In summary concerning the NEB, it seems that the northern portion and edge of the NEB was active early in the apparition, and still is displaying a great deal of curious activity, although I would not classify this as a 'disturbance.'" On August 24 Osawa showed a faded patch in the NEB_n at 322°I, with a strong NEB following same. Three white ovals were seen in the EZ_n, however, though the NEB_s was subdued too in this longitude. At 356°I on August 24 the third of these ovals was on the CM, and a fourth oval followed same. The NEB was normal or even placid. This state of affairs persisted at 104°I too, according to Vitous on August 25, and on August 28 at 179°I. By August 29 Osawa showed small ovals in the EZ_n at 357°I, a definite symptom of decaying activity in the NEB_s. The weakness of the belt was noticed by Osawa on August 29 at 357°I, though Vitous showed it still very strong on August 30 at 153°I. On this date it appeared that the NEB was in its single aspect, and this impression was confirmed by Osawa on Sept. 2 at 12°I. Both components were fragmented by late August and early September.

There were medium-sized and small white ovals in the EZ_n, a very good indicator of the cessation of NEB activity. Another disc by Osawa on September 16 at 310°I directly contradicts the notion that the NEB was in its single aspect. September 19 photographs by Richard Hull tend to confirm the Recorder's assessment of a declining NEB. Drawings by Vitous on September 23 at 310°I and by Doel on September 28 at 23°I show a strong NEB. A photograph of the belt at 139°I by Seaman on September 29 showed a beaten and subdued NEB, though confirmed by Osawa on September 29 at 159°I and also refuted by him on September 30 at 356°I. Two observations made by Vitous on October 2 and 3 show a decaying NEB at 275°I and 77°I respectively. Four discs by Osawa (October 4 at 242°I, October 5 at 78°I, October 5 at 131°I, and October 6 at 221°I) demonstrate distinct NEB Z activity, an excellent indicator of decay. They also suggest the stabilization of the two NEB components, no longer quite so fragmented as they had been, but definitely very thin, another indicator of decay proceeding slowly. EZ activity was bland, by comparison to September, in October, indicating decay. A completely faded NEB_s aspect was visible to Osawa and was recorded on an October 13 disc at 278°I. The reason for this tendency to see the belt single was apparent later on Pioneer #11 shots of Jupiter. An orangish NEB Z appeared to obtrude between a reddish-brown NEB_s and NEB_n. This pattern could often be mistaken for the NEB in its single aspect. Excellent photographs of Jupiter taken by the Pioneer #11 in December showed both an orangish NEB Z and EZ_s in the vicinity of the Great Red Spot. [Sky and Telescope, February of 1975.]

Had we more Jupiter photographs in hand, either made by our own Earth-based astronomers or by the space-bound Pioneer #11, we could be reasonably certain exactly what occurred in the NEB from early August through early December of 1974. On a skeptical note I think that A.L.P.O. observers sometimes draw what they expect to see or what they may interpret from what they see, rather than what in fact is actually visible. There is a tendency then to see "too much" as well as "too little." We next give a table summarizing some belt relative conspicuousness estimates by Alan Heath, which agree with some estimates by the Recorder.

Rank Analysis, white light, Alan Heath, B.A.A.

	1974, August 23	September 10	September 17	November 9
NEB	1	1	1	1
SEB	1	1	1	1
STB	1	1	1	0.5
NTB	2	3	2	2
SSTB	2.5	2	2.5	-
SEB_s	-	-	2.5	-

	November 12	November 16	December 22	December 22
NEB	1	1	0.5	1
SEB	1	1	1	1
STB	1	1	2	1
NTB	2	-	1	1.5
SSTB	-	-	-	2.5
SEB_s	-	3	-	-

	December 24	1974, December 28	1975, January 12	January 16
NEB	1	1	1	1
SEB	1	1	1	1
STB	1.5	1	2	0.5
NTB	1.5	2	2	-
SSTB	-	-	-	-
SEB_s	-	-	-	-

	1975, January 18	Mean Ranking:	Test Ranking:
NEB	1	0.954	1
SEB	1	1	1
STB	1	1.09	1
NTB	2	1.7	2
SSTB	-	2.25	2
SEB_s	-	-	-

In order to assess the meaning of these rankings the Recorder applied a Kendall tau analysis to the ranks. The correlation coefficient was made for consecutive pairs of rankings, one of which always consisted of the test ranking (or the mean ranking), and the other of which was a ranking made for each date.

Tau Table

	Date	Tau	No.	Long. I	Long. II
1974	8/23	.100	1	133°	215°
	9/10	.100	2	61°	06°
	9/17	.067	3	89°	334°
	11/9	.167	4	58°	05°
	11/12	.167	5	189°	14°
	11/16	.167	6	155°	309°
	12/22	.167	7	271°	152°
	12/22	.200	8	350°	231°
	12/24	.000	9	242°	107°
1974	12/28	.167	10	165°	00°
1975	1/12	.167	11	25°	05°
	1/16	.000	12	260°	355°
1975	1/18	.167	13	251°	286°

The results of this tau analysis indicate that there is no serious non-random time disturbance in the data, i.e., that the variation of the belts vis-a-vis one another was perfectly random. What this means for the conclusions of this report is simple to explain. The NEB did not alter its rank with respect to the SEB_n during the period it went through a so-called single aspect.

Installment Two Continued:

This segment of the report will deal exclusively with morphological change in the South Equatorial Belt Complex, including the false Equatorial Band, the South Equatorial Belt South, and the Red Spot and its environs.

The SEB_n was recorded to be as dark as the NEB_s throughout the apparition. On April 18 Budine observed an SEB Z festoon at 87°II and an SEB_n white spot at 102°II. On April 27 Budine observed another such festoon at 351°II, flanked by two small ovals, one at 349°II and the other at 352°II. The SEB_s looked very faint to him in these longitudes. As of May 2 Budine regarded the SEB Z as white, the SEB_n as red-brown, and the SEB_s as orange--at 21°II. The EZ was orange at 153°I on May 2, according to Budine. This hue was confirmed on May 8 by Capen, who called it "yellow-brown" or reddish. The EB became visible preceding 145°I, according to Doel, as of May 4.

On May 2 Budine observed the RS to be of uniform intensity, reddish-brown in color, and possessing a preceding and a following lead point. It was also in its ringed aspect, and this fact was confirmed by Doel on May 4 at 357°II. The SEB_n appeared to Doel to be undulating, broken into two components with white spots associated with the northern component of the SEB_n and dark knots associated with the southern component of same. Two backward pointing festoons (south following) were visible preceding the Red Spot, and one normal festoon was seen following the Red Spot. The SEB Z was dull in appearance. By June 1 Mackal observed the SEB_n to be quite dark and nodulated (though no festoons were visible in the SEB Z) at 190°II. The SEB_s appeared to be invisible and was most certainly inactive. On June 2 Osawa captured a double SEB_n and a festooned SEB_s at 338°II. The Red Spot looked pinkish-brown to Osawa. The SEB_n and the EB were merged on June 2, according to Osawa, at about 149°II; and this position may be regarded as the point of origin of the SEB_n-EB complex. On June 14 Osawa showed a double SEB_n near the Red Spot Hollow. The Red Spot appeared brick red or orange. On June 16 Osawa distinguished the double SEB_n or the SEB_n-EB complex even in an inactive region of the planet at 283°II. The SEB_s was gone in this longitude, and the SEB Z was clear of detail and whitish in cast. At 44°II, however, he showed a gentle SEB_s following the Red Spot and attached to same, and undulating components of the SEB_n. The Red Spot was then in its ringed aspect. On July 1 Mackal observed the EZ to be white at 241°I. The SEB_n was brown, the SEB_s was fox brown (or fawn), and the SEB Z was cream colored--at 12°II. The Red Spot appeared to be dull pasty red. On July 3 Osawa recorded a dark SEB_n (and EB) preceding the CM at 279°II and a faint SEB_n (and EB) following the CM. The SEB_s was double too preceding the CM, and a gap appeared in it following the CM. On July 3 in a letter to Sherrod I said: "I have seen little hooks off of the SEB_n, but no festoons of the kind Budine indicated earlier. These were not long lasting." On photographs taken on July 7 by Seaman in white, blue, and yellow light, there is a large SEB Z white oval just preceding the CM. Numerous indentation spots are visible as well at regular intervals from the preceding limb to the CM. On July 20 Osawa noted a brief merging of the SEB_n and the EB at 305°II, but no SEB_s. The normal double aspect was visible at 330°II, however; and a faint SEB_s was seen preceding the Red Spot, but disconnected from same. The southern component remained dark, while the northern component appeared to be fading. A faint SEB Z festoon was noticed preceding the Red Spot.

These states of activity did not appear to be taking place at all from 159° to 165°II, according to Mackal on July 29, where the SEB_n and the EB were strong preceding the CM but weak following same. No SEB_s was visible at this time. On July 30 at 269°II Osawa caught a thin SEB_s associated with the SEB Z with some festoon activity (four features); the zone was a bright white so that the presence of true white ovals (three to be exact) was uncertain. On August 4 Osawa noted a wispy SEB_s at 321°II connnected to the SEB_n at a distinct point. The Red Spot looked very dark through a blue filter, was hard to resolve in a red filter, and was dim indeed in an orange filter. Since filters tend to show the contrast and emphasize the shading of the features that stand out rather than to show pure intensity per se, I deduce the RS color to be orange-red. White, blue, and yellow frames of Jupiter by Seaman on August 9 at 302°II showed a subdued SEB_n-EB complex. In white light the belt was single, in blue light the SEB_n (southern component) stood out with a white cell on the CM, while in yellow light the false EB (northern component) became visible and the SEB_n faded. A white oval was imbedded in this belt. A photograph by Horiguchi on August 11 at 349°II showed a strong

Fig. 5

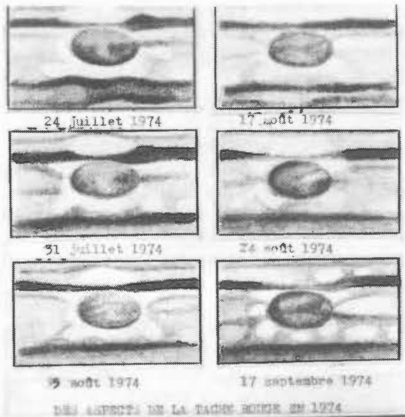


Fig. 6

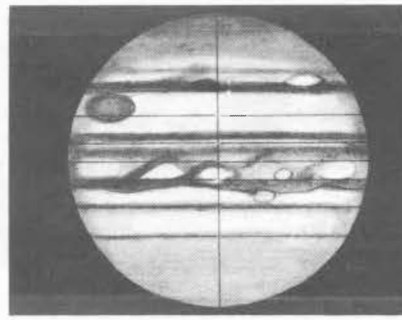


Fig. 7

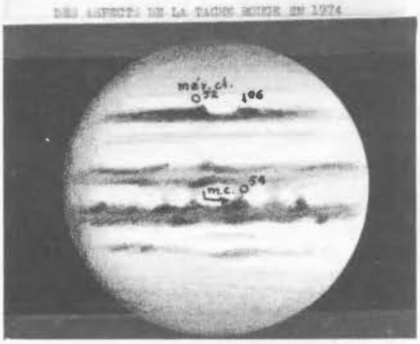


Fig. 8

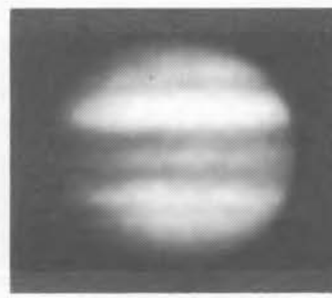


Fig. 9

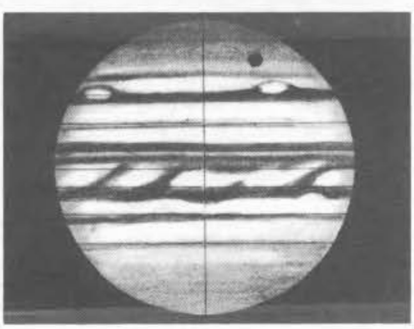


Fig. 10

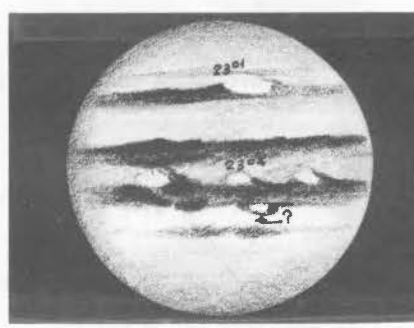


Fig. 11

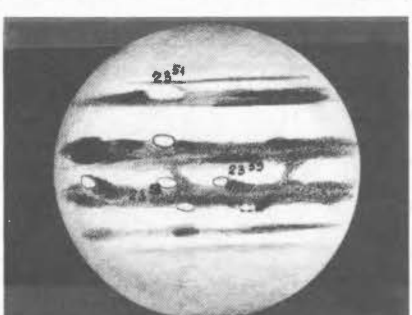


Fig. 12

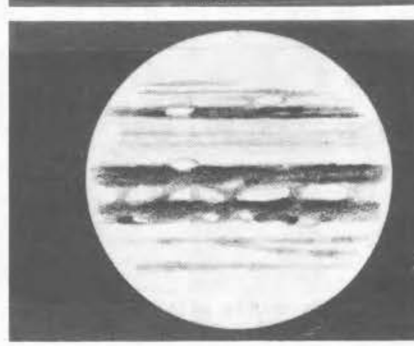


Figure 5. Strip sketches of Red Spot by M. Alexescu, 6-inch. Figure 6. Drawing by J. Dragesco on July 5, 10-inch. Figure 7. Drawing by M. Alexescu on July 7, 6-inch, 225X, 0 hrs., 49 mins., U.T. C.M.=176° (I), 263° (II). Figure 8. White light photograph by G. Seaman on July 7, 8-inch. About 9 hrs., 25 mins, U.T. C.M.=130° (I), 215°(II). Figure 9. Drawing by J. Dragesco on July 8, 10-inch, 205X. Figure 10. Drawing by M. Alexescu on July 22, 6-inch, 3 hrs., 9 mins., U.T. C.M.=110° (I), 83° (II). Figure 11. Drawing by M. Alexescu on July 22, 6-inch, 4 hrs., 2 mins., U.T. C.M.=143° (I), 115° (II). Figure 12. Drawing by M. Alexescu on July 28, 6-inch, 0 hrs., 55 mins., U.T. C.M.=257° (I), 184°(II).

band on the southern edge of a single SEB_n and the Red Spot faded on its northern and southern edges, indicating the cessation of the ringed aspect. This state of appearances was somewhat different from that recorded by Osawa, who made two drawings of the Red Spot region on August 14, one at 326°II and the next at 23°II. He showed the SEB_n composed of two components, the southern one very dark and solid and the northern one fasiculated and duller. We can only conclude that the human eye picks up subtle color contrasts which white light or black and white photography misses or color photography (full spectrum) also misses. The Red Spot was not in its ringed aspect, though it had a northern rim; and the SEB_n, SEB_s, and Red Spot were all called orange. A follow-up drawing on August 14 by Osawa at 87°II showed a large festoon issuing from the SEB_n forming the false SEB_s, a double SEB_n, and a dullish SEB Z. Another follow-up disc at 144°II showed a gently curving southern SEB_n and a greatly fragmented northern SEB_n (false EB).

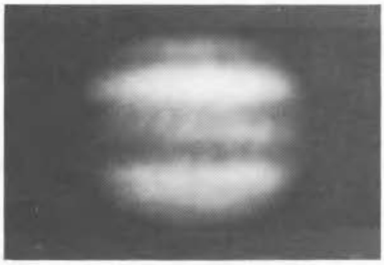
On August 24 Osawa showed a double SEB_n with a filler, a smudgy Red Spot "gray blended with orange, brown and pink," and a faded SEB Z with no sign of the SEB_s following the Red Spot! The SEB was still red-brown. At 72°II there was still no sign of the SEB_s. A blue clearing of SEB Z and the STrZ was noted by Vitous on August 25 at 177°II and on August 28 at 249°II. The Red Spot appeared faded on August 29, according to Osawa; and at 36°II the brownish SEB had lost most of its activity. The SEB_s had disappeared completely to observers using smaller apertures. The blue clearing was recorded by Vitous at 188°II on August 30, and the SEB_n was also faded at this longitude. This was indeed the beginning of the orangish cast that was to encircle Jupiter, as revealed by Pioneer #11 on November 30 and on December 1 and 2 of 1974.

Parenthetically, on September 4 Dragesco noted a dusky SEB Z (as well as EZ_s) at 225°II. This would tend to support the contention of the outbreak of an orangish EZ_s and also refute any contention of the resugence of the SEB_n or the EB in the Red Spot longitude, though the SEB Z remained a pale blue according to Olivarez, while the Red Spot itself was a vivid orange-reddish hue. This was on September 5. The blue clearing was also evident to Vitous on September 6 at 159°II. The evidence thus appears to suggest that the orange cast which completely filled the NEB Z and the EZ_s did not fill the SEB Z, but was confined to the longitude noted by Dragesco.

On September 7 Osawa noted that the Red Spot was faint but large, the RSH was still off center but not by so large an amount relative to the preceding end of the Red Spot, and the SEB_s had revived due to its issuing only from the following end of the Red Spot --at 16°II. The SEB was orange red again, while the Red Spot was brick red with a strong orange cast. On September 29 two drawings by Osawa, one at 206°II and the other at 228°II, showed the SEB_n double (or the SEB_n-EB complex), the false EB darker at 205°II, and the SEB_n (southern component) darker at 228°II. The SEB_s was visible at 228°II but not visible at 205°II (though seeing was poor at the start). There was a red-brownish gray SEB_n, south edge bluish, and two faint festoons in the SEB Z at two distinct points. On September 10 Heath showed the Red Spot with a clear outline at 30°II and called it rosy pink. There was a dark rim in blue light. The blue clearing was still visible to Vitous at 196°II on September 16 and once again consisted of the SEB Z and the STrZ. The SEB_n appeared dark brown and single, instead of warm brown and double. The preceding end of the SEB_s was still detected at 212°II on a disc made by Osawa on September 16. The SEB_n was here double, though the southern component appeared to be faded in places. The SEB was brownish. On September 17 Heath picked up a narrow line in the STrZ, which he called the SEB_s. The SEB_n is described as quite dark at 315°II. This is confirmed by Budine, at 4°II on September 17. The following end of the SEB_s was located well ahead of the Red Spot at 332°II.

Vitous showed the blue clearing on September 23 at 162°II. The SEB_n looked warmer in this longitude. Activity in the SEB_n was obvious to Doel using a 16-inch reflector on September 28 at 197°II. The belt broadened out in a following direction. The SEB_s was gray, and the zones flanking it were dull blue gray. This aspect supported the view of Vitous of a general blue clearing. Warm colors were seen in the false EB, but not in the SEB_n (southern component of the EB-SEB_n complex). On September 29 Osawa showed the SEB_n double with the southern component darker than the false EB, but not so active at 322°II. The SEB_s was not visible. A white light photograph by Seaman on September 29 at 163°II showed a bright white SEB Z and STrZ, a gray SEB_s, and a few white spots in the SEB Z at two points. The SEB_n was single and faint up to a point, darker thereafter. On September 30 Osawa showed a double aspect to the SEB_n at 151°II and no SEB_s. He noted a few wisps in the dusky zone intervening between the SEB_n and the EB. His observation is very consistent with Seaman's photograph in the same longitude. The SEB_n was called reddish brown.

Fig. 13



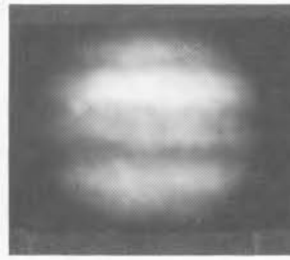
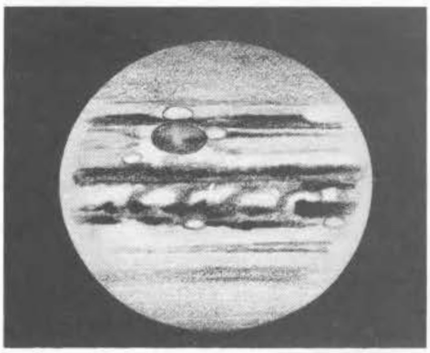


Fig. 14

Fig. 15



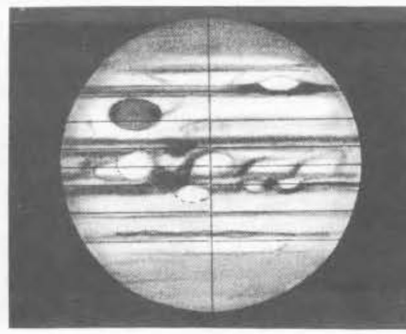
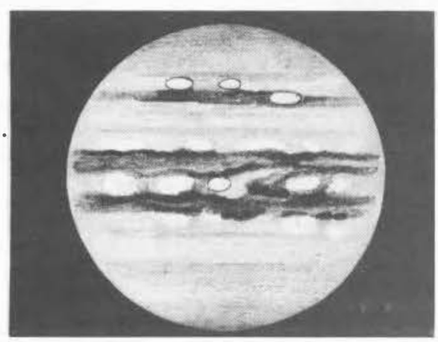


Fig. 16

Fig. 17



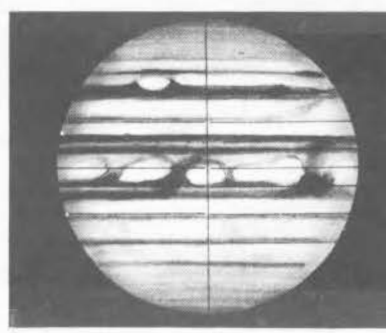


Fig. 18

Fig. 19

Fig. 20

Figure 13. White light photograph by G. Seaman on August 9. 8-inch, 11 hrs., 9 mins., U.T. C.M.=7°(I), 200° (II). Figure 14. Yellow light photograph by G. Seaman on August 9. 8-inch, 11 hrs., 18 mins., U.T. C.M.=13° (I), 205° (II). Figure 15. Drawing by M. Alexescu, August 22, 6-inch, 2 hrs., 20 mins., U.T. C.M.=299° (I), 35° (II). Figure 16. Drawing by J. Dragesco, August 22, 10-inch. Figure 17. Drawing by M. Alexescu, August 25, 6-inch, 2 hrs., 18 mins., U.T. C.M.=52° (I), 125° (II). Figure 18. Drawing by J. Dragesco, August 27, 10-inch. Figure 19. Photograph by G. Viscardy, September 14, 2 hrs., 41 mins., U.T. C.M.=347° (I), 267° (II). Figure 20. Photograph by G. Viscardy, September 15, 2 hrs., 8 mins., U.T. C.M.=124° (I), 38° (II).

On October 1 Doel made a strip sketch of the Red Spot region indicating a strong gray SEB_s at 342°II and connected to the preceding end of the Red Spot. He used the 16-inch reflector. Blue-gray festoons arched over the SEB_s from a brown-gray frame suspended in an orange southern component of the SEB_n--white ovals like semicircles interlaced the blue festoons--while a heavy active false EB, nut brown in color, lay beside a yellow zone which spilled out into the STrZ just preceding the Red Spot. The RSH was centered well but was narrow; and the Red Spot was red, orange, and yellow in color. The STrZ was blue. This blue aspect near the Red Spot was confirmed by Vitous on October 2 at 58°II. A knot in the SEB_n (southern component) was visible at 54°II. The blue clearing was again visible on October 3 at 212°II, according to Vitous. On both dates no SEB_s was seen. Again on October 3 Doel made a strip sketch with the 40-inch reflector. A spectacular backward festoon had its base located at 11°II, and it was colored pure blue. It connected the SEB_n to the SEB_s. Another blue festoon (inclined backwards) was supported by a blue bridge from the first one at 6°II. The STrZ was a pale gray blue up to the preceding end of the Red Spot and into the RSH, interlaced with yellowish tints. The RSH was bordered by blue columns and white ovals directly north of the Red Spot's northern border. The Spot was in its ringed aspect only on the following side, not on the preceding side. It was red-orange in color at this time. All this detail was also recorded on the 16-inch disc, as well.

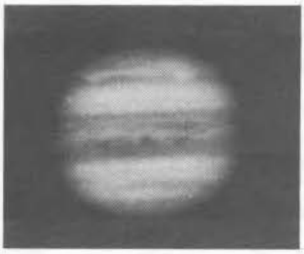
On October 5 Osawa discovered a revival of the SEB_s at 195°II, though "extremely faint", and cool colors in the SEB components. A white oval was caught in the SEB Z. At 247°II on October 5 Osawa did not record an SEB_s. The SEB_n was bland and brown. On October 6 Osawa showed the RSH normal and the SEB Z dusky with an oval in the STrZ. The SEB_s seemed a mere edge or thin line bounding the dusky SEB Z. The SEB_n was brownish gray and the EB orange. The Red Spot was brick red gray on the limb. Budine on October 6 (one revolution difference) confirmed Doel's impression. A letter of October 10 from Elmer Reese (number 771) settled the issue: "The dusky projection on the south edge of the SEB_n immediately preceding the Red Spot is bluish in color being recorded on red but not blue plates." Furthermore, "Current activity in the SEB preceding the RS is very interesting, but it does not appear to be a major disturbance. The current activity reminds me of similar activity in 1956-1958 prior to the great SEB disturbance of 1958." By October 11 and 13 Doel and Osawa recorded the activity to be subsiding in the RSH region. The blue clearing was faint at 130°II on October 17, according to Vitous; and the zones were now blue-white. On October 23 Osawa showed no SEB_s at 317°II, just as Vitous had shown none earlier at 130°II. The zone and the belt literally merged. On October 24 Osawa showed a subdued SEB_n and no SEB_s at 113°II, thereby confirming Vitous. On October 26 Vitous showed the blue clearing strong following the Red Spot at 69°II, but no SEB_s. The Red Spot was orange and was losing its reddish coloration. This was to be confirmed later by Pioneer #11 fourteen hours before the closest encounter with Jupiter on December 3. The blue RSH was also confirmed. The SEB_n appeared very fragmented to Vitous at points immediately preceding and following the CM. It is probably correct to assert that the RSH remained blue from the time it was observed by Doel with the 40-inch reflector to the time Pioneer #11 took its close encounter photographs.

On November 16 Heath captured the SEB_s again at 309°II but much fainter than it had been before. For Osawa the RS's red predominated over the orange, and the remainder appeared to him to be grayish. The SEB_s was absent, and the RSH and associated zones were not at all distinguishable.

The Pioneer #11 photograph in bi-colored light on November 30, 1974, showed an orange Red Spot with red interior remnants, a blue RSH, and white zones flanking a light pale blue SEB_s attached to the following end of the Spot. On December 1, one day later, the zones were white as well preceding the Red Spot; and no SEB_s was visible. Consequently, the orange SEB_s was visible only following the Red Spot. On December 2, fourteen hours before closest approach (5:22 UT, December 3), the RSH was blue, the Red Spot orange, and the SEB_s blue.

On December 22 Heath noted a warm tone in the SEB_n-EB complex at 231°II. On December 28 Heath described the SEB as of a brownish warm tone at 0°II. The Red Spot was rosy pink. In a red filter the Red Spot was more red (or orange) than the SEB at 355°II. The average intensity of the Red Spot was 5.2, whereas on this day it was 5.0, indicating a slight revival of red color. On January 18 Heath called the color of the SEB brown. Red (R) and blue (B) light rankings deduced from intensity estimations of the four major belts of Jupiter are provided below from the intensity report for 1974-75 supplied by Alan Heath:

Fig. 21



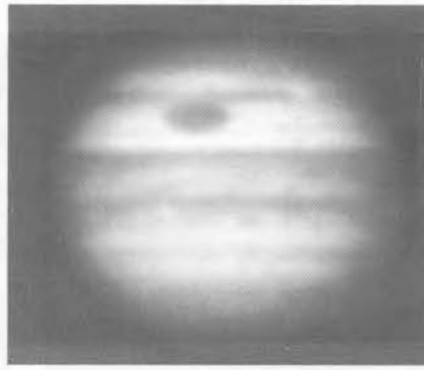
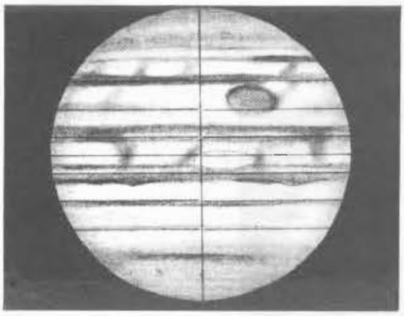


Fig. 22

Fig. 23



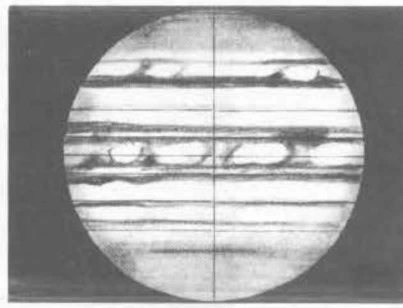
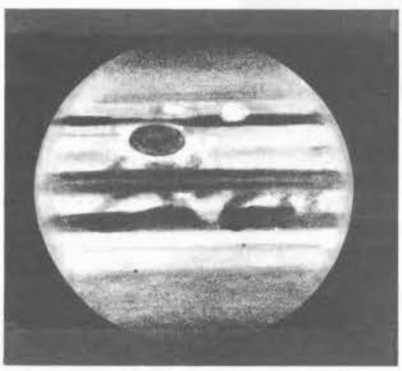


Fig. 24

Fig. 25



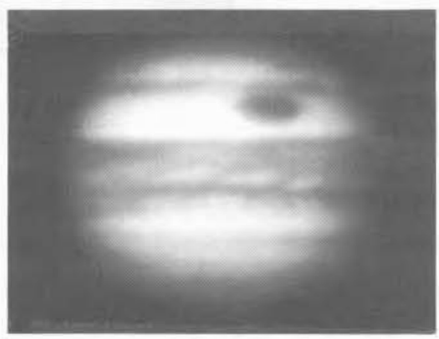


Fig. 26

Fig. 27

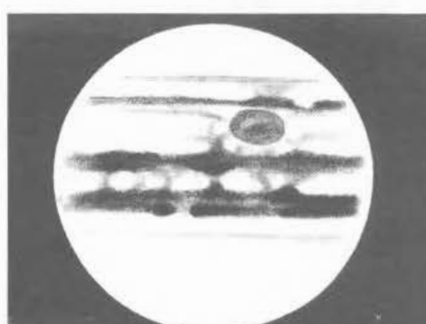
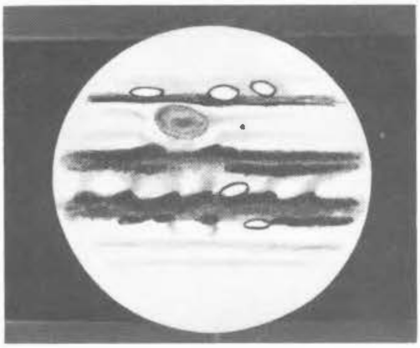


Fig. 28

Figure 21. Photograph by G. Viscardy on September 16, 2 hrs., 26 mins., U.T. C.M.=294° (I), 199° (II). Figure 22. Photograph by Richard L. Hull, September 19, 8-inch. Figure 23. Drawing by J. Dragesco on September 22, 10-inch. Figure 24. Drawing by J. Dragesco on September 28, 10-inch. Figure 25. Drawing by M. Alexescu on October 5, 6-inch, 18 hrs., 21 mins. - 18 hrs., 35 mins., U.T. C.M.=277° - 286° (I), 33°-41° (II). Figure 26. Photograph by Richard L. Hull on October 6, 8-inch. Figure 27. Drawing by M. Alexescu on October 7, 6-inch, 20 hrs., 10 mins.-20 hrs., 25 mins., U.T. C.M.=300° - 309° (I), 39°-48° (II). Figure 28. Drawing by M. Alexescu on October 12, 6-inch, 18 hrs., 27 mins.-18 hrs., 42 mins., U.T. C.M.=306° - 316° (I), 8° - 17° (II).



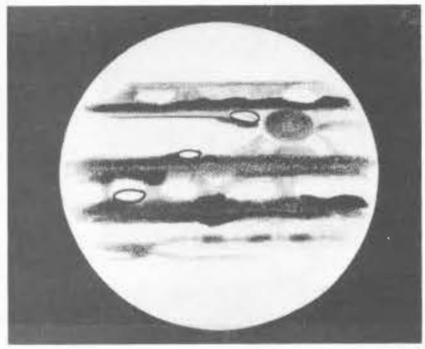


Fig. 29

Fig. 30

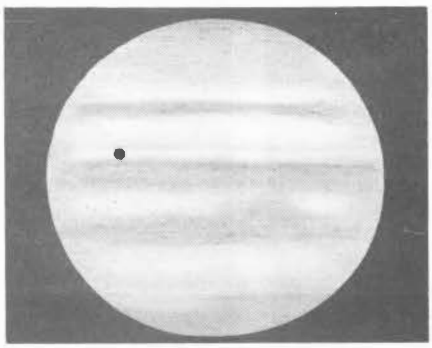


Fig. 31

Figure 29. Drawing by M. Alexescu on October 19, 6-inch, 19 hrs., 50 mins.-20 hrs., 14 mins., U.T. C.M.=22°-37° (I), 30°-45° (II). Figure 30. Drawing by M. Alexescu on November 5, 6-inch, 17 hrs., 53 mins.-18 hrs., 12 mins., U.T. C.M.=114°-126° (I), 353°-5° (II). Figure 31. Drawing by A. W. Heath, November 16, 12-inch, 0 hrs., 53 mins., U.T. C.M.=148° (I), 309° (II).

* *

	September 10			September 17			November 9			December 22			December 24		
	R	B	Rank	R	B	Rank	R	B	Rank	R	B	Rank	R	B	Rank
STB	3	5	-	4.5	5	-	4	5	-	4.5	5	-	3	5	-
SEB	3	6.5	1	4.5	7.5	1	4	7.5	1	4.5	7.5	1	4.5	7.5	1
NEB	3	6.5	1	4.5	7.5	1	4	7.5	1	4.5	7.5	1	4.5	7.5	1
NTB	2.5	-	-	-	1	-	-	-	-	4	4	-	3	4	-

	January 12			January 16			January 18		
	R	B	Rank	R	B	Rank	R	B	Rank
STB	2.5	5.5	-	4	6	-	4	5	-
SEB	4	7	1	4	7.5	1	4	7.5	1
NEB	4	7	1	4	7.5	1	4	7.5	1
NTB	4	4	-	-	-	-	2	4	-

Installment Three:

This segment of the report will deal exclusively with morphological change in the extreme Southern Hemisphere of the planet Jupiter.

On May 2 Budine called the SSTeZ yellow, the SSTB blue-gray, the STeZ yellow, and the STB red at 21°II. On May 4 Doel observed the STB to be composed of two components at 357°II and also noted a grayish SPR. On June 2 Osawa noted a dusky bridge between the STB and the SPR at 338°II. On June 6 Osawa perceived a snake-like STB at 149°II. Such a ripple effect was again evident on June 24 at 44°II. Sherrod discussed a darkening of the STB at 146°II, as of June 27, in a June 29 letter. The STeZ was bright. Bright white ovals in the STB were seen at numerous longitudes by Sherrod and Dorff. The center of one such spot was at 188°II on June 13 to 15, according to Sherrod. As of July 1 Mackal recorded the SPR as faded brown, the SSTB as brown, the STeZ as cream, and the STB as steel gray brown--at 12°II. The SSTB was strong at 279°II on a disc by Osawa on July 3. In three photographs by Seaman on July 7 in white, blue, and yellow light the STB is strongest in white and blue light, but weaker in yellow light, at about 239°II. On July 15 Sherrod discussed three small bright white ovals in the STB, one at about 90°II, one at 170°II, and a duller one located between 270°II and 300°II. On July 20 Osawa showed the STB double at 330°II. A gap in the STB was evident to Mackal on July 29, its preceding end at 160°II, with a dark intense single STB preceding and following same. No SSTB was evident in this longitude at this time. On July 30 Osawa recorded a preceding end of the SSTB at 269°II and an active south edge of the STB. This aspect was confirmed by him in August, the 3rd day, at 289°II. On August 4 Osawa showed the SSTB absent at 321°II. Quoting Sherrod: "The STB has really become alive --not only are there a bunch of white spots but the belt has grown in width and intensity. The color for the last week (first week of August) has been a very dark greyish brown--by far the darkest marking on the planet. Also, the STeZ seems to be getting a bit brighter..." though this could be regarded as artifactual. Furthermore, "the SSTB is becoming more prominent." Faint patches and active regions in the STB were recorded by photography in white light by Seaman on August 9 at 194°II. In blue light the features were more complex, and in yellow light they were hardly visible: A dusky STeZ was seen by Osawa on August 9 at 357°II and was confirmed by Horiguchi on August 11 at 349°II in a photograph. A fragmented SSTB was visible at 326°II on August 14, according to Osawa--slightly stronger at 23°II on the same date. Its preceding end was at 87°II. It was still strong at 144°II, according to Osawa. As of August 24 Osawa confirmed his own impression at 39°II and 72°II respectively. The color of the STB was dark brown-black, according to Vitous, on August 25 at 177°II and on August 28 at 249°II. The preceding end of a bridge between the SSTB and the STB was seen by Osawa on September 2 at 257°II. Three photographs by Seaman in white, blue, and yellow light showed the STB to be weak or subdued in appearance following the Red Spot. It is likely that a haze enveloped the belt at this time. On September 6 Vitous showed a strong STB at 159°II. By September 7 Osawa showed a dark STB again at 16°II--similarly on September 9 from 227°II to 229°II, preceding and following. The actual darkness of the STB was evident on photographs by R. L. Hull in the vicinity of the Red Spot on September 19. By September 28 the STB appeared double to Doel at 197°II--similarly double on September 29 at 322°II-- and on September 30 at 150°II, all according to Osawa. The belt remained single in the vicinity of the Red Spot. A haze over the STB was visible again at 59°II to Vitous on October 2. By October 3 Doel showed the haze lifted at 27°II, an aspect confirmed by Osawa on October 4 at 7°II. The SSTB was also visible on this date at 7°II. On October 5 the STB was double at 195°II, according to Osawa, but faint at 247°II. In a photograph on October 6 R. L. Hull captured a dark STB in the Red Spot region on a photograph, confirmed by Osawa at 331°II and on October 13 at 334°II. On October 17 Vitous showed a haze over the STB at 130°II. However, on October 23 and 24 Osawa showed the STB strong at 317°II and 113°II respectively. To Vitous the STB was still weak at 69°II on October 26, but strong at 214°II on October 27. Budine and Dorff did not see any haze on October 28 and November 7, at 28°II and 14°II respectively. On November 7 and 9 Vitous showed the STB faint at 114°II and 12°II respectively. On November 21 and December 15 Osawa showed the STB strong at 34°II and 287°II respectively. Pioneer #11 showed the STB dark following the Red Spot but light preceding same. A large dark oval spot in the STeZ was recorded by Pioneer #11 from November 30 through December 3, just preceding the Red Spot. It was missed by our observers. By December 21 Osawa showed the STB double at 112°II but faint, the southern component being more obvious than the northern component. At 240°II it was single, however, and also at 269°II. The SSTB was also evident. The STB_n was gone at 63°II on December 23, according to Osawa, with the STB_s still strong.

LUNA INCOGNITA IN 1977

By: John E. Westfall, A.L.P.O. Lunar Recorder

Program Summary

The A.L.P.O. Lunar Section's "Luna Incognita" Program, begun in 1972, is concerned with mapping that portion of the Moon which was not adequately photographed by the Lunar Orbiter and Apollo Missions (Refs.: JALPO, 23 (1972), 118-122, 134-136; 24 (1973), 20-22, 184-187; 25 (1974), 60-63, (1976), 227-231). "Luna Incognita" includes the lunar south polar zone (approximately 82° - 90°S) and the "marginal zone" of the (IAU) southwest limb (from latitudes 52° - 82°S, and approximately from longitude 95°W to the limits of terrestrial visibility).

During the last year, five observers have contributed a total of 30 photographs to this program.

Bruce Gardner (8-in.RR.)	4 photographs
R. W. Goodrich (8-in.RL.).	14 photographs
John S. Korintus (12 1/2-in.RL	8 photographs
Alain C. Porter (4-in.RR.)	1 photograph
John E. Westfall (10-in.RL.)	3 photographs

These photographs have been very useful in the preparation of a series of outline charts to be used for detailed visual drawings, which should be available for distribution in Spring, 1977. These charts are currently being drafted. They consist of 34 charts, covering a variety of favorable combinations of latitude and longitude librations in the "Luna Incognita" region, which has been divided into three "Map Zones":

Zone "A". . . Latitude 80° - 90°S (3 charts)
Zone "B". . . Latitude 65° - 80°S (27 charts)
Zone "C". . . Latitude 50° - 65°S (4 charts)

When these charts are completed, an announcement about their availability and use will appear in the JALPO. Meanwhile, interested ALPO observers are invited to submit to this writer photographs of "Luna Incognita" taken under favorable conditions of lighting and libration, at the dates indicated in the following observing schedule.

Luna Incognita Observing Schedule, 1977

The table below gives those dates in 1977 when at least one of the "Luna Incognita" Map Zones will be visible, with favorable lighting and libration. Zone "A" (the south polar region) is readily visible (i.e., with the South Pole tilted at least 5° toward Earth) for some period during every lunation. Because the solar altitude is always low in this area, best viewing occurs when the solar latitude is negative (south), as in May - September, 1977.

Map Zones "B" and "C" (i.e.,"beyond" the southwest limb) are less often well presented than is Zone "A" because a combination of southerly and westerly libration is needed, and also because this area is illuminated only after full phase. Zone "B" will be best presented in early November and December, 1977. Unfortunately, Zone "C" will not be well presented in 1977.

In the following table:

1. All data are for 0 hours, Universal Time (U.T.).
2. Asterisked (*) colongitudes indicate a low- to medium- Sun angle for Zone "B". (The Sun is always low for Zone "A".)
3. Latitudes are positive if north and negative if south; longitudes are positive if east and negative if west.
4. The Earth's selenographic longitude and latitude are equivalent to geocentric librations.
5. Map Zones "A", "B", and "C" are defined above.

1977 U.T. Date	Solar Colong.	Solar Lat.	Earth's Selenographic Long.	Earth's Selenographic Lat.	Map Zone(s)
JAN 13	185°	+1°5	-3°	+1°	B
14	197	1.5	-2	-1	B
15	210	1.5	-1	-3	B
16	222	1.5	0	-4	B
17	234*	1.5	+1	-5	A,B
18	246*	1.5	+3	-6	A,B
JAN 22	295°	+1°5	+6°	-5°	A

1977 U.T. Date	Solar Colong.	Solar Lat.	Earth's Selenographic Long.	Earth's Selenographic Lat.	Map Zone(s)
FEB 10	166°	+1°4	-1°	-1°	B
11	178	1.4	0	-3	B
12	190	1.4	+1	-4	B
13	202	1.3	+1	-5	A,B
14	214	1.3	+2	-6	A,B
15	227*	1.3	+3	-6	A,B
16	239*	1.3	+4	-7	A,B
MAR 10	147°	+0°9	0°	-2°	B
11	159	0.9	+2	-4	B
12	170	0.8	+3	-5	A,B
13	183	0.8	+3	-6	A,B
14	195	0.8	+4	-7	A,B
15	207	0.8	+5	-7	A,B
16	220	0.7	+5	-6	A,B
17	232*	0.7	+5	-6	A,B
18	244*	0.7	+5	-5	A,B
APR 06	115°*	+0°2	0°	-2°	B
07	128*	0.2	+1	-4	B
08	140	0.2	+3	-5	B
09	152	0.1	+4	-6	A,B
10	164	0.1	+5	-7	A,B
11	177	0.1	+6	-7	A,B
12	189	0.0	+6	-7	A,B
13	201	0.0	+6	-6	A,B
14	213	0.0	+6	-5	A,B
15	225*	0.0	+6	-4	B
MAY 04	097°*	-0°5	-1°	-3°	B
05	109*	0.6	+1	-4	B
06	122*	0.6	+3	-6	A,B
07	134*	0.6	+5	-6	A,B
08	146	0.6	+6	-7	A,B
09	158	0.7	+7	-7	A,B
10	170	0.7	+7	-6	A,B
11	183	0.7	+7	-5	A,B
12	195	0.8	+7	-4	B
13	207	0.8	+6	-3	B
JUN 02	091°	-1°2	+1°	-5°	A
03	104*	1.2	+3	-6	A,B
04	116*	1.2	+4	-7	A,B
05	128*	1.2	+6	-7	A,B
06	140	1.2	+7	-6	A,B
07	152	1.3	+8	-6	A,B
08	164	1.3	+8	-5	B
09	177	1.3	+7	-3	B
JUN 30	074°	-1°5	0°	-6°	A
JUL 01	086	1.5	+2	-6	A
02	098*	1.5	+4	-7	A,B
03	110*	1.5	+5	-6	A,B
04	122*	1.5	+7	-6	A,B
05	135*	1.5	+7	-5	B
06	147	1.5	+7	-3	B
JUL 27	044°	-1°5	-1°	-6°	A
28	056	1.5	0	-6	A
29	068	1.4	+2	-7	A
30	080	1.4	+4	-6	A
31	093	1.4	+5	-6	A
AUG 01	105*	1.4	+6	-5	B
02	117*	1.4	+6	-4	B

1977 U.T. Date	Solar Colong.	Solar Lat.	Earth's Selenographic Long.	Earth's Selenographic Lat.	Map Zone(s)
AUG 23	014°	-1°.1	-1°	-6°	A
24	026	1.1	0	-6	A
25	038	1.1	+1	-7	A
26	050	1.1	+3	-7	A
27	062	1.0	+4	-6	A
28	075	1.0	+5	-5	A
SEP 19	343°	-0°.5	0°	-5°	A
20	355	0.5	+1	-6	A
21	008	0.5	+2	-7	A
22	020	0.4	+3	-7	A
23	032	0.4	+4	-6	A
24	044	0.4	+5	-6	A
OCT 16	312°	+0°.2	0°	-5°	A
17	325	0.2	+2	-6	A
18	337	0.2	+3	-7	A
19	349	0.3	+4	-7	A
20	001	0.3	+5	-6	A
21	013	0.4	+6	-6	A
NOV 09	244°*	+0°.8	-6°	0°	B
NOV 13	293°	+0°.9	+1°	-6°	A
14	306	0.9	+3	-6	A
15	318	0.9	+4	-7	A
16	330	1.0	+6	-6	A
17	342	1.0	+7	-6	A
DEC 06	213°	+1°.3	-7°	0°	B
07	225*	1.3	-7	-1	B
08	237*	1.3	-6	-3	B
09	249*	1.4	-4	-4	B
DEC 13	298°	+1°.4	+4°	-6°	A
14	310	1.4	+6	-6	A
15	323	1.4	+7	-5	A

THE PLANET VENUS: A SUMMARY OF FIVE MORNING APPARITIONS, 1967-1974

By: Julius L. Benton, Jr., A.L.P.O. Venus Recorder

Introduction

The report which is presented within these pages covers the five morning apparitions (western elongations) of the planet Venus listed below:[1]

Inferior Conjunction	1967	Aug. 29	1969	Apr. 8	1970	Nov. 10
Greatest Brilliancy		Oct. 6 (-4.0)		May 14 (-4.2)		Dec. 16 (-4.4)
Greatest Elong. West		Nov. 9 (46°)		June 17 (45°)	1971	Jan. 20 (47°)
Superior Conjunction	1968	June 20	1970	Jan. 24		Aug. 27

Inferior Conjunction	1972	June 17	1974	Jan. 23
Greatest Brilliancy		July 24 (-4.2)		Feb. 27 (-4.3)
Greatest Elong. West		Aug. 27 (45°)		Apr. 4 (46°)
Superior Conjunction	1973	Apr. 9		Nov. 6

Because of the extremely small number of useable observations which were received during any one of the observing seasons above, it has been necessary to combine the submitted data for the present report. The distribution of observations by apparition might be of interest to the reader:

Apparition	Observations
1967 Aug. 29 - 1968 June 20	21
1969 Apr. 8 - 1970 Jan. 24	8
1970 Nov. 10 - 1971 Aug. 27	10
1972 June 17 - 1973 Apr. 9	30
1974 Jan. 23 - 1974 Nov. 6	20
Total:	89

Out of the 89 observations received, only about 30 were useable. This problem was due to a number of circumstances: (1) proper observing forms were not employed by observers; (2) data accompanying observations were incomplete; (3) several observers lacked experience. Emphasis in coming Venus apparitions must be placed upon the use of proper observing forms and upon submitting all of the necessary data available, and inexperienced individuals will be asked to enroll in the A.L.P.O. Training Program or to rely on the assistance of the Recorder throughout the observing period.

The following twenty-one persons should be recognized as having contributed observations of Venus during the 1967-1974 period:

Observer	Location	Number of Observations	Instrumentation
1. Barnhart, Steven	Chillicothe, Ohio	4	7" (17.5 cm.) Reflector
2. Böhme, Dietmar	Nessa, Netherlands	5	6" (15 cm.) Reflector
3. Capen, Charles F.	Wrightwood, California	4	6" (15 cm.) Reflector & 16" (40 cm.) Reflector
4. Cross, Eugene	Las Cruces, New Mexico	2	6" (15 cm.) Refractor
5. Delano, Kenneth J.	Taunton, Massachusetts	1	12 1/2" (31 cm.) Reflector
6. Eppert, Chet	Philadelphia, Pennsylvania	1	3" (7.6 cm.) Refractor
7. Haas, Walter H.	Las Cruces, New Mexico	1	12 1/2" (31 cm.) Reflector
8. Hanford, Jon	Reynoldsburg, Ohio	1	8" (20 cm.) Reflector
9. Heath, Alan W.	Nottingham, England	11	12" (30 cm.) Reflector
10. Hill, Ricky	Greensboro, North Carolina	3	6" (15 cm.) Reflector
11. Jones, Ben	Rising Fawn, Georgia	2	2.4" (6 cm.) Refractor
12. Keel, Billy	Nashville, Tennessee	3	6" (15 cm.) Reflector
13. Krisciunas, Kevin	Naperville, Illinois	13	6" (15 cm.) Reflector
14. Lima, Roy	Jacksonville, Florida	1	8" (20 cm.) Reflector
15. Manning, George K.	Bronx, New York	3	3.5" (9 cm.) Catadioptric
16. Otis, Mike	Aberdeen, South Dakota	5	8" (20 cm.) Reflector
17. Papp, Janos	Budapest, Hungary	1	6" (15 cm.) Reflector
18. Porter, Alain	Narragansett, Rhode Island	18	6" (15 cm.) Reflector
19. Senour, Martin	Cleveland, Ohio	2	10" (25 cm.) Refractor
20. Simmons, Karl	Tucson, Arizona	7	21" (53 cm.) Reflector
21. Thiede, Eric	Madison, Wisconsin	1	16" (40 cm.) Reflector

The writer would like warmly to thank all of the above mentioned individuals for their continued active participation and support in the various observing programs of the A.L.P.O. Venus Section during the years indicated. His only regret is that the useable submitted data were so scarce. Persons are hereby strongly urged to undertake observing programs during future morning apparitions of Venus, periods which have been severely neglected in past years, as is clearly shown by this report.

Visual Observations of Surface Details

Examination of the data for the morning apparitions covered by this report reveals that the elusive markings depicted on drawings can be roughly placed into the five categories outlined in an earlier Venus Section report.[2] Most of the surface markings were amorphous dusky shadings, very often seen near the terminator and continuous with the suspected terminator shading. No ultraviolet photographs were submitted during the apparitions mentioned; also, few observations were sent in which were based upon visual colorimetric techniques (i.e., ones in which color filter techniques were employed).

The illustrations accompanying this report (Figures 32 and 33) should suffice to represent some of the more typical features seen on the apparent surface of Venus.

Cusps, Cusp-Caps, Cusp-Bands, and Extended Cusps

With perhaps only one or two exceptions, both the northern and southern cusps appeared similar in brightness and morphology during the apparitions in question. Few instances were noted in which the cusp-caps could actually be described as prominent. Most reports showed that the often-observed cusp extensions were not apparent; several reports indicated a bright limb band extending from cusp to cusp, and the presence of this limb band appeared to coincide with the visibility of dusky features on Venus. Cusp-extensions, of course, are noteworthy only when Venus is a narrow crescent.

Terminator Irregularities

Indentations or so-called "bumps" along the otherwise geometrically regular terminator were infrequently detected during the morning apparitions in 1967-1974. Contrast effects are often the cause of such anomalies, as was evidenced in a previous report.[2]

Ashen Light

No observations of the controversial Ashen Light, or any other dark hemisphere illumination, were received during the periods discussed in this report.

Phase and Dichotomy Estimates

The theoretical dates of dichotomy for the morning apparitions of Venus in 1967-1974 are presented below. Also, observational estimates of dichotomy are included, credit being given to specific observers as it applies:

Apparition	Dichotomy: Theoretical	Dichotomy: Observations	Discrepancy
1967 Aug. 29- 1968 June 20	1967 Nov. 7	1967 Nov. 13*a (Capen)	6^d late
1969 Apr. 8- 1970 Jan. 24	1969 June 18	(No observations this apparition)	
1970 Nov. 10- 1971 Aug. 27	1971 Jan. 20	1971 Feb. 02 (Heath)	13^dlate
1972 June 17- 1973 Apr. 9	1972 Aug. 26	1972 Aug. 31*b (BAA)	5^d late[3]
1974 Jan. 23- 1974 Nov. 6	1974 Apr. 5	1974 Apr. 6*c (BAA)	1^d late[4]

Notes:

*a Terminator was straight using the Wratten 25 (red) and Watten 106 (orange) filters; terminator was either concave or convex at other wavelengths.

*b From Journal of the British Astronomical Association, 1973, 83, 6, p. 449 (Robinson). Terminator straight with W15 (yellow) filter.

*c From Journal of the British Astronomical Association, 1975, 85, 3, p. 268 (Robinson). Unusual discrepancy of one day noteworthy.

The difference between the dates of theoretical and observed dichotomy has been named the Schroeter Effect, and its value frequently amounts to about four to ten days. Most of the figures above are within this range, but the last entry is unusual.[4]

Concluding Remarks

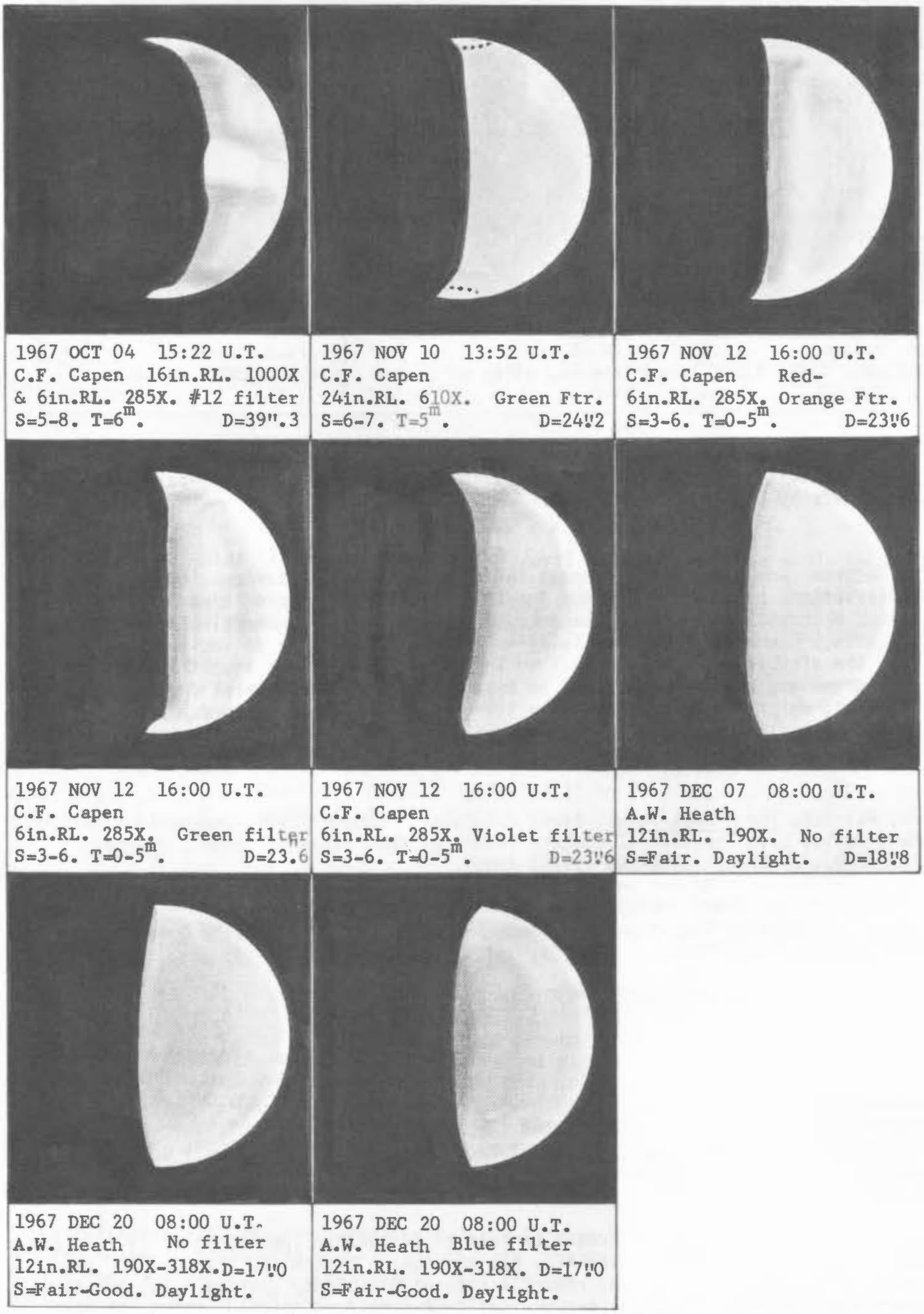
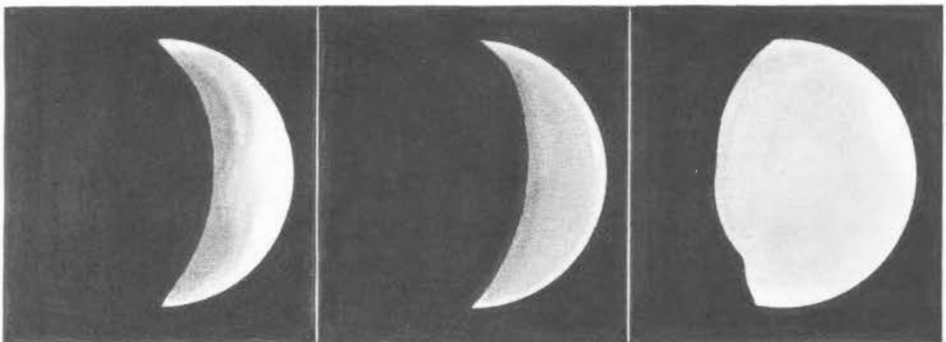


Figure 32. Selected A.L.P.O. Drawings of Venus during the 1967 morning apparition. See also text of Dr. Julius Benton's Venus Report. Copied and prepared for publication here by Dr. John E. Westfall. S is the seeing on a scale of zero(worst) to ten (perfect). T is the estimated dark-sky limiting stellar magnitude. D is the apparent angular diameter of Venus.



1969 MAY 17 17:20 U.T. K.J. Delano 12½in.RL. 150X. #15 filter S=4. T=8/10. D=36".4	1970 DEC 24 08:15 U.T. A.W. Heath 12in.RL. 318X. No filter S=Good. D=36".0	1974 JUN 08 03:00 U.T. J. Papp 6in.RL. 260X. No filter S=7. T=5. D=14".3

Figure 33. Selected A.L.P.O. Drawings of Venus during morning apparitions in 1969-1974. See also text of Dr. Julius Benton's Venus Report. Copied and prepared for publication here by Dr. John E. Westfall.

* * * * * * * * * * * * * * *

The Recorder would like to encourage individuals to take a serious interest in making observations of the planet Venus for both morning and evening apparitions. Simultaneous observations of Venus, because of the controversial and elusive nature of apparent surface phenomena, are especially valuable. Photography at various wavelengths of the visible spectrum, as well as in the ultraviolet, is sought. Venus observing programs are outlined in detail in a pamphlet which accompanies the "Venus Observing Kit", which can be obtained by writing the author. The Recorder stands ready to assist individuals in planning and executing their research programs: regular correspondence is welcomed.

References

1. Moore, Patrick, The Planet Venus, Faber and Faber: London (1959, Second Edition.)
2. Benton, Julius L., "The 1971-72 Eastern (Evening) Apparition of Venus", Journal of the A.L.P.O., 25 (7-8): 151-160 (1975, June).
3. Robinson, J. Hedley, "Report on the Elongation of Venus, 1972 August", Journal of the B.A.A., 83 (6): 449 (1973).
4. Robinson, J. Hedley, "Report on the Elongation of Venus, 1974 April", Journal of the B.A.A., 85 (3): 268 (1975).

SATURN CENTRAL MERIDIAN EPHEMERIS: 1977

By: John E. Westfall

The two tables on pages 156 and 157 give the longitude of Saturn's geocentric central meridian (C.M.) for the illuminated (apparent) disk for 0^h U.T. for each day in 1977. These tables are a continuation of those for 1969-76, previously published in the JALPO, and incorporate corrections for phase, light-time, and the Saturnicentric longitude of the Earth.

"System I" assumes a sidereal rotation rate of 844°.00/day (period = $10^h\ 14^m\ 13^s.1$), intended for use with features in the NEB, EZ, and SEB. "System II", intended for the rest of the ball, assumes a sidereal rotation rate of 812°.00/day (period = $10^h\ 38^m\ 25^s.4$). These rates are only approximations because latitude-dependent rotation rates are more uncertain than, say, for Jupiter; but longitudes calculated from the following tables should give conveniently small drift rates for most features. A.L.P.O. Saturn observers are urged to make central meridian timings, combined with latitude measures (or at least estimates) whenever possible, so that these rotation rates, and any future C.M. tables, can be made more accurate.

To find the central meridian at any time, find the 0^h U.T. central meridian for the appropriate data and system, and then add the hours and minutes corrections from the related table, "Motion of the Central Meridian," as shown in the example below:

Example: A festoon in the EZ transits the central meridian at $07^h\ 23^m$ on February 7, 1977 U.T. (the EZ is in System I).

System I C.M. at 0^h U.T., 7 FEB 1977	321°2
+ Motion of System I C.M. in : 07^h	246.2
20^m	011.7
03^m	001.8
System I C.M. at $07^h\ 23^m$, 7 FEB 1977 U.T.	580°9
	-360.0
	220°9 (221°).

Note that, if the calculated longitude exceeds 360°, one subtracts 360°. Also, in general, it is more realistic to round calculated longitudes to the nearest whole degree.

OBSERVING THE PARTIAL LUNAR ECLIPSE OF APRIL 4, 1977

By: John E. Westfall, A.L.P.O. Lunar Recorder

Particulars

The partial lunar eclipse on the night of April 3-4* 1977, will be well-timed for observers throughout the United States. The northern limb of the Moon will be covered by the Earth's umbral shadow, with an eclipse magnitude of 0.198 (magnitude 1.000 or greater is total). The Universal and Local Standard Times of eclipse events are as follows:

	U.T.	EST	CST	MST	PST
Moon enters Penumbra	02:05.0	21:05.0	20:05.0	19:05.0	18:05.0
Moon enters Umbra	03:30.2	22:30.2	21:30.2	20:30.2	19:30.2
Middle of the Eclipse	04:18.2	23:18.2	22:18.2	21:18.2	20:18.2
Moon leaves Umbra	05:06.4	00:06.4	23:06.4	22:06.4	21:06.4
Moon leaves Penumbra	06:31.5	01:31.5	00:31.5	23:31.5	22:31.5
			April 4	April 3	
			1977		

The position angles of contacts of the umbra with the limb of the Moon are:

First Contact = 44°E of N (P.A. = 044°).
Last Contact = 9°W of N (P.A. = 351°).

Suggested Types of Observations

All too frequently, amateur observers neglect partial lunar eclipses, feeling that they are uninteresting events compared to the more spectacular total eclipses. Actually, many types of useful observations can be made during partial lunar eclipses. Interested observers may obtain an "A.L.P.O. Lunar Eclipse Observation Form" from this writer to help them record their observations. Observing reports should then be forwarded to Prof. Walter H. Haas, except for umbral contact timings, which should be sent to: Sky and Telescope, 49-50-51 Bay State Road, Cambridge, Mass. 02138.

Particular types of observations which can be made are listed below; the parenthetical notes indicate what form of optical aid is suitable, where "N" = naked eye, "B" = binoculars, and "T" = a telescope. All timings should be made to a tenth of a minute (telephone time messages should be this accurate). Also, note the intrument(s) and magnification(s) used, seeing, transparency, and your observing location.

1. Penumbra.
   a. Time, and note the position on the Moon's limb of, the first and last visible penumbral shading (N,B,T).
   b. Note variations of tone and color within the penumbra, aided by sketches if possible (N,B,T). It should be noted that, although this is a partial umbral eclipse, the entire Moon will be covered by the penumbra. Although not all the

(text continued on page 159)

* The eclipse occurs on the night of April 3-4 by local civil time in the United States.

SATURN, 1977

LONGITUDE OF CENTRAL MERIDIAN OF ILLUMINATED DISK

SYSTEM I -- 0^h U.T.

Day	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	49.9	296.7	170.2	53.6	171.0	50.9	166.3	185.8	67.4	183.5	62.4	177.6
2	174.0	60.8	294.2	177.6	294.9	174.7	290.2	309.7	191.3	307.3	186.3	301.4
3	298.0	184.9	58.2	301.5	58.8	298.6	54.0	73.7	315.2	71.2	310.1	65.3
4	62.1	308.9	182.2	65.5	182.7	62.4	177.9	197.6	79.1	195.0	73.9	189.2
5	186.2	73.0	306.3	189.4	306.6	186.3	301.7	321.6	203.0	318.9	197.7	313.0
6	310.3	197.1	70.3	313.3	70.4	310.1	65.6	85.5	326.8	82.7	321.6	76.9
7	74.4	321.2	194.3	77.3	194.3	74.0	189.4	209.4	90.7	206.6	85.4	200.7
8	198.5	85.2	318.3	201.2	318.2	197.8	313.3	333.4	214.6	330.4	209.3	324.6
9	322.6	209.3	82.3	325.1	82.1	321.7	77.1	97.3	338.5	94.2	333.1	88.5
10	86.7	333.4	206.3	89.1	205.9	85.5	201.0	221.3	102.4	218.1	96.9	212.3
11	210.8	97.4	330.3	213.0	329.8	209.4	324.8	345.2	226.2	341.9	220.8	336.2
12	334.9	221.5	94.3	336.9	93.7	333.2	88.7	109.1	350.1	105.8	344.6	100.1
13	99.0	345.5	218.3	100.8	217.5	97.1	212.5	233.1	114.0	229.6	108.4	223.9
14	223.1	109.6	342.3	224.7	341.4	220.9	336.4	357.0	237.9	353.4	232.3	347.8
15	347.2	233.7	106.2	348.7	105.3	344.8	100.2	120.9	361.7	117.3	356.1	111.7
16	111.3	357.7	230.2	112.6	229.1	108.6	224.1	244.8	125.6	241.1	119.9	235.6
17	235.4	121.8	354.2	236.5	353.0	232.5	332.8	8.8	249.5	4.9	243.8	359.5
18	359.5	245.8	118.2	0.4	116.9	356.3	81.4	132.7	13.3	128.8	7.6	123.3
19	123.6	9.9	242.2	124.3	240.7	120.2	190.1	256.6	137.2	252.6	131.5	247.2
20	247.7	133.9	6.1	248.2	4.6	244.0	298.8	20.5	261.1	16.4	255.3	11.1
21	11.8	257.9	130.1	12.1	128.5	7.9	112.6	144.4	24.9	140.3	19.1	135.0
22	135.9	22.0	254.1	136.0	252.3	131.7	286.4	268.4	148.8	264.1	143.0	258.9
23	259.9	146.0	18.1	259.9	16.2	255.5	100.2	32.3	272.7	27.9	266.8	22.8
24	24.0	270.0	142.0	23.8	140.0	19.4	274.1	156.2	36.5	151.8	30.7	146.7
25	148.1	34.1	266.0	147.7	263.9	143.2	38.0	280.1	160.4	275.6	154.5	270.6
26	272.2	158.1	29.9	271.6	27.8	267.1	162.0	44.0	284.2	39.4	278.3	34.5
27	36.3	282.1	153.9	35.5	151.6	30.9	286.0	167.9	48.1	163.3	42.2	158.4
28	160.4	46.2	277.8	159.4	275.5	154.8	49.9	291.8	171.9	287.1	166.0	282.3
29	48.5		165.8	47.1	163.2	42.5	297.8	179.6	59.6	174.8	53.7	170.1
30	172.6		289.7	171.0	287.0	166.3	61.8	303.5	183.5	298.6	177.6	294.0
31	296.7		53.6		50.9		185.8	67.4		62.4		57.9

MOTION OF THE CENTRAL MERIDIAN

01^h -- 035°.2	09^h -- 316°.5	17^h -- 237°.8	10^m -- 005°.9	01^m -- 000°.6
02 -- 070.3	10 -- 351.7	18 -- 273.0	20 -- 011.7	02 -- 001.2
03 -- 105.5	11 -- 026.8	19 -- 308.2	30 -- 017.6	03 -- 001.8
04 -- 140.7	12 -- 062.0	20 -- 343.3	40 -- 023.4	04 -- 002.3
05 -- 175.8	13 -- 097.2	21 -- 018.5	50 -- 029.3	05 -- 002.9
06 -- 211.0	14 -- 132.3	22 -- 053.7		06 -- 003.5
07 -- 246.2	15 -- 167.5	23 -- 088.8		07 -- 004.1
08 -- 281.3	16 -- 202.7	24 -- 124.0		08 -- 004.7
				09 -- 005.3

Figure 34. C.M. of Saturn in System I in 1977. See also text of article "Saturn Central Meridian Ephemeris: 1977" on pages 154 and 155.

SATURN, 1977

LONGITUDE OF CENTRAL MERIDIAN OF ILLUMINATED DISK

SYSTEM II -- 0^h U.T.

Day	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	145.7	120.5	178.0	149.6	27.0	355.0	230.5	336.4	306.1	182.3	149.3	24.5
2	237.8	212.6	270.1	241.5	118.9	86.8	322.3	68.3	38.0	274.1	241.1	116.3
3	329.9	304.7	2.1	333.4	210.8	178.7	54.2	160.3	129.9	6.0	332.9	208.2
4	62.0	36.8	94.1	65.4	302.7	270.5	146.0	252.2	221.8	97.8	64.8	300.0
5	154.1	128.8	186.1	157.3	34.6	2.4	237.9	344.2	313.7	189.7	156.6	31.9
6	246.2	220.9	278.1	249.3	126.4	94.2	329.7	76.1	45.6	281.5	248.4	123.7
7	338.3	313.0	10.1	341.2	218.3	186.1	61.6	168.1	137.4	13.3	340.3	215.6
8	70.4	45.1	102.1	73.1	310.2	277.9	153.4	260.0	229.3	105.2	72.1	307.5
9	162.5	137.1	194.1	165.1	42.1	9.8	245.3	352.0	321.2	197.0	163.9	39.3
10	254.6	229.2	286.1	257.0	134.0	101.6	337.1	83.9	53.1	288.9	255.8	131.2
11	346.7	321.2	18.1	348.9	225.8	193.5	69.0	175.8	145.0	20.7	347.6	223.1
12	78.8	53.3	110.1	80.8	317.7	285.3	160.8	267.8	236.8	112.6	79.4	314.9
13	170.8	145.4	202.1	172.8	49.6	17.2	252.7	359.7	328.7	204.4	171.3	46.8
14	262.9	237.4	294.1	264.7	141.5	109.0	344.6	91.6	60.6	296.2	263.1	138.7
15	355.0	329.5	26.1	356.6	233.3	200.9	76.4	183.6	152.5	28.1	354.9	230.6
16	87.1	61.5	118.1	88.5	325.2	292.7	168.3	275.5	244.3	119.9	86.8	322.4
17	179.2	153.6	210.1	180.4	57.1	24.6	246.3	7.4	336.2	211.8	178.6	54.3
18	271.3	245.6	302.1	272.3	148.9	116.4	324.4	99.4	68.1	303.6	270.5	146.2
19	3.4	337.7	34.0	4.2	240.8	208.3	42.4	191.3	160.0	35.4	2.3	238.1
20	95.5	69.7	126.0	96.2	332.7	300.1	120.5	283.2	251.8	127.3	94.1	330.0
21	187.6	161.8	218.0	188.1	64.5	32.0	260.5	15.1	343.7	219.1	186.0	61.9
22	279.7	253.8	310.0	280.0	156.4	123.8	40.6	107.0	75.5	310.9	277.8	153.8
23	11.8	345.9	41.9	11.9	248.2	215.7	180.6	198.9	167.4	42.8	9.7	245.6
24	103.9	77.9	133.9	103.8	340.1	307.5	320.7	290.9	259.3	134.6	101.5	337.5
25	196.0	169.9	225.9	195.7	72.0	39.4	52.6	22.8	351.1	226.4	193.4	69.4
26	288.0	262.0	317.8	287.6	163.8	131.2	144.6	114.7	83.0	318.3	285.2	161.3
27	20.1	354.0	49.8	19.5	255.7	223.1	236.6	206.6	174.8	50.1	17.1	253.2
28	112.2	86.0	141.7	111.4	347.5	314.9	328.5	298.5	266.7	141.9	108.9	345.1
29	296.4		325.7	295.1	171.3	138.6	152.5	122.3	90.4	325.6	292.6	169.0
30	28.5		57.6	27.0	263.1	230.5	244.4	214.2	182.3	57.4	24.5	260.9
31	120.5		149.6		355.0		336.4	306.1		149.3		352.8

MOTION OF THE CENTRAL MERIDIAN

01^h -- 033°.8	09^h -- 304°.5	17^h -- 215°.2	10^m -- 005°.6	01^m -- 000°.6
02 -- 067.7	10 -- 338.3	18 -- 249.0	20 -- 011.3	02 -- 001.1
03 -- 101.5	11 -- 012.7	19 -- 282.8	30 -- 016.9	03 -- 001.7
04 -- 135.3	12 -- 046.0	20 -- 316.7	40 -- 022.6	04 -- 002.3
05 -- 169.2	13 -- 079.8	21 -- 350.5	50 -- 028.2	05 -- 002.8
06 -- 203.0	14 -- 113.7	22 -- 024.3		06 -- 003.4
07 -- 236.8	15 -- 147.5	23 -- 058.2		07 -- 003.9
08 -- 270.7	16 -- 181.3	24 -- 092.0		08 -- 004.5
				09 -- 005.1

Figure 35. C.M. of Saturn in System II in 1977. See also text of article "Saturn Central Meridian Ephemeris: 1977" on pages 154 and 155.

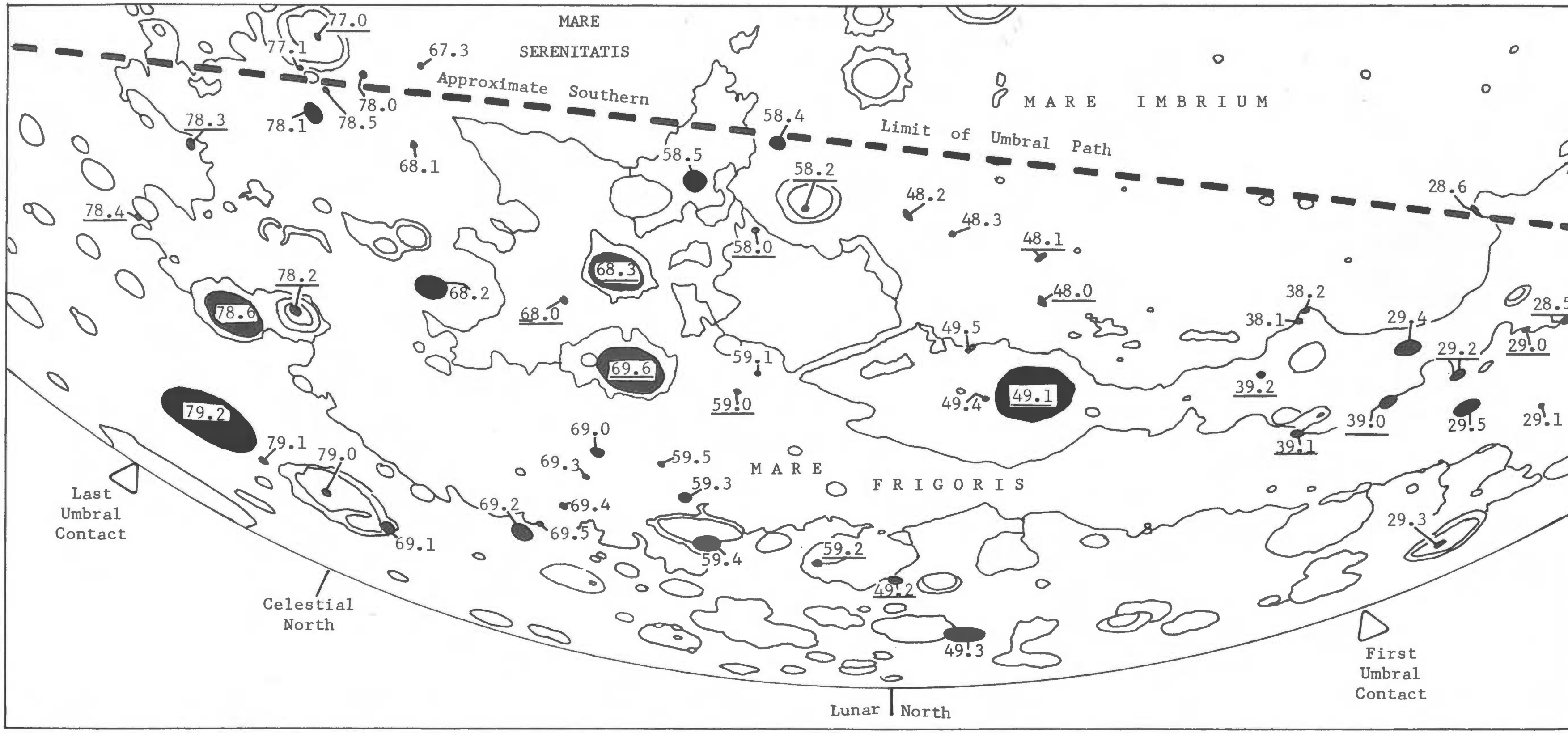


Figure 36. Schematic chart of northern limb of Moon during partial eclipse of April 3/4, 1977, showing, in black, features which may be used for umbral contact timings. Identification numbers refer to the table in the text, following the system used by S.M. Kozik; underlined numbers refer to those features easiest to identify. The dashed line is the approximate southern limit of the path of the umbra, disregarding enlargement. South is at the top.

(text continued from page 155)

penumbra will be visible, note its maximum discernible extent (N,B,T).

2. Umbra.

a. Appearance.--

(i) Edge-- Note the sharpness or diffuseness (i.e., apparent width) of the umbral edge, along with possible colors (B,T).

(ii) Interior-- Note (and, if possible, sketch) the brightness and color of the umbral interior, along with any changes with location or time (N,B,T).

b. Contact Timings.--

(i) Limb--Time, and note the position of, the first and last umbral limb contacts (B,T).

(ii) Lunar Features (T, use 60X or greater)--The accurate timing of umbral contacts with specific lunar features is the most useful form of observation for this eclipse because it allows the degree of enlargement of the Earth's shadow to be calculated (this varies for each eclipse). When possible, time both umbral immersion and emersion, and, for larger features (e.g., Plato), time both the first and the last immersion and emersion contacts (for small features, time when the shadow edge crosses the feature's center).

Because the umbra will cross only the north portion of the Moon, only three of the usually-timed features (Plato, Aristoteles, and Eudoxus) will be affected. However, there are actually a large number of other features which may also be used--so many that the observer should select those which he can most readily identify. Before the eclipse (if necessary, on the previous evening), the observer should acquaint himself with the location and appearance of these features. His list of timings should then be attached to page 3 of the "ALPO Lunar Eclipse Observation Form" and should be sent to Sky and Telescope. The following section lists the lunar features which may be timed for umbral contacts during the forthcoming eclipse, and includes an identification chart.

Features Usable for Umbral Timings

The table below lists those features, given by S. M. Kozik in his Table and Schematic Chart of Selected Lunar Objects (Oxford: Pergamon Press, 1961) which should contact the umbra during the partial eclipse of April 3/4, 1977. These features are shown on the accompanying chart (Figure 36). The numerical identifications are those used by Kozik, and underlined numbers indicate those features easiest to identify. The parenthetical descriptions are: (bc), bright crater; (cm), crater with central mountain; (dc), dark cirque; (ds), dark, irregular spot; (mg), mountain group; and (mt), mountain. Other notes follow the table.

No.	Name and Description	No.	Name and Description
28.5	Sharp B (bc)	59.2	W.C. Bond B (bc)
28.6	Heraclides Prom. (mg)	59.3	Sheepshanks (bc)
29.0	Sharp A (bc)	59.4	Christian Mayer (bc)
29.1	Harpalus E (bc)	59.5	Sheepshanks C (bc)
29.2	Foucault (bc)	67.3	Luther (bc)
29.3	Pythagoras α (cm)	68.0	Eudoxus A (bc)
29.4	Bianchini - - - - -	68.1	Daniell D (bc)
29.5	Harpalus - - - - -	68.2	Bürg - - - - - -
38.1	Laplace D (bc)	68.3	Eudoxus - - - -
38.2	Laplace α Prom. (mt)	69.0	Galle (bc)
39.0	Bouger (bc)	69.1	Thales (bc)
39.1	Condamine A (bc)	69.2	Democritus (bc)
39.2	Maupertius A (bc)	69.3	Galle C (bc)
48.0	Pico (mg)	69.4	Democritus B (bc)
48.1	Pico β (mg)	69.5	Democritus A (bc)
48.2	Piton (mg)	69.6	Aristoteles - -
48.3	Piazzi Smyth (bc)	77.0	Posidonius A (bc)
49.1	Plato (dc)	77.1	Posidonius B (bc)
49.2	Epigenes A (bc)	78.0	Posidonius P (bc)
49.3	Anaxagoras (bc)	78.1	Daniell (dc)
49.4	Plato G (bc)	78.2	Hercules G (bc)
49.5	Plato J (bc)	78.3	Maury (bc)

No.	Name and Description	No.	Name and Description
58.0	Cassini C (bc)	78.4	Cepheus A (bc)
58.2	Cassini A (bc)	78.5	Posidonius M (bc)
58.4	Thaetetus	78.6	Atlas - - - - - -
58.5	Calippus - - -	79.0	De la Rue J (bc)
59.0	Egede A (bc)	79.1	Endymion G (bc)
59.1	Egede B (bc)	79.2	Endymion (ds)

NOTES

38.2 The brightest point on the cape of Laplace.
48.1 Coördinates of the mountain in the middle of three mountains which form a ridge.
49.3 Surrounded by rays.
59.4 Coördinates of the "center of gravity" of the bright figure of the crater with a short ray.
69.1 Surrounded by rays.
77.0 Bright internal crater near the center of Posidonius.
77.1 On the terrace of Posidonius.
78.2 A bright crater situated eccentrically at the dark bottom of Hercules.
78.4 A bright crater on the terrace of Cepheus.
(Notes and descriptions are taken from Kozik op cit.)

BOOK REVIEWS

Astronomical Calendar 1977, by Guy Ottewell. Department of Physics, Furman University, Greenville, South Carolina 29613. 59 pages, paperbound. Price $4.95. Quantity discount available.

Reviewed by J. Russell Smith

This is the fourth year for the publication of this Astronomical Calendar. The format is 11" by 15", which gives sufficient room for a large sky map plus a Solar System diagram for each month of the year. The page facing the map lists the principal astronomical events for the month. This section is followed by 12 pages of text, which includes the following topics: "Overview of Astronomy", "Position", "Time", "Constellations","Star Designations", "Ecliptic", "Zodiac", "Precession", "Magnitudes", "Elongations", "Sun", "Tides", "Young Moon", "Jupiter's Satellites", "Comets", "Meteors", "Brightest Stars", "Some Events of the Preceding Year", and "Space Exploration in 1977", which is followed By a "Corkscrew Diagram of Jupiter's Satellites" for each month of the year.

The next section gives a map of cloudiness for the U.S. for each month of the year. This is followed by charts giving the positions and movements of the planets, the principal asteroids, and comets for the year. The final two pages is an excellent glossary of about 120 words.

This reviewer believes you will have to see this calendar truly to appreciate its value as an aid to your astronomical endeavors.

* *

Atlas of the Planets, by Vincent de Callatay and Audouin Dollfus. University of Toronto Press, 1974 (English translation), 152 pages. Price $15.00.

Reviewed by James W. Young, A.L.P.O. Remote Planets Recorder

In astronomical atlases there tends to be a great deal of redundancy between book selections. Authors of planetary atlases have such a great wealth of material at their disposal that duplication should really be at a minimum. With this text, unusual and different material is displayed for the reader to enjoy and to absorb. Advanced planetary-minded amateurs will find new and exciting tables, illustrations, and unique drawings which will enhance any library. The authors of this work have found data this reviewer has seldom seen presented elsewhere. As many of our readers have found and will experience, lectures and teaching assignments can and will be greatly improved by referring to and using ideas gathered from this atlas.

The most rewarding aspect of this volume is the abundant use of historical drawings, illustrations, and photographs. The earliest days with the crude telescopes to the large modern planetary observatories such as the Pic du Midi have been historically reviewed in Part I in order to set the stage for understanding the full impact planetary research advances have had on modern views.

After setting of these historical views, Part II deals with modern astronomy and offers a concise discussion of the fundamental principles of planetary science. This section prepares the reader for the majority of the atlas material in Part III; namely, 9 chapters dealing with each principal planet, minus the Earth but plus a small chapter devoted to the asteroids.

Each of the planetary chapters is fully illustrated with a diversity of drawings, tables, and photographs, many of which have seldom been used in other modern texts or similar works. The illustrations allow the mind fully to realize points usually difficult for the layman to comprehend. In all chapters special emphasis is given to planetary surface detail and its importance to the study of atmospheric composition of the outer planets.

Detailed drawings of surface features are used throughout all chapters, except with the asteroids, and, of course, Pluto. Many fine renderings of surface markings and contrast variations are shown of the four Galilean satellites as well as Titan of Saturn. The chapter on Mars offers an abundant usage of old and modern drawings and maps. Some of the early Mariner IV photographs enhance this chapter's ability to provide comparisons between ground-based observations and those of a satellite encounter.

Although this work is not as up-to-date (translation and republish time loss) as some might like, it will greatly enlighten the planetary enthusiast and will strengthen his backgound in planetary astronomy.

* *

A.L.P.O. Jupiter Observer's Manual, edited by Phillip Budine and Ron Doel. Available from Mr. Phillip Budine, Box 68A, R.D. 3, Walton, NY 13856. 1976. 34 pages, Paperbound, Price $2.00.

Reviewed by Richard L. Hull, A.L.P.O. Jupiter Staff

This manual is aimed at the beginning Jupiter observer or at anyone wishing to see what is involved in the study of the Giant Planet. The manual assumes that the reader has little or no prior knowledge of the planet, and it takes him from an introduction to the A.L.P.O. Jupiter Section through the study of complex Jovian eruptions in easy orderly steps. The manual is fully illustrated where illustrations are needed the most. A disc of Jupiter, with a key to the names of all the major belts and zones, is one of the first illustrations which prepares the reader for the discussion throughout the booklet.

Ron Doel's excellent article on making disc drawings is a great boon to those who think that one must be an artist in order to make disc drawings. Ron begins by putting the reader at ease on the subject, and then he tells what one needs to complete the disc and the stages in which detail should be recorded.

Phillip Budine follows Ron's article and tells us that the discs are of little value unless good transit timings accompany them. Mr. Budine gives the methods used in transit timings as well as the full nomenclature of features often seen on Jupiter to describe what we are observing and how to abbreviate the names of the features.

There are sections outlining what kinds of work are usually done on Jupiter and the scope of each, such as Jovian color recording and photography. In addition to disc drawing and transits, the strip sketch which allows the observer to keep track of changes in local regions of Jupiter without whole disc drawings, is emphasized.

Actual examples of drawings and transits are presented in finished form to serve as a guide to the novice observer. Many of the drawings are actual submissions by various Jupiter Section members and reflect the kind of work the Section needs and expects to further its goals in recording the activities of the Giant Planet.

A section on Jovian eruptions, with drawings showing what to expect, prepares the beginner with prior knowledge of what to look for in the way of "news flash" happenings on Jupiter and their significance to the section.

A final section by Mr. Paul Mackal explains the goals of the Jupiter Section of the A.L.P.O. in the 1970's. In this article Mr. Mackal presents the problems and scope of investigations by amateurs in this decade and closes with a breakdown of what the two Recorders in the Jupiter Section are responsible for, and to which one certain forms of data are to be forwarded.

* *

1976 Jupiter Handbook Supplement, edited by Paul K. Mackal. Available from Paul K. Mackal, 7014 West Mequon Rd., 112 North, Mequon, Wisconsin 53092. 78 pages.

Mimeographed. Price $2.00 for A.L.P.O. members, $2.25 for non-members.

Reviewed by Rodger W. Gordon

The 1976 Jupiter Handbook Supplement is divided into ten topics by six different authors. All of them are well-known members of the A.L.P.O. Jupiter Section. A wealth of information is contained in the Supplement which should be of interest and use to all Jupiter Section members and planetary observers in general.

Observing Jupiter With a Six-Inch Reflector, by Paul Mackal, gives much useful information on the relationship of seeing to magnification. There are also several graphs showing the relationship of seeing versus time of year and seeing versus smallest resolvable detail, which should be of potential help to any observer.

How to Pick Up and Draw Fine Detail of Jovian Markings, by Toshihiko Osawa, is a short section; but it contains a wealth of information for the beginning observer. The importance of several observations of the markings you are attempting to draw can not be over-emphasized, and Osawa conveys his point very well. However, he should have pointed out that faint detail on Jupiter is often easier to see if the image is allowed to drift at right angles to the line of sight (belts at 90° drift to the eye) instead of parallel to the normal east-west drift. No mention is made of the use of filters, which can also accentuate faint detail. Oscillating your line of sight all over the disc is recommended for picking up fine detail. The same effect can be gotten by tapping the telescope and following the resulting oscillations. Some observers are now using a stereo eyepiece arrangement, but this is not mentioned. Reports indicate that fine detail is more readily picked up when observing with two eyes, and doing so is less tiring.

The Use of Color Photos as a Guide for Disc Drawings, by Joseph Vitous, gives an excellent method of producing colored disc drawings by first making a color photograph. Mr. Vitous has pioneered the field of color disc drawings, and those who have seen his drawings know the accomplishment of his careful technique. Not counting the extra time necessary, the results are interesting and useful.

High Resolution Planetary Photography and Negative Enhancement, by Gary Seaman, covers the basic systems of astronomical photography of small images and the necessity of matching the proper film to the E.F.L. of the instrument and object to be photographed, development of film, and enhancement of detail on negatives by various films and developers. Gary is careful to point out that no method of enhancement can show details which have not originally been captured on the negative.

Observer Reliablility and Validity of Observations of Same, by Paul Mackal, attempts to point out the criteria to become an observer whose observations can be used with a high degree of reliability. In this article the application of the telescope to the seeing conditions at hand, which affects the reliability of the overall observations, is given a good treatment. The relationship of effective diameter of the telescope and its relation to the seeing is graphically shown. The reviewer believes observer reliability should also include the reliability of his equipment.

The Analysis of Jovian Color Filter Intensity Data, by Paul Mackal, correlates the A.L.P.O. intensity scale with the B.A.A. scale. A brief treatment of the reasons for employing filters is given, and contrast effects compared to the wavelength of light are evaluated and are compared with black and white. Tables of correlation of the ranks of Jovian belts are given.

Trend and Correlational Analysis of Jovian Ranks, by Paul Mackal, analyzes the random and non-random time trends in the ranks of Jovian belts. However, this treatment does not appear to show any non-random trends. The analysis here is based on observations by Walter Haas in 1972. Since the work is based on the results of only one observer, it might be worthwhile for other observers to test the observations to see if the same conclusion holds true.

Belt Disturbances and the Nature of Jovian Markings, by Wynn Wacker, discusses the history and morphology of the SEB Disturbances over the years with possible explanations as to cause. The serious consequences of observed colors in the Jovian markings compared to the inadequacy of current theories to explain all of them in a satisfactory way is well documented. A very thorough analysis of the leading theories is given, and the results are interpreted according to the data at hand. The interactions of the various belts are given a thorough but somewhat simplified treatment. The possible periodicity of Disturbance phenomena appears well established, even if, as shown in the paper, many of the phenomena show little trend to a definite periodicity over short intervals.

An Update on SEB Disturbance Analysis, by Ron Doel, describes the great Triple Disturbance of 1975. This was a feature unique in the history of Jupiter observations. The effect this Disturbance had on Jupiter is still going on, and it has affected the planet almost totally. Ron presents a chronological sequence of events of the 1975 Disturbances and their relation to past Disturbances. He also attempts to explain the SEB Disturbances, their colorations, and their interaction with other phenomena.

Tables to Assist Computation of Jovian Shadow Transit Times, by Walter H. Haas, gives the formula as well as the table for determining the time of a satellite's shadow transit over the Jovian central meridian. The reviewer suggests that one pay no attention to the method described in the October, 1975, issue of Astronomy magazine, which is correct only around opposition and fails to consider phase angle.

Briefly, the 1976 Jupiter Handbook Supplement is an excellent work; and the Jupiter observer will find much to interest him. One should definitely have a copy of An Advanced Observer's Handbook for Amateur Jupiter Observers to use with the 1976 Jupiter Handbook Supplement. It is the same price as the Supplement.

* *

Poetic Potentials In Information of Astronomy, by Ernest Robson. Primary Press, Dufour Editions, Chester Springs, PA 19425. 1976. 10 pages, paperback. Price $1.25.

Reviewed by Phillip W. Budine

Mr. Robson does an excellent and truly unique service in presenting information revealed about astronomy through the media of poetry.

The author states that there are three kinds of astronomical information which at least are compatible with, and at best augment, the information of poetry. First, astronomy is dimensionally the most universal of sciences because its macroscopic events shape and limit the boundaries of our universe. A second compatibility between the information of poetry and astronomy is the visual prominences of the night sky. The radiances, the colors, and the uncountable variations in pattern yield the rich associative potentials upon which the imagination feeds. Thirdly, telescopes of 10" to 12" aperture, now being used by amateurs, increase the number of observable events in the night sky by the ratio of the square of the diameter of the pupil of the eye (1/5") to the square of the diameter of the telescope (12") or 1/25:144. Astronomy is one of the few sciences that can drastically increase the visual information of so many persons.

Astronomical information is noted in poetry and writings by Walt Whitman, Titus Lucretius Carus, Marianne Moore, Shakespeare, Robert Clairemont, Morris Bishop, Robert Frost, and others.

Here, I believe, one fine example of the poetry used in Mr. Robson's publication will give the reader an idea of the type of writings explored: Elizabeth Coatworth's poem on the "The Pleiades":

"Sweet as violets in a weary heart,
Haunting as the lovely names in old tales,
Beloved as a man's own fields, are the Pleiades.
Why is one star loved and not another?
What magic is there in this little cluster
To hold the spirit from generation to generation?"

Mr. Robson also gives some splendid examples of astronomical poetry of his own design. To summarize, Ernie states: "Availability of enlarged visual preceptions for many, universality resulting from its limits on our boundaries of space-time, the mystery of unpredictability in an open universe as well as the splendor and complexity of its physical systems give the information of astronomy its poetic potential."

This publication is of an unusual nature and deals with the relationship of astronomy in poetry- a subject not dealt with by previous authors. Even if the reader is not seriously interested in poetry, this little collection of writings is a necessary addition to complete your astronomical library.

* *

The Spacecraft Revolution: A Sociological Study, by William Sims Bainbridge. John Wiley and Sons; New York, NY, 1976. 294 pages. Price $16.95.

Reviewed by Bruce M. Frank

The causes of revolutions have been the subject of lengthy speculation for interested laymen and scholars since the nineteenth century. However, most of this speculation concerns political or social upheaval. Little attention has been given in the past to revolutions of a technological and scientific nature with the notable exception of Thomas S. Kuhn (The Copernican Revolution). William Bainbridge, in The Spacecraft Revolution: A Sociological Study, takes a Kuhnian approach to explore the reasons for the rapid growth of programs for space exploration. Mankind has spent more than 100 billion dollars, says Dr. Bainbridge, without a clear purpose in doing so. His major premise is that the speacecraft movement was founded by a handful of fanatic supporters in several countries. Men such as Wernher von Braun and Robert Goddard are seen by Dr. Bainbridge as shrewdly manipulating public opinion to gain financial backing for their rocket development projects. While these projects were really geared as first steps toward manned spaceflight, their writings stressed the rocket's potential as a military weapon in order to gain necessary funding.

It was this soft sell of space exploration with the hard sell of military prowess which led major political figures such as Hitler and Stalin to underwrite these projects leading to the initial triumphs of the movement. Rocket societies, science fiction clubs, and prominent authors associated with the movement, e.g., Arthur C. Clarke, provided the ongoing impetus when public and governmental interest in space research declined in the late 1940's- early 1950's. The ultimate success of the movement was, of course, the development of extensive U.S. and Soviet space programs in the 1960's culminating in manned exploration of the Moon.

In the last section of the book, Dr. Bainbridge discusses non-spacecraft attempts to explore space by focusing on current attempts by astronomers to contact extraterrestrial civilizations via radio telescopes.

What is the ultimate benefit of the spacecraft revolution? Dr. Bainbridge says that it is too early to tell. However, as with all successful revolutions, a lasting influence on our social institutions as well as on our perceptions of mankind's place in the Universe is predicted.

Anyone interested in a unique theory to explain one of Man's greatest technological achievements will find The Spacecraft Revolution a welcome addition to his or her library.

* *

NEW BOOK RECEIVED

By: Bruce M. Frank

Collected Works of Sir Harold Jeffreys; Volume 5, by Sir Harold Jeffreys and Bertha Swirles Jeffreys, Gordon and Breach, New York, NY, 493 pages. Price $46.00.

This volume, in the six volume series, contains Sir Harold Jeffreys' principal writings on the geophysical aspects of astronomy. The major focus of the papers is the processes resulting in the formation of our Solar System. Also included are papers outlining his theories as to the composition of the outer planets, as well as stellar evolution. The text requires extensive knowledge of mathematics to be fully understood. Nevertheless, reviewing the speculations of one of the foremost scientists of our time should prove worthwhile to anyone interested in theoretical astronomy.

A SIMULTANEOUS OBSERVING PROGRAM FOR THE PLANET SATURN: SOME PRELIMINARY REMARKS

By: Julius L. Benton, Jr., A.L.P.O. Saturn Recorder

Abstract. The subjective nature of visual observations of the finer detail on a planet makes it difficult to decide what features are real and what ones are not. Planned simultaneous observations can shed light on this problem. A program of simultaneous drawings, color observations, latitude estimates, photographs, and other observations of Saturn is being organized for the 1977-78 apparition. Interested observers are invited to correspond with the Recorder for details about how to participate.

For the better part of a decade, this writer has been the Saturn Recorder of the A.L.P.O.; and over the years he has been confronted with a recurrent problem when attempts have been made to assemble and suitably to analyze the observational material for a given apparition. Specifically, it has been virtually impossible to ascertain whether the detail shown on individual drawings of Saturn has been genuine or fictional in nature; and these uncertainties have quite naturally affected the significance of the final apparition reports to a considerable degree. Yet, there is no implication intended here to discourage our dedicated colleagues from submitting their individual observations of Saturn, nor is there any suggestion forthcoming that such observations are essentially useless to the scientific community. It is clear that most of our participating observers have honestly and painstakingly attempted to depict on drawings what was seen through their telescopes on the planet's apparent surface, but many of these individuals have been faced with identical decisions while executing drawings as those the Recorder has encountered when reducing the data; that is, what details truly exist on Saturn, and which features are illusions? in general, such questions cannot be answered conclusively by a single observer nor by the analyst, mainly because most of the fine detail on Saturn is very near the visual threshold and the resolution limit of the instrument employed. Thus, the content of apparition reports must in part be generalities rather than specific remarks concerning fine structures within Saturnian belts, zones, and ring components.

Examination of previous apparition reports in this Journal will reveal few instances in which simultaneous observations were made, and those which did emerge in the course of the data analysis were purely fortuitous. The writer suggests; indeed urges, here the initiation of a rigorous and long-term simultaneous observing program for Saturn, much in keeping with the objectives of a similar endeavor by Chapman years ago.[1] If one reads the results of the Chapman program, it will become clear that the outcome of the undertaking was promising, even though the program was discontinued for lack of observer interest over a long-term period.[2,3]

Simultaneous observations are extremely important in visual endeavors, and this writer considers them vital to the success of our efforts in planetary observation. As the reader is probably aware, there is a high incidence of subjectivity inherent in individual observational reports, even though the person carrying out the observations may be a seasoned observer with exceptional ability. Confirmational reports by a team of experienced observers will help increase the objectivity of the data, while proving to be interesting and educational in scope at the same time. Ultimately, our apparition reports will rest on firmer foundations when the accumulated data are evaluated and are presented to the scientific community.

The simultaneous observing program for Saturn intended here will consist of efforts by individuals who have at least some experience in drawing the planet and in attempting visual numerical relative intensity estimates using the A.L.P.O. scale. The prerequisite experience will insure familiarization with the observing techniques and methods of the Saturn Section. Potential participants in the program should have thoroughly studied the Saturn Handbook and the various observing programs of the Section as well.[4] Especially beneficial in a systematic, simultaneous program of observation would be the utilization of a spectrum of instrumental types and apertures, although the optical quality of such equipment should be excellent (the optics should also be clean and aligned properly).

So, once the fundamental experience is realized, and upon complete acquaintance with the Saturn observing program, the prospective participant should obtain from the Recorder a list of observing dates and times for the simultaneous effort. These lists will be published monthly and sent to interested observers, those who show a sincere desire to follow through with the program. The simultaneous effort will take place first with respect to drawing Saturn on the standardized blanks for various numerical values of B. Note that B is the planetocentric latitude of the Earth referred to the ring plane, and it can be found for the date in question in an appropriate ephemeris. Following simultaneous drawings, the observer should attempt intensity estimates of the features visible on the globe of the planet and in the rings. Note that drawings initially should be made in integrated light, following up under the same conditions with intensity estimates. Absolute color estimates must be made in integrated light as well, taking care to utilize the appropriate reference standard established by the Section.[4] Once the primary work has been done, supplementary observations with different filters (all observers should ideally have the same sets of filters) may proceed, including investigations of the bicolored aspect of the rings (an area in great need of simultaneous study), latitude estimates (visual by the Haas technique), etc. Satellite magnitude estimates might become a part of the program, although when suitable comparison stars are used for magnitude work the results are less subjective than are other endeavors.

Observers who specialize in photographic work on Saturn might carry out programs in conjunction with the simultaneous visual studies. Confirmatory photographs to match visual drawings would be extremely valuable. Photographic work might be done at visual and other wavelengths for comparison purposes, and these could ultimately be used to yield latitudes if the resolution is suitable.

Once observations are made for a given month, the results should be mailed to the Recorder promptly for preliminary analysis and comment. It is advised that copies of drawings be made with the utmost care, since they are primarily what our comparisons will deal with. A meaningful way to reproduce drawings is to do so by photographic methods. Photocopies are useful, however, if only they represent the drawing resolution and contrast properly.

Plans call for the beginning of the simultaneous observing program at the opening of the 1977-78 apparition of Saturn, in the autumn of this year. The time interval between now and then will allow preparations to be made for all aspects of the endeavor, and interested individuals should write the Recorder regarding their intentions. The success of the program will naturally depend on the response of our observers, and it is hoped that enough seriously interested persons will join with us to allow meaningful conclusions. More information on the simultaneous program will appear in this Journal as plans develop for 1977-78.

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AMERICAN AND ITALIAN OBSERVATIONS OF SATURN IN 1974-1975: SOME COMPARATIVE NOTES

By: Julius L. Benton, Jr., A.L.P.O. Saturn Recorder

Introduction

The present report is an attempt to offer some brief comparative remarks concerning visual and photographic investigations of the planet Saturn during the 1974-75 apparition by A.L.P.O. observers and members of the Neapolitan Astro-Amateur Group in Naples, Italy. For a complete appreciation of the material presented here, it is strongly recommended that readers consult the apparition reports which appeared in previous issues of this Journal.[1,2]

American observers employed a variety of instrumental types ranging from 3.5" (9.0 cm.) to 18.5" (47.0 cm.) in aperture, while those in the Naples group utilized principally reflectors of 8" (20.0 cm.) aperture. In addition, our Italian colleagures employed a 23.5" (60.0 cm.) reflector for photographic programs at the Swedish Astrophysical Station of Anacapri (Naples). Although there are only 178 visual observations of Saturn by the Naples group, the total number of intensity, color, and latitude estimates (and measurements) far exceed in quantity those made by observers in this country. (We should perhaps mention that one of the "American" observers was actually in England.)

Both reports covered the same period in which Saturn was visible to observers, although it is apparent that observations by our foreign associates began earlier than they did in this country.

Comparative Notes on the Globe and Rings

Looking over the intensity estimates made visually by members of the A.L.P.O. and the Neapolitan Astro-Amateur Group, the writer decided, for comparison purposes, to include only those global and ring features common to both apparition reports. Further, because the visual numerical intensity scales are quite different, and due to the fact that the methods of data reduction also differed between the two reports, the common features have been listed in Table I in order from the brightest to the darkest intensity, along with accompanying absolute color estimates.

Some very interesting similarities exist between the two listings based upon the order of intensity alone, as an examination of Table I will reveal. First, the outer portion of Ring B was consistently the brightest feature of Saturn in both listings, followed by the inner portion of Ring B and the EZ (Equatorial Zone). Note that the latter two are reversed in the two columns, but they nonetheless were brighter than the remaining features in the lists. The inner and outer portions of Ring A in the two columns are reversed in order of conspicuousness, and it is obvious that American observers recorded these two ring areas as being brighter than our Italian friends saw them. An apparent discrepancy exists between the visual intensity estimates of the SSTeB and the SPR in the two compilations, and one should notice also that the conspicuousness of the SEB_s versus the SEB_n is reversed. Examination of the data shows little difference between the intensities of the SEB_s and the SEB_n according to Italian observers, while A.L.P.O. data reveal a considerably brighter SEB_s in comparison to the SEB_n. Aside from these variations between the American and Italian intensity values, it is noteworthy to observe that the two scales of relative numerical intensity correspond exactly with regard to the order of the remaining features.

Attesting to the fact that absolute color estimates are highly subjective, there is but little correlation between the colors of Saturn's belts, zones, and ring components in the two reports.

TABLE I

Relative Numerical Intensity of Mutually Recorded Saturnian Belts, Zones, and Ring Features by American and Italian Observers in 1974-75

The following scales of relative numerical intensity are based upon visual numerical intensity estimates carried out by members of the A.L.P.O. and the Neapolitan Astro-Amateur Group, including absolute color estimates. The order of the listings runs from the brightest features to the darkest features on the planet's globe and rings (based upon the average numerical estimates).

(A.L.P.O. Data) Saturnian Feature and Color		(Naples Data) Saturnian Feature and Color	
Ring B (outer)	white	Ring B (outer)	---
Ring B (inner)	dull white	EZ	pink
EZ	cream to dull white	Ring B (inner)	---
Ring A (outer)	greyish-white	STeZ	yellow pink
Ring A (inner)	greyish-white	SSTeB	---
STeZ	yellowish-grey	SEB Z (IZ)	---
SPR	brownish-grey	Ring A (inner)	bluish-green
SEB Z	yellow	STeB	indefinite
STeB	brownish-grey	Ring A (outer)	bluish-green
EB	brownish-grey	EB	---
SSTeB	brownish-grey	SEB_n	dark reddish
SEB_s	brownish-grey	SEB_s	---
SEB_n	brownish-grey	SPR	greenish
Crape Band	grey	Crape Band	---
Ring C (off Globe)	very dark grey	Ring C (off Globe)	violet
B10 (Cassini's)	very dark grey to black	Cassini's	---
Shadow Globe on Rings	black	Shadow Globe on Rings	---

Further scrutiny of Table I, including examination of the two apparition reports,[1,2] shows that observers in both countries described similar features on Saturn. There were, however, some phenomena seen by one group of observers and missed by the other, although this fact is not surprising.

Photographs at visual wavelengths were taken by both American and Italian investigators, including a number of infrared exposures by the Naples group. Of particular interest in our comparative study is the occurrence of a pair of photographs of Saturn made close together in time. The first of these appears on page 92 (Figure 6) of the A.L.P.O. report, a photograph taken on 1975, January 16 by a Mr. Ron Price using a 12.0" (30.0 cm.) reflector.[1] It may be compared to a photograph taken by the Naples group on 1975, January 15 employing a 23.5" (60.0 cm.) reflector and a W9 (yellow) filter, as shown on page 9 (Figure 5) of the Italian report (see also Figures 6, 7, and 8 on page 10).[2] Note that superimposing techniques were employed by the Naples observers in order to obtain better images, while the A.L.P.O. photograph was obtained in a far less sophisticated manner. In addition to the photographic investigations, our Italian colleagues used microdensitometric techniques to generate photometric profiles of the major and minor axes of the ring system in three different spectral ranges (see Figure 9 on page 11 of the Naples report).[2] Comparative notes are presented in reference to a similar systematic investigation of Saturn by the Neapolitan Astro-Amateur Group, which relates the photometric findings in 1974-75 to those obtained in 1973-74.[3]

Latitudes of Saturnian belt edges are presented in tabular form in both observational reports. In the A.L.P.O. study, eccentric (mean), planetocentric, and planetographic latitudes are listed, obtained by the visual technique developed by Haas[4]; and the results are based upon the work of only one individual. The values for Saturn's features presented in the Naples report are planetocentric latitudes obtained by visual methods and by measurement of photographs in three wavelengths, including the infrared. There is poor agreement between the numerical data of both reports (see Table I on page 12 of the Italian report and Table II on page 91 of the A.L.P.O. report[1,2]). The Naples data are taken from some 600 observations, although it is impossible to ascertain from the report what methods were employed for the acquisition of the visual information for computation of latitudes.

Both the A.L.P.O. and Italian reports lacked investigations of Saturn's satellites. This is an area of great neglect, it appears, in places other than the United States.

No mention of the bicolored aspect of the ring system could be found in the Italian report.

Conclusions

It is hoped that future coöperation between the Neapolitan Astro-Amateur Group and the A.L.P.O. can be stimulated, for it appears that a certain level of continuity exists between observing techniques and the way in which the features on Saturn are described. Of course, there are differences with respect to the scales for estimating visual numerical intensities of Saturn's main features; but such variations are not much different from those which are encountered frequently by the A.L.P.O. from Great Britain (from the British Astronomical Association). Our Italian colleagues have added a degree of sophistication to their investigations of Saturn, including statistical treatment of the accumulated data; and it would be meaningful if American observers could follow this example. In recent years, A.L.P.O. observers have shown a moderate trend in this direction; and better systematic observations (and an increased number of such observations) have fortunately yielded more statistically sound data. This writer would like to see an eventual uniformity of observing techniques among organizations like the B.A.A., the A.L.P.O., and the Neapolitan Astro-Amateur Group; but even though differences exist, it is worthwhile to determine what groups of individuals working independently of one another can come up with. The present report, hopefully, illuminates some of the mutually significant information about Saturn.

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PERIODIC COMET GRIGG-SKJELLERUP: NOTES AND AN EPHEMERIS

Mr. Dennis Milon calls attention to this comet, which was discovered by Grigg in 1902 and was rediscovered by Skjellerup in 1922. It will make an unusually close approach to the Earth in 1977, being only 0.18 Astronomical Units distant on April 2. The stellar magnitude may reasonably be expected to become as bright as 9 or 10 for a short time. The best way to make magnitude estimates will hence be to use comparison stars on AAVSO charts.

The emphemeris on page 169 is taken from an article by G. Sitarski in Acta Astronomica, Vol. 26 (1976), No. 3. It rests upon two observations in 1966 and four in 1972, an improvement of the time of perihelion passage and the perihelion distance, and the integration of the equations of the comet's motion including the perturbations caused by all the planets from Mercury to Pluto.

The large negative declination of Comet Grigg-Skjellerup will strongly favor Southern Hemishpere observers throughout March and early April. Effective international coöperation thus becomes critical to adequate observational coverage. At closest approach on April 2 the comet will lie in the southern constellation of Telescopium.

* *

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Sustaining Members and Sponsors. The persons listed below support the work of the A.L.P.O. by paying higher dues, $30 for Sponsors and $15 for Sustaining Members for a volume of six issues. Their generous assistance has been, and is, of great value.

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Ephemeris of Periodic Comet Grigg-Skjellerup during its close approach to the Earth in 1977. Dates are by Ephemeris Time, 0 hrs. The right ascension and declination are relative to the epoch 1950.

DATE	RIGHT ASCENSION	DECLINATION
1977, Feb. 26	$10^h25^m.9$	-62° 8'
27	10 29.2	-62 59
28	10 32.9	-63 51
Mar. 1	10 37.0	-64 44
2	10 41.5	-65 38
3	10 46.6	-66 32
4	10 52.4	-67 28
5	10 59.0	-68 24
6	11 6.4	-69 20
7	11 14.9	-70 18
8	11 24.7	-71 15
9	11 36.9	-72 12
10	11 49.7	-73 7
11	12 4.4	-74 1
12	12 22.2	-74 52
13	12 43.8	-75 39
14	13 7.0	-76 19
15	13 34.3	-76 51
16	14 4.8	-77 10
17	14 37.8	-77 16
18	15 12.0	-77 4
19	15 45.9	-76 35
20	16 18.2	-75 47
21	16 47.8	-74 41
22	17 14.1	-73 19
23	17 37.1	-71 42
24	17 57.0	-69 51
25	18 14.1	-67 49
26	18 28.9	-65 36
27	18 41.6	-63 14
28	18 52.6	-60 44
29	19 2.2	-58 6
30	19 10.7	-55 23
31	19 18.2	-52 36
Apr. 1	19 24.8	-49 44
2	19 30.7	-46 50
3	19 36.0	-43 55

DATE	RIGHT ASCENSION	DECLINATION
1977, Apr. 4	$19^h40^m.8$	-40° 59'
5	19 45.2	-38 4
6	19 49.2	-35 11
7	19 52.9	-32 20
8	19 56.3	-29 33
9	19 59.4	-26 49
10	20 2.3	-24 11
11	20 5.1	-21 37
12	20 7.5	-19 9
13	20 9.9	-16 46
14	20 12.1	-14 28
15	20 14.2	-12 17
16	20 16.2	-10 11
17	20 18.1	- 8 11
18	20 19.8	- 6 16
19	20 21.5	- 4 27
20	20 23.1	- 2 42
21	20 24.6	- 1 3
22	20 26.1	+ 0 32
23	20 27.5	+ 2 2
24	20 28.8	+ 3 28
25	20 30.0	+ 4 51
26	20 31.2	+ 6 9
27	20 32.4	+ 7 24
28	20 33.5	+ 8 35
29	20 34.5	+ 9 43
30	20 35.5	+10 48
May 1	20 36.4	+11 51
2	20 37.3	+12 50
3	20 38.2	+13 48
4	20 39.0	+14 42
5	20 39.8	+15 35
6	20 40.5	+16 25
7	20 41.2	+17 14
8	20 41.8	+18 0
9	20 42.4	+18 45
10	20 42.9	+19 28

* *

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Attention: All Authors: In professional scientific magazines it is standard practice for all articles to be preceded by short abstracts and to be followed by a suitable bibliography, or list of references. The Editor here requests authors who contribute articles to this journal also to supply an abstract and bibliography. Many of our authors do already furnish a bibliography, but our practice has been far from uniform. The abstract should be 50 to 200 words long, an informative summary of the contents of the article. Our readers may not know that the titled articles in Journal ALPO appear in the widely used, comprehensive index Astronomy and Astrophysics Abstracts (formerly Astronomisches Jahresbericht). They appear at present without abstracts; and clearly it would help the users of Astronomy and Astrophysics Abstracts and would also enhance the stature of JALPO to have abstracts accompany our article titles there. The Editor speaks from recent experience in using a number of library indices during a literature search as part of his work at the Physical Science Laboratory of New Mexico State University.

The article about simultaneous observations of Saturn by Julius Benton on pages 164 to 166 may serve as an example of an article with abstract and bibliography, as desired.

Errors in Recent Issues. In JALPO, Vol. 26, Nos. 1-2 (1976) Table I on page 12 should have been headed "Observed Saturnicentric Latitudes in 1974-75", not in 1973-74. Dr. Julius Benton has pointed out this blunder.

The lower left photograph on pg. 75 of Vol. 26, Nos. 3-4 lacks an figure number and a caption, as Mr. Takeshi Sato has kindly informed us. One should there read: "Figure 26. Mr. Sadao Murayama hearing the discussions of his younger friends. He is Head of the Division of Physical and Chemical Science Research, National Science Museum, Tokyo. He is an authority on meteoritics and a former Director of the Jupiter Section of the Oriental Astronomical Association". Our apologies to Author Sato and to Mr. Murayama!

NAA Convention in Colorado. The ALPO is participating in the Fourth National Amateur Astronomers Convention on August 10-13, 1977 at the University of Colorado in Boulder. The General Chairman is Mr. Derald D. Nye, 5604 Bowron Place, Longmount, CO 80501. The four convening organizations this year are the Western Amateur Astronomers, the Association of Lunar and Planetary Observers, the International Occultation Timing Association, and the Astronomical League. Accommodations will be available at the Kittredge Residence Halls located across the street from the Sommers - Bausch Observatory and the Fiske Planetarium. Lodging for 5 nights (August 9-13) and meals for 4 days will cost approximately $87 per person for single occupancy, $80 per person for double occupancy, and $50 per child under 13 years of age. Those who prefer can find motels near the campus. The Astronomical League is sponsoring a telescope and astrophotography contest. There will be field trips to the National Center for Atmospheric Research, the Time and Frequency Division at the National Bureau of Standards, and the Solar Flare Patrol at the National Oceanic and Atmospheric Administration. Pre-registration will cost $18 for both individuals and family groups until August 1, 1977, thereafter $20. The check should be made payable to the "National Amateur Astronomers" and should be mailed to Mrs. Denise Nye, NAA Convention Registration, 5604 Bowron Place, Longmont, CO 80501.

Apart from their actual attendance, ALPO members who are qualified can perhaps best support meetings of this kind by contributing papers to the program and drawings, charts, and photographs to the astronomical display. ALPO members wishing to present a paper should submit an abstract to Walter Haas, Box 3AZ, University Park, New Mexico 88003. It is not too early to start planning your paper, for the days between now and August will pass quickly.

New Address for Lunar Recorder Huddleston. All correspondence with this staff member should be addressed as follows: Marvin W. Huddleston, Drawer 1168, Mesquite, Texas 75149

New Assistant Jupiter Recorders. The following persons have been appointed Assistant Jupiter Recorders: Ron Doel of Maple Shade, NJ; Rodger W. Gordon of Nazareth, PA; Richard Hull of Richamond, VA; and Gary Seaman of Big Bear Lake, CA.

1977 Riverside Telescope Maker's Conference. The Ninth Annual Conference of this group will be on May 21 and 22, 1977 at Camp Oakes, which is east of Big Bear City, Calif. on Highway 38 at Lake Williams Estate Road. This location is 50 miles northeast of Riverside, high in the San Bernardino Mountains, in a very clean mountain camp at an elevation of 7300 feet and with a very dark sky. The co-sponsors are the Riverside Astronomical Society and the San Bernardino Valley Astronomers. There will be camping facilities and four served meals at Camp Oakes, with optional motel accommodations in the vicinity. Interested persons wanting further information should write to Mr. Clifford W. Holmes, 8642 Wells Avenue, Riverside, CA 92503. The Riverside Telescope Maker's Conference has been very popular and has attracted extremely good attendance in recent years.

Two Interesting Publications. Mr. Robert R. Young of Harrisburg, PA has written to point out these publications of interest to amateur astronomers and available from the Astronomical League: 1. The Proceedings of Astrocon '76, The National Convention of the League and the ALPO in August, 1976. It is a 100-page commemorative booklet available for $6.00 from George H. Maurer, RD 3, P.O. Box 140, Coopersburg, PA 18036. Published in a 6 - by 9-inch format, the booklet includes abstracts of 50 papers, a list of the more than 670 registrants, a photographic history of the meeting, and more than 40 photographs. The editing, a really big job, was done by ALPO member Gary Becker.
2. Guidelines for Astronomy Courses is a handbook to aid amateur societies in starting astronomy education programs. It was prepared by the League's Education Committee and

is available for $4.50 from T. Michael Flick, Chairman, 1643 Elder Court, Fort Wright, KY 41011. Guidelines is published in a ring binder format to allow easy and planned updating. The Education Committee is composed of planetarium directors, educators, and amateurs experienced in astronomy education activities.

Concerning Possible UFO Sightings by Amateur Astronomers. While it must be hard at this late date to say anything new about UFO's, nevertheless a new project is being carried out by Dr. J. Allen Hynek, the Director of the Lindheimer Astronomical Research Center of Northwestern University. It consists of surveying by questionnaire amateur astronomers, with special interest in active observers. Dr. Hynek is being assisted by Mr. Gert Herb, whom some of the readers of this journal met at the Kutztown Convention last August. A survey of the Astronomical League members is in progress. It is planned to conduct a survey of ALPO members in the United States in the next few months; present plans are that the questionnaire will come from Dr. Hynek's office. The objectives are described below by Mr. Herb: "In THE PROMISE OF SPACE, Arthur C. Clarke asserted that a paucity of UFO reports from amateur astronomers makes the existence of UFO's difficult to accept. This is a reasonable assumption, lacking only proof. Thus Dr. J. Allen Hynek and this writer initiated a survey of amateur astronomers with the hope of establishing whether this paucity does indeed exist - and if not, how reports from skilled observers compare with the majority of UFO reports.

"All members of the Astronomical League have already been successfully queried. However, it is difficult to assess their average astronomical proficiency, making it desirable to obtain an independent response from a smaller, but much more skillful, group of observers for comparison.

"ALPO members will be asked whether they have observed unidentified flying objects - not objects identified as spacecraft. We define UFO as objects not readily yielding to explanation as known natural phenomena - requiring, perhaps, new physical principles for an explanation.

"As skilled amateur scientists, members will be asked to contribute fresh data on a phenomenon that has intrigued our society for thirty years - one that may continue to elude us until we begin to assemble facts rather than poorly founded assumptions based on wrong premises."

OBSERVATIONS AND COMMENTS

Hourly Counts of Telescopic Meteors. Mr. Don Machholz, 34B Fillmer Avenue, Los Gatos, CA 95030 has submitted the following table of observed hourly rates of telescopic meteors in 1976. He observed with a 10.0-inch (25.4-cm.) reflector at 42X, f /3.8, diameter of field 2.4 degrees. The meteors were recorded in the course of a program of comet hunting. The observation sites were Concord, California in January-March, various sites in the Santa Cruz Mountains of California in April, and Loma Prieta Mountain in the Santa Cruz Mountains in May-December. The "Evening" observations are before midnight; the "Morning" observations, after midnight. We must first of all certainly congratulate any observer who spent 553 hours (375.25 + 177.75) in observing, more than two-thirds of it after midnight, and who recorded 1312 telescopic meteors!

Hourly Rates of Observed Telescopic Meteors

1976

	MORNING			EVENING		
Month	Hrs.	Meteors	Rate	Hrs.	Meteors	Rate
Jan.	23.00	46	2.00	12.50	10	0.80
Feb.	11.25	26	2.31	20.75	23	2.14
Mar.	19.00	33	1.74	12.75	11	0.87
Apr.	25.75	42	1.63	18.25	14	0.76
May	42.50	85	2.00	26.75	29	1.08
Jun.	38.50	100	2.60	14.00	15	1.07
Jul.	32.00	113	3.53	14.00	25	1.79
Aug.	40.25	138	3.43	10.75	23	2.14
Sep.	26.75	70	2.62	14.25	28	1.96
Oct.	42.50	143	3.36	14.50	34	2.34
Nov.	41.75	135	3.23	16.50	34	2.06
Dec.	32.00	119	3.72	12.75	16	1.25
1976	375.25	1050	2.80	177.75	262	1.47

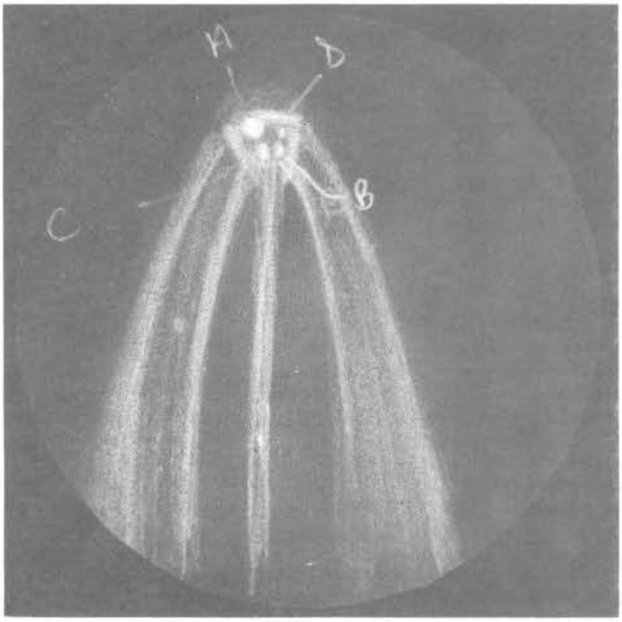

Figure 37. Drawing of Comet West (1975n) by Stephen O'Meara of Cambridge, Mass. with the 9-inch Clark refractor of Harvard Observatory, used at 100X. March 11, 1976, 9 hrs., 15 mins., U.T. Four nuclei were noted and are labelled, along with a bright central tail spine. Drawing contributed by Dennis Milon.

* * * * * * * * * * * * * * * *

Concerning an ALPO Solar Section. We want to thank all our readers who wrote in to express an opinion about a suggested ALPO Solar Section. Their ideas are being carefully considered, and the adopted course of action will be announced soon. It is always very helpful to the staff of this society to have the benefits of reader comment and constructive criticism.

Concerning the Front Cover. Mr. Paul Mackal contributed the sketches of the great Red Spot on Jupiter shown on the front cover of this issue. The details recorded by a skilled and experienced observer with favorable seeing can hardly fail to be of interest to students of the Giant Planet. The Red Spot was very dark during the period of observation, as has been true almost all of the time from 1960 onward.

The Strolling Astronomer

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NOTICE: In order to facilitate the reproduction of drawings in future issues readers are requested to exagerate contrasts on drawings submitted. Extremely faint marks cannot be reproduced. Outlines of planetary discs should be made dark and distinct. It is not feasible to reproduce drawings made in colors. Following these precepts will permit better reproductions.

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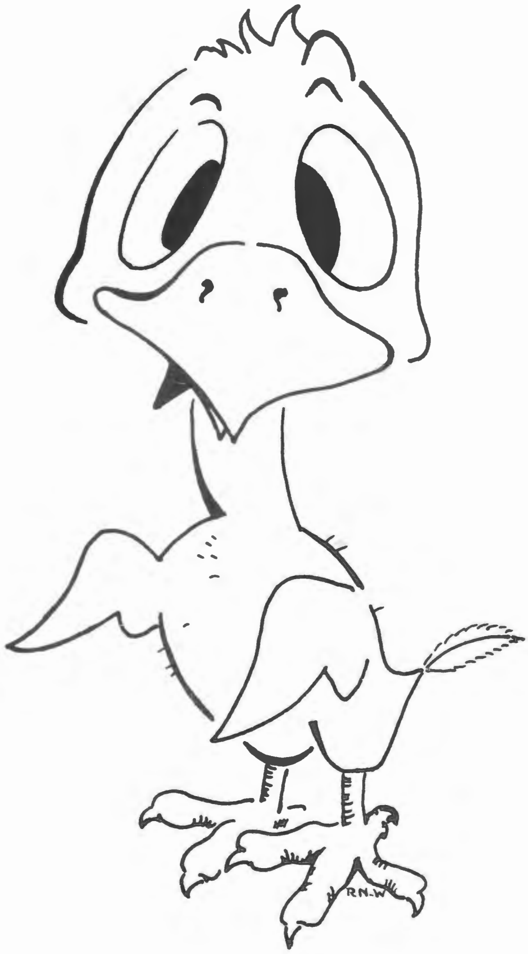

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