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A naked-eye view of P/Halley as it appeared in late March from Hawaii. The comet lies just below the "handle" of the teapot in Sagittarius, with the tail stretching toward the brightest region of the Milky Way. Drawing by Stephen J. O'Meara.

INSIDE THIS ISSUE

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Manuscripts will be reviewed for possible publication; send typed, double-spaced copy to the Editor (Cambridge address above). Cometary observations also should be sent to the Editor in Cambridge; all data intended for publication in the *ICQ* should be sent on standard *ICQ* observation report forms.

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SOURCES OF VISUAL PHOTOMETRY FOR P/HALLEY. I.

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With the large amount of photometric data now available for the current return of periodic comet Halley 1982*i*, it would seem worthy to have the sources for such data collected in a single location for convenient reference. There will ultimately be a huge amount of photometric data at all wavelengths. This collection deals with the visual and *V*-band magnitudes of P/Halley. CCD *V* magnitudes obtained when a comet is far from the sun (and thus small enough in apparent size, such that the contribution of the coma outside of the field-of-view to comet's m_1 is negligible) are perhaps the data which are most compatible and comparable with m_1 data obtained by visual observers. A large amount of photographic magnitudes have been published in such sources as the *Minor Planet Circulars* with astrometric data, but these are almost completely useless (most are given only to a full magnitude, sometimes a half-magnitude, with errors of perhaps as much as ± 3–4 mag). The other large collection of published photometric data of P/Halley already published which is not included in this compilation is that concerning the infrared magnitudes.

The sources listed below almost always contain either total *V* magnitudes (usually obtained via CCD) or total visual magnitude estimates (obtained by visual observers). The latter set of data is published entirely in the *ICQ*. [NOTE: Less-detailed observations of chiefly British observers, which have not all yet been published in the *ICQ*, have been published in recent issues of the monthly journal *The Astronomer* (published by British amateur astronomers); we anticipate that most of these data will be published (with more details, as per our requirements for publication of data) in the *ICQ* in the near future. Total visual magnitude estimates with even fewer details also appear in the *IAU Circulars*; the lack of sufficient information, and the sometimes-poor-quality of these data, precludes some of these observations' ever being published in the *ICQ*. Similar data, made by yet other observers, may be found in other publications, such as the *Kiev Comet Circulars*. Researchers studying total visual magnitude data should use chiefly the *ICQ* data for the period 1985 July–1986 July, since the most experienced and most consistent visual observers have their observations published in this journal, and the majority of such data (2789 magnitude estimates) has already been published. It is recommended that researchers studying the light curve of P/Halley use only visual data obtained by 6–10 of the most consistent *ICQ* observers who followed the comet over a long arc of time (especially when the comet was fainter than mag 10); experience shows that most new comet observers, as well as those who made few ($\leq\sim$ 20) observations of P/Halley, often make the comet far too faint (and occasionally far too bright) by using improper observing techniques. The requirements for publication of cometary magnitude data in the *ICQ* during the past 5 years have made the magnitude observations much more consistent, and incomplete or really bad data are not published in the *ICQ* (though more work needs to be done to make visual magnitude estimation among different observers even more consistent).] The *ICQ* issues containing P/Halley photometric data are listed first in the compilation which follows.

There now exist total visual magnitude estimates published in the *ICQ* for every UT date from 1985 Oct. 6 to 1986 Jan. 28 (except Oct. 9 and 31) and from 1986 Feb. 15–June 13 (except May 23). To give a useful indication of the numbers of estimates made by observers, *Table I* lists the top 25 or so observers of P/Halley, as well as the top observers of all comets (as per data published during the past 10 years in this journal). The four sets of columns include observer (identified by observer code) and actual numbers of published magnitude estimates, the first two sets of columns referring to long- and short-period comets, respectively. The third set of columns list numbers of estimates made of P/Halley alone, and the last set of columns list actual numbers of nights for which the observers obtained at least one magnitude estimate of P/Halley (several observers often obtained two or more estimates on one night, using different instruments and methods). Some observers have not yet contributed their post-perihelion P/Halley data for publication; these observers are flagged by an asterisk (*) in the final two sets of columns (thereby indicating that those numbers refer only to pre-perihelion data). Charles Morris' (MOR) post-perihelion data arrived too late to be tallied here, but they will be published in the October issue; he thus far appears to be the most prolific observer of P/Halley, with magnitude estimates obtained on 160 nights into early July.

Most of the CCD magnitudes are to be found in various issues of *Astronomy and Astrophysics*, *Icarus*, or the *IAU Circulars*. Should readers notice any significant sources left out of this listing, the author would be pleased to learn of such references for a future second paper (perhaps to be published in 1987). This compilation is intended to be as complete as possible up through July 1986. Sources for electronic data are listed alphabetically by first author, with the dates of observations given in brackets at the end of each reference. Electronic magnitude data of P/Halley obtained after its 1985 conjunction with the sun are not included, because the coma size was by then too large to have any meaning towards "total magnitude". Some data sets are listed where actual observations were made in a band somewhat different than *V* (*B*, *R*, and Thuan-Gunn filters), but since there was not much coma contribution and since tranformation formulae (to derive *V* data) are often provided by the authors, some such sets were included. Note also that much of the electronic magnitude data were published on *IAU Circulars* (denoted below as *IAUC*s) before being published again with more details in *Astronomy and Astrophysics*, *Nature*, and *Icarus*. These sources are also given for purposes of cross-checking. The chief sources are preceded by a filled circle (•); minor sources are preceded by an open circle (○).

TABLE I. NUMBERS OF TOTAL VISUAL MAGNITUDE ESTIMATES
OF COMETS PUBLISHED IN THE ICQ (up through July 1986 issue)
Observers are listed by their 3-letter, 2-digit ICQ code

Long-period comet totals		Short-period comet totals		P/Halley: total estimates		P/Halley: total nights	
BOR	935	BOR	907	GRE	334	MOR	(160)
JON	457	MOR	734	MOR	158*	GRE	131
MOR	371	GRE	503	BOU	152	SEA	113
KEI	268	JON	441	MAC	144	MAC	100
KEE	237	BOU	430	KEE	136	KEE	92
PEA	205	MER	338	BOR	125	BOR	89
SHA02	203	KEI	319	SHA02	123	SHA02	85
SPR	180	PEA	314	SEA	121	BOU	81
BOU	179	SHA02	314	HAL	95	HAL	78
GRE	162	MAC	292	JON	90	JON	75
FEI	158	SEA	272	MOR03	71	MOR03	67
SEA	146	SPR	268	MER	69	MER	62
CLA	135	MOR03	235	BUS01	58	LOV	56
MAC	131	KEE	209	CLA	57	WOO	54
MOR03	130	CLA	200	HAS02	56	CLA	45
MER	116	HAL	176	LOV	56	KEI	39*
BUS01	111	BUS01	173	KEI	55*	DUC	38
WEG	108	COM	131	WOO	54	LOO01	37*
DEY	94	BOE	125	WEG	54*	BAT01	36
MAL	93	HAS02	101	SPR	44*	BUS01	33
RID	93	FEI	82	DUC	41	HAS02	33
PAN	90	WEG	72	LOO01	40*	DEA	31
COM	83	LOO01	70	BAT01	36	MOE	29
CAV	78	MOE	70	DEA	31	WEG	28*
HUR	74	DUC	68	MOE	31	LUD	28*
BOE	68	SAK	65	ZAN	31	SPR	27*

Some of the sources listed below contain discussion concerning the apparent variability of P/Halley's brightness before the coma was definitely detected in Sept. 1984. The reader is referred to a good discussion of this by Zdenek Sekanina (1985, *Astron. Astrophys.* **148**, 299–308).

International Comet Quarterly (ICQ) sources of total visual magnitudes:

- *ICQ* **7**, 65, 81, 105–106 (1985).
- *ICQ* **8**, 25–38, 47–70, 93–109 (1986).

Sources of electronically-obtained total magnitudes:

- Barker, E. S.; and C. B. Opal (1986). in *Asteroids, Comets, Meteors II* (C.-I. Lagerkvist *et al.*, eds.; Uppsala: Reprocentralen HSC), 481–485 [1984 Sept. 28; V magnitudes are provided for three other (later) nights, but their use of small diaphragm apertures probably would not have included the whole coma].
- Baudrand, J., *et al.* (1982). *IAUC* 3753 [1982 Nov. 15–16, *B* magnitudes].
- Belton, M. J. S.; and H. Butcher (1982a). *Nature* **298**, 249 [negative report, 1981 Dec. 2–3].
- Belton, M. J. S.; and H. Butcher (1982b). *IAUC* 3742 [more detailed information on *IAUC* 3873 regarding 1982 Oct. 20].
- Belton, M. J. S.; and H. Butcher (1983). *IAUC* 3776 [1982 Dec. 13].
- Belton, M. J. S., *et al.* (1984). *IAUC* 3934 [1984 Mar. 4].
- Belton, M., *et al.* (1985). *IAUC* 4029 [1984 Feb. 4, Oct. 30, Nov. 26].
- Belton, M. J. S.; P. A. Wehinger; and S. Wyckoff (1983). *IAUC* 3873 [1983 Feb. 13].
- Cruikshank, D. P.; W. K. Hartmann; and D. J. Tholen (1985). *Nature* **315**, 122–124 [1985 Feb. 17–20].
- Jewitt, D. C.; G. E. Danielson; and R. J. Terrile (1982). *IAUC* 3688 [negative observation, 1981 Dec. 18].
- Jewitt, D. C., *et al.* (1982). *IAUC* 3737 [recovery of P/Halley, 1982 Oct. 16].
- Jewitt, D.; and G. E. Danielson (1984). *Icarus* **60**, 435 [1981 Dec. 18 negative report, 1982 Oct. 16 recovery, 1984 Jan. 4–8; also given are conversion formulae from Thuan-Gunn magnitudes to *V*; initial abbreviated results in Jewitt, Danielson, and Terrile (1982) and in Jewitt *et al.* (1982)].
- Le Fevre, O., *et al.* (1984). *Astron. Astrophys.* **138**, L1–L4 [*B* magnitudes, 1984 Feb. 2–6; initial abbreviated results in Lecacheux *et al.* (1984)].
- Lecacheux, J., *et al.* (1984). *IAUC* 3928 [1984 Feb. 4, *B* magnitudes].
- Meech, K. J.; D. Jewitt; and G. R. Ricker (1986). *Icarus* **66**, 561–574 [1984 Oct. 22–27, 1985 Jan. 18–21; *R* magnitudes with conversion formula to *V*].
- Pedersen, H.; and R. M. West (1984). *IAUC* 3914 [1984 Jan. 27].
- Racine, R. (1984). *IAUC* 3914 [1983 Dec. 31, *IIIaF* magnitude].
- Sicardy, B., *et al.* (1983). *Astron. Astrophys.* **121**, L4–L6 [negative report, 1981 Dec. 2; 1982 Oct. 16–17, Nov. 15–16].
- Spinrad, H.; M. J. S. Belton; P. A. Wehinger; and S. Wyckoff (1986). in *Asteroids, Comets, Meteors II* (C.-I. Lagerkvist *et al.*, eds.; Uppsala: Reprocentralen HSC), 491–496 [1983 Oct. 10, 1984 Feb. 4].
- Spinrad, H.; S. Djorgovski; and M. J. S. Belton (1984). *IAUC* 3996 [1984 Sept. 25–27].
- Wehinger, P. A., *et al.* (1985). *IAUC* 4041 [1985 Feb. 17].
- West, R. M.; and H. Pedersen (1982). *IAUC* 3758 [1982 Dec. 10].
- West, R. M.; and H. Pedersen (1983a). *IAUC* 3770 [1983 Jan. 14].

• West, R. M.; and H. Pedersen (1983b). *Astron. Astrophys.* **121**, L11–L12 [1982 Dec. 10, 1983 Jan. 14; initial abbreviated results in West and Pedersen (1983a)].
• West, R. M.; and H. Pedersen (1984). *Astron. Astrophys.* **138**, L9–L10 [1984 Jan. 27–30; initial abbreviated results in Pedersen and West (1984)].
o Wyckoff, S., *et al.* (1985a). *IAUC* 4029 [1984 Nov. 26].
• Wyckoff, S., *et al.* (1985b). *Nature* **316**, 241-242 [1984 Nov. 26, 1985 Feb. 17, Mar. 24, Apr. 18; abbreviated, preliminary results in Wyckoff *et al.* (1985a) and Wehinger *et al.* (1985)].
o Wyckoff, S.; P. A. Wehinger; and M. J. S. Belton (1986). in *Asteroids, Comets, Meteors II* (C.-I. Lagerkvist *et al.*, eds.; Uppsala: Reprocentralen HSC), 487–490 [further discussion of 1985 Feb. 17 magnitude reported in Wyckoff *et al.* (1985b)].

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TABULATION OF COMET OBSERVATIONS

The large amount of P/Halley photometric data will be obvious from a brief look at this and the previous issues of the *ICQ*. We would like to take this opportunity to encourage all observers and recorders who have the capability to produce observations in machine-readable form to contact the Editor concerning the transmission of data by computer format. We can accept floppy disks which are readable on IBM PCs, Digital VAXes, and Digital MicroVAXes. Material can be sent to the Editor via the university computer network 'BITNET', by sending files or 'mail' to username GREEN on node CFA1. It is also possible for individuals who can access ARPAnet, EARN, and other similar networks, to send mail to the same address. If necessary, we can still also read punched cards (but do not recommend this medium, which is very error-prone). We can also read 9-track magnetic tapes, if they are the only alternative available. In lieu of the vast amount of time expended on entering the P/Halley data into machine-readable form, and with the ever-increasing amount of older data awaiting publication, the need for data to be sent already in machine-readable form is all the more pressing. We can send information to interested individuals regarding the *ICQ* record format; observations should be listed with strict adherence to columns and the positioning of decimals and symbols, as they appear in published form in the *ICQ*.

In the descriptive data which follows, many abbreviations have been used to shorten the length of the text. The 3-letter, 2-digit *ICQ* observer codes are used for the observer; the codes not listed in the table preceding the tabulated data in *this* issue (p. 85) may be found in the April issue (p. 44), as much of the descriptive data published in this issue supplement tabulated data in the last issue. Other abbreviations include the standard 1-letter codes for instrument type, and the capital letters N, S, E, and W for directions (where unambiguous).

Explanations for the headings of the tabulated data were given on page 9 of the January issue; as stated therein, a newly-expanded and detailed set of *ICQ* keys to observers, references, etc., is available from the Editor for US$4.00 postpaid. Note again that an exclamation mark (!) following the date in the tabulated data indicates that the observer has corrected his magnitude estimate in some manner for atmospheric extinction. An asterisk (*) in the same column indicates that the given observation replaces one published in an earlier issue of the *ICQ*. New references added to the Reference Key include *ME* (*V* photometry by Tedesco, Tholen, and Zellner 1982, *A.J.* **87**, 1585; mag range 6–13), *PA* (M45 sequence by Johnson and Mitchell 1958, *Ap.J.* **128**, 31), and *PB* [Pleiades chart in *Sky Telesc.* **70**, 465 (1985)]. A new group source is *14* for the Australian comet group (c/o D. A. J. Seargent); the group source codes appear in the Observer Key, between the 3-letter, 2-digit Observer Code and the observer's name. Individuals using the *ICQ* magnitude data may have noticed that the aperture for the naked eye has not been published in a consistent manner. Our new policy is to publish "0.0 [cm]" when the observer does not provide a value. It is possible (but difficult) to measure a dark-adapted pupil, and this aperture will vary from observer to observer. Those who attempt studies of aperture effects upon magnitude estimates will perhaps want to adapt some standard naked-eye aperture, such as 0.7 cm. — D.W.E.G.

◇ *P/Halley* (1982*i*): 1985 Sept. 12.13: in 29.8-cm *f*/5 L (62×), $m_2 \sim 13.5$–14.0 [KEI]. Sept. 14.36: in 50-cm *f*/5 L (157×), almost-stellar nucleus of mag 14.5 [BOR]. Sept. 16.35: in 50-cm *f*/5 L (157×), almost-stellar nucleus of mag 14.5 [BOR]. Sept. 16.49: stellar condensation of mag 13.7 [MOR]. Sept. 17.37: in 50-cm *f*/5 L (157×), almost-stellar nucleus of mag 14 [BOR]. Sept. 17.50: "coma was slightly elongated toward p.a. $\sim 200°$; in 25.6-cm L (45×), the comet appeared almost stellar (only the condensation was visible)" [MOR]. Sept. 22.06: possible starlike central condensation; coma elongated toward p.a. $\sim 290°$ [GUA]. Sept. 25.37: in 31.7-cm L, nearly-stellar nucleus of mag $\sim$ 13; in 50-cm *f*/5 L (157×), central condensation 0.3′ across and mag 13.0, "nucleus" of mag $\sim$ 14.5 [BOR]. Sept. 26.17: in 29.8-cm *f*/5 L (62×), $m_2 = 13.5$ [KEI]. Sept. 26.49: "for the first time, the comet is brighter in lower power" [MOR].

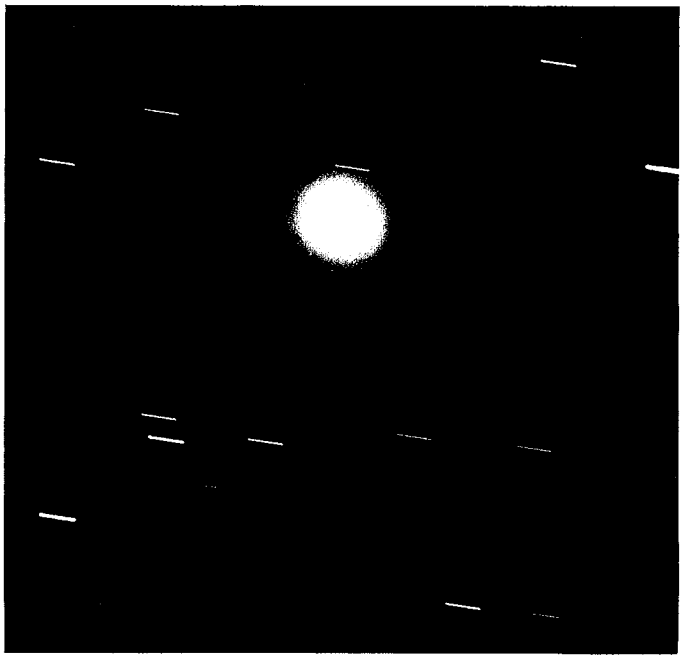
From early October for about 3 weeks, Merlin [MER] noted a bright nuclear region of diameter < 3″ which was of mag $\simeq$ 15 on Oct. 10 and $\simeq$ 14 on Oct. 19; on Oct. 19.97, he "discerned rather clear fluctuations of brightness within a few minutes in the range mag 13.5–14.5 of this false nucleus." Oct. 7.39: moon was up; comet had a 1′ condensation [MOR]. Oct. 10.38: almost-stellar nucleus [BOR]. Oct. 11.00: starlike central condensation of $m_v = 13.5$–14.0 [GUA]. Oct. 12.37: nearly-stellar nucleus of mag 13.0 [BOR]. Oct. 12.5: in 61-cm C (264×), "comet was distinctly elongated toward p.a. 240° and had a bright, non-stellar condensation" [MOR]. Oct. 22.17: in 12.7-cm L, diffuse tail of width 1.5′ [KEI]. Oct. 22.32: in 31.7-cm L, nuclear condensation of size 0.1′ – 0.2′, mag 11.5 [BOR]. Oct. 23.36: in 31.7-cm L, stellar nucleus of mag 13.3 [BOR]. Oct. 26.14: quasi-stellar central condensation of $m_v = 12$ [GUA]. Oct. 26.41: nuclear condensation of mag 11.1 [BOR].

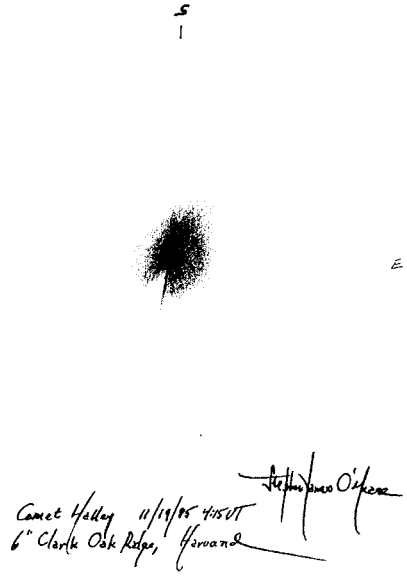
◇ *P/Halley (cont.).* 1985 Nov. 5.22: in 20×80 B, "straight, 1° tail (p.a. 302°) visible, but there was only a hint of the tail in the 25.6-cm L. On the next night, the same tail was suspected in binoculars under poorer conditions; however, this tail was not observed on subsequent nights. During Nov. 5–7, two tails, one toward the SW and the other toward the SE, were detected in both the 25.6-cm L and 20×80 B; both were very faint, short, and stubby" [MOR]. Nov. 5.90: gas tail; in 29.8-cm *f*/5 L (62×), jets visible in p.a. 285° [KEI]. Nov. 6.21: "the SW tail was brighter, but by the next night the SE tail had become more obvious" [MOR]. Nov. 7.18: in 31.7-cm L (55×), coma dia. 7.5′, DC 6–7 [BOR]. Nov. 7.88: in 15.6-cm *f*/5 L, 24×, tail 0.25° long in p.a. ~ 95°; in 10×50 B, coma 15′ × 20′ [BOU]. Nov. 7.94: in 10×50 B, tail fanned over p.a. 270° – 320° [KEI]. Nov. 7.99: in 12×60 B, coma size 15′ × 25′ and tail spread in p.a. 90° – 270° [WEG]. Nov. 8.05: in 10×50 B, coma 10′ × 13′; in 20.3-cm *f*/10 T, 50×, tail 0.05° in p.a. 245° [COM]. The Nov. 8 naked-eye sighting of P/Halley by MOR was a joint observation with S. Edberg from 7000 feet elevation. Nov. 9.18: in 20 × 80 B, coma dia. = 12.5′, DC 5, tails suspected in p.a. 110° and 270°; in 31.7-cm L (55×), coma dia. 8′, DC 7 [BOR]. Nov. 9.91: 0.33°-tail is gas tail; in 10 × 50 B, also a broader, diffuse tail 0.17° long in p.a. 283°; in 29.8-cm *f*/5 L (62×), nucleus mag 10.5 [KEI]. Nov. 10.92: in 12×60 B, second tail 0.25° long in p.a. 100° [WEG]. Nov. 11.60: in 15-cm *f*/8 L, 50×, coma dia. 4′, DC 9, 0.2°-long tail suspected in p.a. 355° [WIL02]. Nov. 12.07: in 20.3-cm *f*/10 T, 50×, tail 0.08° long in p.a. 115° [COM]. Nov. 12.13: "sharp central condensation" [SHA02]. Nov. 12.96: in 33-cm *f*/5 L (45×), "diffuse coma, no structure seen" [SHA02]. Nov. 13.24: also tails 0.4° and 0.33° in p.a. 35° and 270° [KEI]. Nov. 14.91: in 10-cm L (28×), "intense, compact central cond." of dia. 3′ [GUA]. Nov. 14.92: "bright central condensation of $m_2 = 8.7$; diffuse coma" [MIL02]. Nov. 16.05: "jet or streamer was visible" [LIN02]. Nov. 17.56: same comments as for Nov. 11.60, except dia. = 5′ and p.a. = 15° [WIL02]. Nov. 18.07: in 20-cm *f*/12 R (40×), $m_2 = 7.8$ (AA) [SHA02]. Nov. 18.20: in 20 × 80 B, coma dia. 16′, DC 6; in 31.7-cm L (55×), trace of blue to coma, dia. 13′, DC 7 [BOR]. Nov. 19.04: tail fanned from p.a. 90° through south to p.a. 212° [KEI]. Nov. 19.23: in 20 × 80 B, coma dia. 15′, DC 5–6; in 50-cm *f*/5 L (96×), DC 8, almost stellar nucleus of mag 9–10 [BOR]. Nov. 22.43: "comet had a sunward extension which appeared to wrap around the southern part of the coma and join with the main tail" [MOR]. Nov. 24.00: in 31.7-cm *f*/6 L (68×), DC 7 [BOR]. Nov. 28.14 and Dec. 3.21: very poor conditions; magnitude estimate an obvious underestimate [MOR]. Nov. 29.42: in 20-cm L, tail 0.5° long in p.a. 280° [LOV].

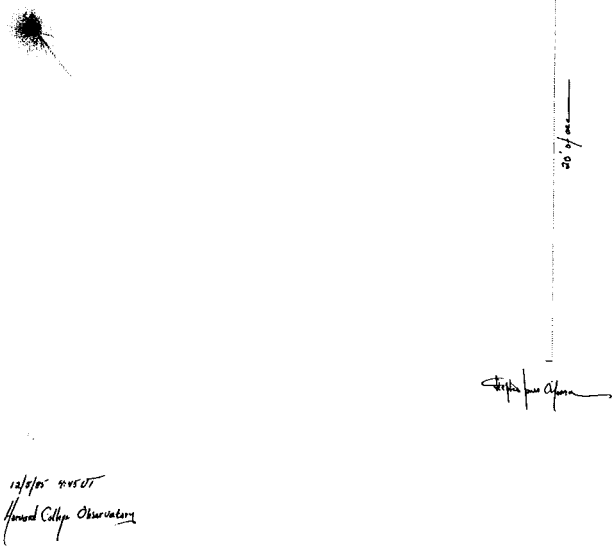
Dec. 1.46: in 20-cm L, tails 0.4° and 0.2° in p.a. 85° and ~ 240° [LOV]. Dec. 1.74: coma elongated in p.a. 75° [BAR]. Dec. 1.75: in Celestron-8, 169×, "starlike nucleus, $m_2 \simeq 9.5$" [KAM01]. Dec. 1.83: tail fanned through p.a. 72° – 100°, also tail 0.3° long in p.a. 0° [KEI]. Dec. 2.44: in 15×80 B, tail 0.5° towards E [LOV]. Dec. 2.79, 4.86, 5.74: coma elliptical [WAG]. Dec. 2.80: tail 0.5° long in p.a. ~ 80°, 20.3-cm *f*/10 T, 50× [COM]. Dec. 3.43: in 15×80 B, tail 0.5° towards E [LOV]. Dec. 3.75: in 20×80 B, coma dia. 18′, DC 6, "asymmetric coma toward p.a. 65°; bright, disklike, central condensation of dia. ~ 20″ and $m_2 = 7.7$" [MIL02]. Dec. 3.83: in 29.8-cm *f*/5 L, much structure, including jets and hoods, visible in inner coma [KEI]. Dec. 3.99: in 20×120 B, coma dia. 18′, DC 6 [BOR]. Dec. 4.2: "the coma was irregular in shape with a bulge toward the south"; in 25.6-cm L (45×), $m_2 = 9.2$, and at 222×, the condensation was "bumpy" with activity suggested in p.a. ~ 0° and ~ 233°; the tail in p.a. 114° was only suspected [MOR]. Dec. 5.05: tail straight and narrow; in 31.7-cm *f*/6 L (55×), coma dia. 7.5′, DC 8, tail 2′ wide, 1.0° long in p.a. 70° [BOR]. Dec. 5.83: also tails each 0.3° long in p.a. 100° and 34° [KEI]. Dec. 6.2: "the coma was slightly parabolic in shape with the major axis perpendicular to the primary tail; the condensation was offset toward the west, and there was a suggestion of a second tail toward p.a. ~ 110°" [MOR]. Dec. 6.42: in 31.7-cm *f*/5 L (86×), $m_2 = 8.7$ (SAOC) [JON]. Dec. 8.12: in 20×80 B, coma elongated to ENE [DUC]. Dec. 9.45: in 31.7-cm *f*/5 L (86×), $m_2 = 8.7$ (SAOC) [JON]. Dec. 9.76: also tail 0.3° in p.a. 93°; in 20×80 B, 15′ tail in p.a. 79°, jet in p.a. 330°; in 29.8-cm L, nuclear mag 9.7, with fountains and hoods visible [KEI]. Dec. 10.01: in 100-cm *f*/21 L, 210×, coma dia ≃ 18′, dia. of central cond. ≃ 14″, "coma completely round and uniform, with no visible jets" [FER]. Dec. 10.2: to naked eye, "the comet looked like a star ($m_2 = 5.5$) with a very faint and difficult coma surrounding it", and there was "a suggestion of a short tail toward the east"; in 6×15 B, "only the inner condensation was visible"; in 20×80 B, "the coma's shape was nearly parabolic — significantly different than a few days earlier" [MOR]. Dec. 10.42: in 7×50 B, coma dia. 11′; in 31.7-cm *f*/5 L (86×), coma dia. 5′, DC 6–7, dia. of central cond. ~ 1′, $m_2 = 8.9$ (SAOC) [JON]. Dec. 10.77: additional tails 0.25° and 0.17° long in p.a. 35° and 60°, respectively, in 12×60 B [WEG]. Dec. 11.42: in 31.7-cm *f*/5 L (86×), DC 6, $m_2 = 8.7$ (SAOC), tail in p.a. 50° [JON]. Dec. 12.11: in 20×80 B, central 10″ very bright [DUC]. Dec. 12.45: in 15×80 B, tail 0.33° long in p.a. 70° [SEA]. Dec. 12.78: in 20×80 *f*/5 B, coma dia. 12′, DC 5 [MIL02]. Dec. 13.10: in 20×80 B, "central brightening expanded to 20″" (from previous night) [DUC]. Dec. 13.11: in 14-cm *f*/3.6 S, 28×, "hint of dust tail" at p.a. 90° [SPR]. Dec. 13.44: in 15×80 B, tail 2° in p.a. ~ 70° [LOV]. Dec. 14.45: in 15×80 B, tail 3° in p.a. 68° [LOV]. Dec. 14.80: in 20-cm *f*/12 R (40×), $m_2 = 5.6$, "thin central brighter spine" [SHA02]. Dec. 15.1: "tail was very faint"; in 25.6-cm L (45×), there was "a bulge in the coma toward the north" [MOR]. Dec. 15.79: "drop-shaped coma elongated at p.a. 64° with 0.5° gas tail" [GUA]. Dec. 15.83: in 20×80 B, "quasi-stellar central condensation of $m_2 = 9.0$; diffuse but easy coma to dia. 10′, with faint outer coma" extending to dia. 15′ [MIL02]. Dec. 18.49: in 7×50 B, $m_1 \sim 5.4$:, tail 2.5° in p.a. 260° [MAT01]. Dec. 19.42: in 31.7-cm *f*/5 L (86×), coma dia. ~ 2′, DC 6, $m_2 = 8.8$ (SAOC) [JON]. Dec. 21.75: in 7×50 B, tails 0.33° and 0.42° in p.a. 210° and 316° [MER]. Dec. 21.77: in 40-cm *f*/5 L, 81×, tails 0.10° long in p.a. 44° and 88° [MER]. Dec. 22.02: in 31.7-cm L (55×), coma dia. 3.5′, DC 6–7, moonlight [BOR]. Dec. 22.1: "comet is less condensed, lacking the sharp stellar condensation" [MOR]. Dec. 22.75: in 40-cm *f*/5 L, 81×, comet diffuse, tails 0.01°, 0.02°, 0.07° in p.a. 163°, 235°, 326° [MER]. Dec. 23.78: in 40-cm *f*/5 L, 81×, tail 0.05° in p.a. 309° [MER]. Dec. 26.11: in 14-cm *f*/3.6 S, 28×, "fan-shaped tail visible despite moon" [SPR]. Dec. 27.71: fan tail spanning p.a. 0° – 80° [BAR]. Dec. 28.76: diffuse material to N [KEI]. Dec. 29.44: in 15×80 B, tail "brighter than previously", 0.6° long in p.a. 70° [SEA].

(text continued on page 81)

Comet Halley
10/07/85 8:35 U.T.
18-inch Clark Refractor, Amherst College
Stephen James O'Meara







On this page and page 79, and also on page 83, are several drawings of P/Halley by Stephen J. O'Meara and two photographs of the same comet. The photo on page 79 was taken 1985 Dec. 3 by G. Emerson with a 30-cm $f/1.8$ Schmidt camera and IIaO plate; Emerson notes that the tail was visible to the edge of the plate. The photo at upper left on this page was taken at Lick Observatory on 1985 Nov. 21 (103aO plate, Crossley reflector, 20-min exposure beginning 9:56 UT). The O'Meara drawings above and to the left were made on 1985 Nov. 19 (4:15 UT, 6-inch Clark refractor, Oak Ridge Observatory) and Dec. 5 (4:45 UT, 9-inch Clark refractor, Harvard College Observatory). His drawings on page 79 were made (from upper left in clockwise direction) on Dec. 10 (3:15 UT, 10×50 binoculars, from Concord, MA), Nov. 19 (0:30 UT, 9-inch Clark, HCO), and Oct. 7 (8:35 UT, 18-inch Clark refractor, Amherst College). O'Meara's four drawings on page 83 were made using 10×50 binoculars in 1986 April during his trip to the southern hemisphere; UT times, clockwise from upper left: Apr. 10 (15:00), Apr. 12 (11:00), Apr. 15 (11:00), Apr. 13 (18:48).

◇ *P/Halley (cont.).* 1985 Dec. 29.45: same comments as for Nov. 17.56, except tail = 0.1° long in p.a. 85° [WIL02]. Dec. 29.74: "material to N and E" [KEI]. Dec. 30.02: "undefined nucleus" [MCB]. Dec. 30.99: in 20×120 B, DC 6, tail 1.5° in p.a. 64°; in 31.7-cm L (55×), coma dia. 4.2′; in 50-cm L (96×), coma dia. 3.4′, tail 0.5° long and only 0.3′ wide [BOR]. Dec. 31.11: in 20-cm *f*/10 S, 64×, "dust bulge included in coma size" [SPR].

1986 Jan. 1.07: in 32-cm *f*/4 L, 33×, "brighter knot in tail, 2.0° from nucleus" [KEE]. Jan. 1.98: in 15-cm *f*/5 R (31×), coma dia. 6′, tail 0.67° long in p.a. 55°; tail 0.11° wide at end, diffuse central spine of tail was 0.13° long [MOR03]. Jan. 1.99: in 20×120 B, coma dia. 5.6′, DC 7, tail 3.5′ − 4′ wide at beginning, 1.4° long in p.a. 62°; in 31.7-cm L (55×), coma dia. 5.0′, DC 7, tail > 1° long and 2.5′ wide, nuclear mag 10.0 [BOR]. Jan. 2.72: coma 12′ × 15′ [GUB]. Jan. 3.72: coma 12′ × 14′ [GUB]. Jan. 3.72: in 14×100 B, coma 4.7′ × 9.4′ [HAS02]. Jan. 4.73: fan-tail spanning p.a. 35° − 90° [BAR]. Jan. 6.00: in 20×120 B, coma dia. 6′, DC 6, tail > 1° long, first 0.7° of tail quite bright; in 31.7-cm L (55×), coma dia. 4.7′, DC 6–7, separate rays suspected in tail [BOR]. Jan. 6.73: in 7×50 B, m_2 = 6.5 [ZAN]. Jan. 6.74: in 20×80 B, tail 0.93° in p.a. 65°; extremely strong, elliptical (major axis toward p.a. 65°) central condensation (dia. ≃ 3′), offset in the coma toward the comet's direction of motion; blue color easily seen; tail "quite broad, with a difficult, faint, central spine" [ZAN]. Jan. 6.75: fan-tail spanning p.a. 40° − 100° [BAR]. Jan. 7.15: maximum width of the tail was ~ 30′ [MOR]. Jan. 7.72: coma 10′ × 15′ [GUB]. Jan. 7.73: in 20×80 B, "bright, starlike central condensation of m_2 = 6.7" [MIL02]. Jan. 7.98: sharp brightness increase [BOR]. Jan. 7.99: in 15-cm *f*/5 R (31×), coma dia. 4.5′, tail 0.62° long in p.a. 60°; diffuse central spine of tail 0.20° long [MOR03]. Jan. 9.73: fan-tail spanning p.a. 40° − 115° [BAR]. Jan. 9.98: in 20×120 B, DC 7, tail 2° in p.a. 61°, sunward side of tail brighter; in 50-cm L (96×), DC 7, bright and wide (type II) tail [BOR]. Jan. 10.1: comet's dust tail becoming visible as a bulge on the southern side of the gas tail; at its end, width of gas tail was 10′ [MOR]. Jan. 10.70: DC 6–7 and tail length 1.5° in 15×80 B [KRO01]. Jan. 10.76: "no features in tail or coma" [SHA02]. Jan. 11.76: in 15-cm *f*/5 L, 75×, tail 0.10° in p.a. 230° [MER]. Jan. 11.97: in 50-cm L (96×), perfectly stellar nucleus of mag 9.2 [BOR]. Jan. 12.10: in 11×80 B, "dust tail superimposed on short plasma tail" [SPR]. Jan. 12.73: in 7×50 B, blue color, strong central cond. (dia. 0.6′), m_2 = 6.8, tail quite broad and straight, probable central spine; in 20×80 B, coma dia. 5.3′, DC 6 [ZAN]. Jan. 12.97: in 31.7-cm L (55×), coma dia. 2.9′, nuclear condensation 15″ across and mag 8.5 [BOR]. Jan. 13.76: fan-tail spanning p.a. 20° − 90° [BAR]. Jan. 14.73: tail length 2.0° in 34×150 R [AER]. Jan. 14.75: also tail 0.3° long in p.a. 85° [KEI]. Jan. 14.97: in 31.7-cm L (55×), coma dia. 2.8′ [BOR]. Jan. 15.40: in 20-cm L (80×), coma dia. 3.0′, DC 7–8 [LOV]. Jan. 15.96: in 7×50 B, tail 1.4° long; in 50-cm L (78×), coma dia. 2.3′, broad 15″ jet in p.a. 130° [BOR]. Jan. 16.75: in 40-cm *f*/5 L, 254×, tails 0.01° long in p.a. 223° and 268° [MER]. Jan. 16.75: in 40-cm *f*/5 L, 81×, tail 0.20° in p.a. 33°, curved toward p.a. 55°; also tail 0.04° in p.a. 355° [MER]. Jan. 16.96: in 50-cm L (96×), coma dia. 2.5′, DC 7, tail length > 0.5°, nuclear magnitude 8.8 [BOR]. Jan. 18.1: broad dust tail was adjacent to southern edge of gas tail; total angular extent of the tails was from p.a. 55° to 75° [MOR]. Jan. 19.10: total angular extent of dust and gas tails was from p.a. 50° to 70° [MOR]. Jan. 20.73: in 20×80 B, coma dia. 3.3′, DC 7–8, tail 3.33° in p.a. 60° [ZAN]. Jan. 20.74: in Celestron-8, "starlike nucleus and relatively weak, elliptical coma" [KAM01]. Jan. 20.76: in 15-cm *f*/5 L, 75×, coma dia. 9′, DC 6, tails 0.11° in p.a. 196° (curved toward p.a. 161°), 0.09° in p.a. 201° (curved toward p.a. 230°), and 0.02° and 0.06° in p.a. 254° and 316° [MER]. Jan. 26.73: in 20×80 B, coma dia. 2′, DC 7–8, very faint tail ≃ 0.92° long in p.a. ~ 60° [ZAN]. Jan. 27.72: in 20×80 B, coma dia. 2′, DC 7–8, very faint tail ≃ 0.67° in p.a. 60° [ZAN].

Feb. 22.46: in 15-cm *f*/5 R (31×), coma dia. 2′, DC 8 [MOR03]. Feb. 25.57: in 20×80 B, coma of "higher surface brightness" than preceding morning [DUC]. Feb. 25.70: in 11×80 B, tail 0.5° long in p.a. 280° [JON]. Feb. 27.56: in 20×80 B, "10′-long bright edge on N edge of tail where it leaves the coma" [DUC]. Feb. 27.70: "bright nonstellar nucleus in parabolic coma; short jet toward p.a. 210°, fainter than nucleus and brighter than coma"; tail brighter and longer around p.a. 275°; in 11×80 B, tail 0.5° and 0.6° long spanning in p.a. 252° and 275°; in 31.7-cm *f*/5 L (86×), DC 7 [JON]. Feb. 28.56: in 20×80 B, "north edge of tail 15′ long and brighter" (than on previous morning) [DUC]. Feb. 28.70: in 11×80 B, broad tail 1° long between p.a. 260°–275°; parabolic coma [JON]. Feb. 28.85: in 7×50 B, coma dia. 13′, DC 4 [WOO].

Mar. 1–13: S edge of tail sharp and distinct, N edge diffuse and concave to the N [BEM]. Mar. 1.78: in 15×80 B, m_2 ≃ 5, coma dia. ≃ 3′, DC 8 [SEA]. Mar. 2.56: in 20×80 B, "north edge of tail still bright" (see Feb. 28.56 observation) [DUC]. Mar. 2.85: in 7×50 B, coma dia. 20′, DC 4 [WOO]. Mar. 3.45: in 2.5×25 B, tail 2.5° long in p.a. 280° [SEA]. Mar. 4.70: in 11×80 B, tail 1.2° long between p.a. 255°–270°, parabolic coma; in 31.7-cm *f*/5 L (86×), coma dia. 5′, DC 8, coma stronger on S side [JON]. Mar. 4.76: in 15×80 B, DC 8, tail ≃ 3° long in p.a. 280° [SEA]. Mar. 5.70: in 7.8-cm *f*/7.5 R (30×), tail 1.5° long between p.a. 257°–270°, parabolic coma; in 31.7-cm *f*/5 L (86×), m_2 = 6.3 (SAOC), in twilight [JON]. Mar. 5.76: in 15×80 B, DC 8, tail 3.5° long in p.a. 270° [SEA]. Mar. 6.74: in 15×80 B, tail as on Mar. 5.76 [SEA]. Mar. 6.83: in 7×50 B, coma dia. 23′, DC 4; fine filaments seen in tail [WOO]. Mar. 8.26: also 2.0° tail in p.a. 275° [SHA02]. Mar. 8.69: in 11×80 B, tails 2.4° and 1.3° long spanning p.a. 260°–280° and 255°–260°; "the tail brightness 0.5° from head was ≃ Scutum cloud of Milky Way"; in 31.7-cm *f*/5 L (86×), m_2 = 8.2 (SAOC), coma dia. 5′, DC 8 [JON]. Mar. 9.69: in 11×80 B, tail 2.8° toward p.a. 255°–273°; "tail at 0.5° from head midway in brightness between Sgr and Sct clouds" [JON]. Mar. 9.75: also tail 4.5° long in p.a. 276°, 10×50 B [BOU]. Mar. 10.69: in 11×80 B, tail ~ 3.5° long; in 31.7-cm *f*/5 L (86×), coma dia. 7′ [JON]. Mar. 10.73: also tail 6.0° long in p.a. 275°, 10×50 B [BOU]. Mar. 11.75: to naked eye, second tail 5° long in p.a. ~ 270° [BOU]. Mar. 13.70: in 11×80 B, DC 8, 3.5° tail toward p.a. 258°–268°, also short tail at p.a. 277°, "bright nucleus in parabolic coma"; in 31.7-cm *f*/5 L (86×), m_2 = 7.3 (SAOC), coma dia. 6.5′ [JON]. Mar. 13.75: to naked eye, second tail 5° long in p.a. 270° [BOU]. Mar. 13.83: in 7×50 B, coma dia. 20′, DC 4 [WOO]. Mar. 14.53: in 20×80 B, "tail ≃ 0.25° wide, more narrow near coma" [DUC]. Mar. 14.73: to naked eye, second tail 6° long in p.a. 272° [BOU]. Mar. 14.78: m_2 = 8 in 15.2-cm *f*/5 L, 127× [SEA]. Mar. 14.78: in 15.2-cm *f*/5 L, 127×, inner coma dia. < 0.1′, m_2 ≃ 8.0 :, (in-focus, AA) [BOU].

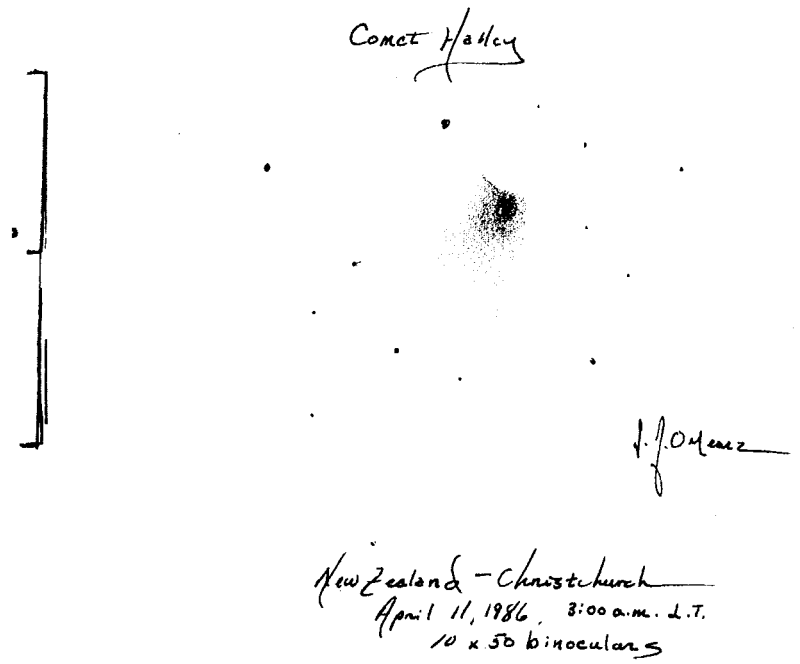
◇ *P/Halley (cont.).* 1986 Mar. 14.83: in 7×50 B, coma dia. 21′, DC 4; fine filaments seen in tail [WOO]. Mar. 15.23: in 3×18 B, the gas tail was 10° long; also dust tail 7.5° long in p.a. 258°–280° [BUS01]. Mar. 15.70: in 11×80 B, DC 8; 1°, 2°, and 3° tails in p.a. 252°–270°, 254°–269°, and 258°–269° [JON]. Mar. 15.78: in 10×50 B, second tail 3.5° long in p.a. 270° [BOU]. Mar. 15.83: in 7×50 B, coma dia. 20′, DC 4; fine filaments seen in tail [WOO]. Mar. 16.18: also 3.5° tail in p.a. 274° [SHA02]. Mar. 16.23: gas tail ~ 10° long; dust tail ~ 3° long [COM]. Mar. 16.23: in 3×18 B, the 10° tail was a gas tail; also dust tail 7° long in p.a. 250°–280° [BUS01]. Mar. 16.70: in 11×80 B, "fairly symmetrical parabolic coma"; in 31.7-cm *f*/5 L (86×), m_2 = 8.3 (in-focus), = 7.8 (slight defocus), SAOC [JON]. Mar. 17-20: both edges of tail diffuse [BEM]. Mar. 17.53: in 20×80 B, coma "larger and more diffuse" [DUC]. Mar. 17.73: "tail a little fainter than Sct cloud"; in 31.7-cm *f*/5 L (86×), m_2 = 8.5 (SAOC) [JON]. Mar. 17.75: in 10×50 B, second tail 3.0° long in p.a. 267° [BOU]. Mar. 18.23: in 3×18 B, the 10° tail was a gas tail; also dust tail 7° long in p.a. 255°–280° [BUS01]. Mar. 18.53: in 20×80 B, "bright, shallow parabolic 'bow-shock' on E side of nucleus, several arcmin across" [DUC]. Mar. 18.71: "tail a little fainter than Sct cloud, coma wider than tail near head (11×80 B), southern part of tail longer and brighter"; in 31.7-cm *f*/5 L (86×), m_2 = 8.6 (SAOC) [JON]. Mar. 18.71: to naked eye, 5° tail is dust tail, gas tail perhaps 9° in p.a. 265°; in 15×80 B, coma dia. 8′, DC 8 [SEA]. Mar. 18.73: in 10×50 B, second tail 4° long in p.a. 270°; same tail 6° long to naked eye [BOU]. Mar. 19.23: in 3×18 B, the 13° tail was a gas tail; also dust tail 7° long in p.a. 248°–280° [BUS01]. Mar. 19.73: in 15 × 80 B, coma dia. 11′, DC 7 [SEA]. Mar. 19.73: to naked eye, second tail 5° long in p.a. 270° [BOU]. Mar. 20.24: in 3×18 B, the 13° tail was a gas tail; also dust tail 7° long in p.a. 255°–290° [BUS01]. Mar. 20.73: in 15×80 B, coma dia. 8′, DC 8, tail possibly 0.25° long in p.a. ~ 5°; possible anti-tail [SEA]. Mar. 20.76: to naked eye, second tail 7° long in p.a. 273°; in 15×80 B, tail 0.25° long in p.a. ~ 5° [BOU]. Mar. 21.74: to naked eye, second tail 5.5° long in p.a. 271° [BOU]. Mar. 21.83: in 7×50 B, coma dia. 18′, DC 4; fine filaments seen in tail [WOO]. Mar. 22.75: 5° tail was dust tail; also 6.5°-tail (gas) in p.a. 260° [SEA]. Mar. 22.75: in 10×50 B, second tail 5° long in p.a. 270° [BOU]. Mar. 22.77: to naked eye, second tail 6° long in p.a. 270° [BOU]. Mar. 22.83: in 7×50 B, coma dia. 19′, DC 4; fine filaments seen in tail [WOO]. Mar. 23.69: in 11×80 B, 3.5° tail in p.a. 258°–280° [JON]. Mar. 23.74: in 15×80 B, coma dia. 15′ [SEA]. Mar. 23.83: in 7×50 B, coma dia. 19′, DC 4 [WOO]. Mar. 24.72: in 11×80 B, DC 8–9, 3.2° tail in p.a. 262°–278°; in 31.7-cm *f*/5 L (86×), m_2 = 8.3 (SAOC) [JON]. Mar. 24.78: in 15×80 B, coma dia. 16′, DC 7, sharp kink in ion tail ~ 3° from coma [SEA]. Mar. 24.81: in 10×50 B, second tail 5° long in p.a. 271° [BOU]. Mar. 25.71: in 31.7-cm *f*/5 L (86×), m_2 = 8.5 (SAOC) [JON]. Mar. 26.71: in 31.7-cm *f*/5 L (86×), m_2 = 9.1 (SAOC) [JON]. Mar. 27.67: in 31.7-cm *f*/5 L (86×), m_2 = 8.6 (SAOC) [JON]. Mar. 30.74: in 31.7-cm *f*/5 L (86×), $m_2 \simeq$ 9.8 (VN) and mag of "condensation" = 8.1 (VN, Sidgwick) [JON]. Mar. 31.73: in 31.7-cm *f*/5 L (86×), m_2 = 8.2 (SAOC) [JON].

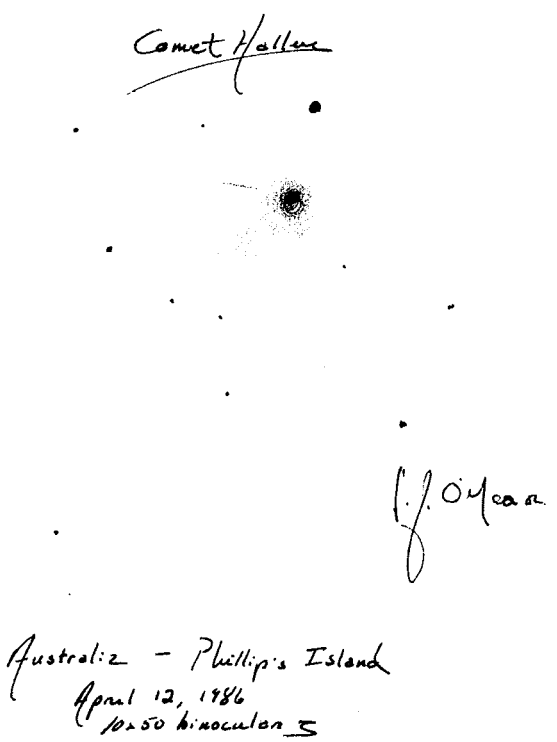
Apr. 1.53: to naked eye, second tail 6° long in p.a. 285° [BOU]. Apr. 1.71: in 31.7-cm *f*/5 L (86×), m_2 = 9.8 (SAOC), "bright condensation around nucleus" [JON]. Apr. 2.10: additional tail 1.5° long in p.a. 74° [MER]. Apr. 2.71: in 7×50 B, coma dia. 25′, DC 4 [WOO]. Apr. 3.09: broad, 4.7° tail at p.a. 284°–296° (other tail was narrow) [SHA02]. Apr. 3.11: in 10×70 B, tail 3° long in p.a. 278° [MER]. Apr. 4.54: in 20×65 B, 0.3° anti-tail in p.a. 30° [SEA]. Apr. 4.71: in 7×50 B, coma dia. 24′, DC 4 [WOO]. Apr. 4.75: in 31.7-cm *f*/5 L (86×), m_2 = 9.9 (SAOC) [JON]. Apr. 5.25: also tails 0.83°, 0.25°, and 0.15° long in p.a. 322°, 122°, and 186° [MER]. Apr. 5.56: in 10×50 B, DC 4, gas tail 4.5° long in p.a. ~ 280°, dust fan-tail 3.0° long in p.a. 295° and 1.5° in p.a. 46° [BOU]. Apr. 5.58: in 15×80 B, anti-tail longer and brighter, ~ 0.5° long [SEA].

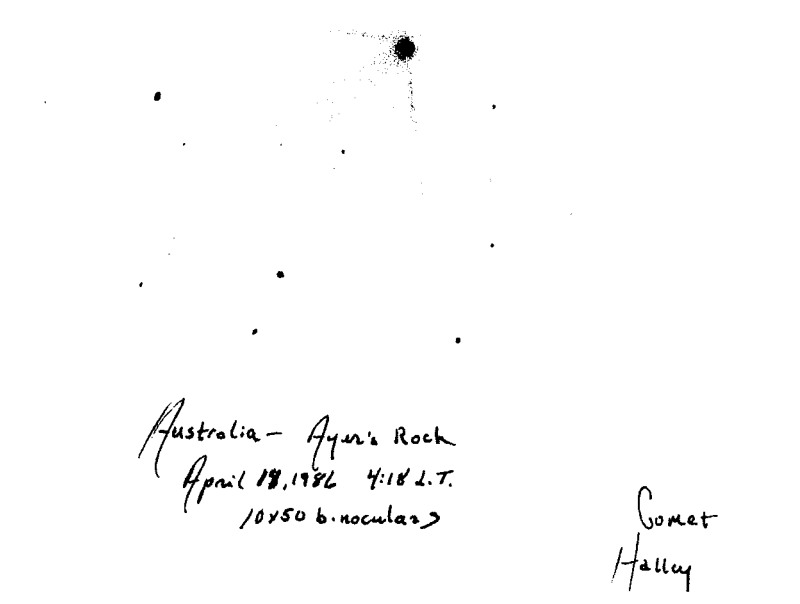
Apr. 6: Alan Hale [HAL] noted "a distinct brightening of the coma, first observed on Apr. 6, which persisted for several days; accompanying the greater brightness was a pronounced increase in jet activity in the inner coma. Especially noteworthy is the rise of ~ 0.5 mag between Apr. 5 and 6. Whether the 0.3-mag increase in 1.5 hr (18:05-19:28 UT) noted on Apr. 6 is real or illusory is unknown . . . This same brightness was observed throughout the following night. On subsequent nights a slow fading was observed. Very little if any jetting was noticed on Apr. 4 and 5, with only zones of varying brightness detected in the inner coma. On Apr. 6, a relatively bright jet at p.a. 85° and a fainter jet at p.a. 115° were seen, both of which were embedded in a fan-shaped envelope. By 19:30 UT on the same morning, the envelope appeared slightly larger and more fanned out. On Apr. 7, the entire structure was significantly brighter and larger: the primary jet, which appeared bright, curved into a distinct envelope which delineated the ends of the secondary and one or two lesser jets. On subsequent nights this activity subsided significantly, with the primary jet returning to its previous brightness and size. Only a trace of the secondary jet was later observed (on Apr. 11), and the distinct envelope seen on Apr. 7 was not observed again." Mr. Hale was observing from Australia at the time, and several other observers also noted the increase in brightness at this time (as published in the tabulated data in this and the last issue), including BOU, GRE, JON, MER, SEA, and SHA02, among others.

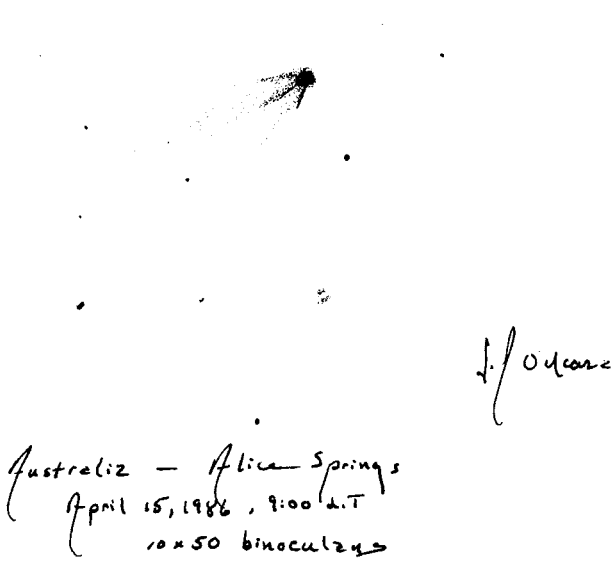
Apr. 6.48: in 31.7-cm *f*/5 L (86×), m_2 = 8.6 (VN) [JON]. Apr. 6.71: in 7×50 B, coma dia. 25′, DC 5 [WOO]. Apr. 7.11: also tails 0.37° and 0.47° long in p.a. 69° and 126° [MER]. Apr. 7.49: "coma wider than tail near head" [JON]. Apr. 7.58: in 15×80 B, tails 4° and 0.5° in p.a. 290° and 45° [SEA]. Apr. 7.59: in 10×50 B, 3.5°-tail was gas tail; additional tails ("dust fan") 2.5° and 1.2° in p.a. ~ 285° and 50° [BOU]. Apr. 7.71: in 7×50 B, coma dia. 30′, DC 4 [WOO]. Apr. 8.45: in 31.7-cm *f*/5 L (86×), m_2 = 8.3 (VN), "diffuse coma with small, bright nucleus" [JON]. Apr. 8.52: "false nucleus very bright" [SEA]. Apr. 8.71: in 7×50 B, coma dia. 30′, DC 4 [WOO]. Apr. 8.95: also 7.4° and 9.6° tails in p.a. 330° and 9° [SHA02]. Apr. 9.41: fan-shaped tail spanning p.a. 337° to 18° by naked eye and to 75° with 20×80 B [MAC]. Apr. 9.52: tail spanned p.a. 310°–50° [BOR]. Apr. 9.53: in 15×80 B, also tail 0.67° long in p.a. 45° [SEA]. Apr. 9.55: in 10×50 B, 4°-tail was gas tail; additional tails ("dust fan") 2.5° and 1.5° in p.a. 335° and 38° [BOU]. Apr. 9.71: in 7×50 B, coma dia. 35′, DC 4 [WOO].

◇ *P/Halley (cont.).* 1986 Apr. 9.88: also 2.9° tail in p.a. 306°–356° [SHA02]. Apr. 10.47: to naked eye, fan-shaped tail spanning p.a. 342°–32°; in 20×80 B, same tail spanned 327°–64° [MAC]. Apr. 10.56: in 15×80 B, very broad fan tail between p.a. ~ 55° and 320° [SEA]. Apr. 10.57: in 31.7-cm *f*/5 L (86×), DC 8, "large diffuse coma with small, bright condensation" of dia. ~ 1′ [JON]. Apr. 10.71: in 7×50 B, coma dia. 35′, DC 4 [WOO]. Apr. 10.76: in 10×50 B, coma dia. 26′, DC 4–5, gas tail 4.5° long in p.a. 320°, dust tails ("fan") 2.5° and 1.75° long in p.a. ~ 340° and 53° [BOU]. Apr. 10.91: also 4.5° and 2.6° tails in p.a. 0° and 321°–38° [SHA02]. Apr. 11.02: in 8×30 B, type-II tail 2.6° long in p.a. 325°–0° [HAS02]. Apr. 11.14: in 10×70 B, second tail 1.3° long in p.a. 73° [DEA]. Apr. 11.42: in 15×80 B, tails 3.5° and ~ 1° in p.a. 330° and 60° [SEA]. Apr. 11.50: "straight gas tail, fan-shaped dust tail" [BEM]. Apr. 11.71: in 7×50 B, coma dia. 30′, DC 4 [WOO]. Apr. 11.74: in 10×50 B, gas tail 6° long in p.a. 337°, dust fan 3.5° in p.a. ~ 350°–70° [BOU]. Apr. 12.19: in 10×70 B, coma dia. 22′, tails 1.0° in p.a. 62° and 1.2° in p.a. 348° [DEA]. Apr. 12.30: "parabolic" 3.7°-long tail at p.a. 11°–39° (other tail was straight) [SHA02]. Apr. 12.40: to naked eye, tail 1.5° long in p.a. 360° [KEE]. Apr. 12.78: in 10×50 B, dust fan-tail 3.0° and 2.5° long in p.a. 7° and 86° [BOU].









◇ *P/Halley (cont.).* 1986 Apr. 12.93: tails 3.7° (main tail), 3.1° (faint), and 1.6° (fan of material) in p.a. 17°, 36°, and 17°–77°; other tail was faint and narrow [SHA02]. Apr. 13.04: to naked eye, 9.9° tail in p.a. 44° (central direction of parabolic tail) [SHA02]. Apr. 13.25: 3.4° tail was very faint [SHA02]. Apr. 13.44: in 10×50 B, 3.5°-tail was part of dust fan; also tails 2.5° (gas) and 3° (dust) in p.a. 354° and 90° [BOU]. Apr. 13.46: to naked eye, broad tail spanning p.a. 280° – 10° (90° wide) [KEE]. Apr. 13.70: in 7×50 B, coma dia. 18′; in 31.7-cm *f*/5 L (86×), m_2 = 9.0 (SAOC) [JON]. Apr. 13.91: also fan-tail 3.1° long in p.a. 37°–65° (other tail was faint, narrow) [SHA02]. Apr. 14.06: in 10×70 B, coma dia. 26′, tails 2.7° in p.a. 55° and 1.1° in p.a. 352° [DEA]. Apr. 14.44: in 31.7-cm *f*/5 L (86×), $m_2 \simeq 9.5$ (SAOC) [JON]. Apr. 14.46: in 9×63 B, 4°-tail was part of dust fan; also tails each 3° long in p.a. 357° (gas) and 18° (dust) [BOU]. Apr. 14.50: tail 12° long to naked eye [THO]. Apr. 14.62: to naked eye, tails in a broad fan, ~ 20° in p.a. 80° [SEA]. Apr. 15.34: fan-shaped tail spanning p.a. 36°–61° [MAC]. Apr. 15.49: in 9×63 B, 4.5°-tail was gas tail; also dust fan 4° long in p.a. 28° – 92° [BOU]. Apr. 15.64: also tail 1.7° long in p.a. 91° [MAC]. Apr. 15.64: also tail 1.7° long in p.a. 86°–96° [MAC]. Apr. 15.67: to naked eye, coma dia. 40′, DC 5, broad tail 12° long in p.a. 10° – 80° [KEE]. Apr. 15.72: in 31.7-cm *f*/5 L (86×), m_2 = 8.6 (SAOC) [JON]. Apr. 16.44: fan-shaped tail spanning p.a. 41°–77° [MAC]. Apr. 16.52: to naked eye, additional tail 6° long in p.a. 85° [SEA]. Apr. 16.52: to naked eye, coma dia. 30′ and tail length 15° [THO]. Apr. 16.57: in 10×50 B, 5.5°-tail was part of dust fan; also tails each 4° long in p.a. 34° (gas) and 43° – 94° (dust) [BOU]. Apr. 16.61: tail spanned p.a. 45°–95° [BOR]. Apr. 16.71: in 7×50 B, coma dia. 16′, DC 7, tail 0.5° suspected toward p.a. 75°–105°, hazy sky; in 31.7-cm *f*/5 L (86×), m_2 = 9.5 (SAOC) [JON]. Apr. 17.02: also 2.1° tail in p.a. 19°–103°, "side rays brighter than main tail" [SHA02]. Apr. 17.06: in 10×70 B, coma dia. 22′, tails 2.1° in p.a. 30° and 1.0° in p.a. 125° [DEA]. Apr. 17.45: in 7×50 B, DC 6, 1.3° tail (suspected to 3.8°) in p.a. 65°–93° [JON]. Apr. 18.13: also tail lengths 6.6° and 4.6° in p.a. 65° (center of broad tail) and 50° (edge of broad tail); other tail was straight [SHA02]. Apr. 18.42: in 31.7-cm *f*/5 L (86×), m_2 = 9.1 (AA) [JON]. Apr. 18.67: to naked eye, coma dia. 30′ and tail 20° long in p.a. 70°–100° [THO]. Apr. 19.18: in 10×70 B, coma dia. 18′, fan tail in p.a. 70° [DEA]. Apr. 19.66: tail narrower [SEA]. Apr. 19.68: to naked eye, dust tail was also 20° in p.a. ~ 100° [BOU]. Apr. 19.90: in 20×80 B, coma dia. 26′, DC 6–7, m_2 = 4.9 (WW) [SHA02]. Apr. 20.19–26.21: coma irregular in shape [MAC]. Apr. 20.71: in 10×50 B, dust fan was spread over p.a. 78° – 108° [BOU]. Apr. 20.71: nuclear condensation stellar in 15×80 B [SEA]. Apr. 20.71: to naked eye, coma dia. 30′ and tail 20° long in p.a. 75°–97° [THO]. Apr. 21.40: in 31.7-cm *f*/5 L (86×), m_2 = 8.0 (SAOC) [JON]. Apr. 24.51: to naked eye, tail 25° long in p.a. 87°–95° [THO]. Apr. 24.54: in 7×50 B, coma dia. 22′, DC 3 [WOO]. Apr. 25.89: in 7×50 B, also 2.4° tail in p.a. 109° [SHA02]. Apr. 26.89: broad tail [SHA02]. Apr. 27.41: in 31.7-cm *f*/5 L (86×), m_2 = 9.6 (SAOC), "small nucleus, [with surrounding] condensation not very bright" [JON]. Apr. 27.42: to naked eye, tail 22° long in p.a. 95°–125° [THO]. Apr. 28.54: in 7×50 B, coma dia. 18′, DC 5 [WOO]. Apr. 29.37: in 31.7-cm *f*/5 L (86×), m_2 = 8.9 (SAOC), "small nucleus surrounded by bright condensation" [JON]. Apr. 29.54: in 7×50 B, coma dia. 19′, DC 5 [WOO]. Apr. 29.90: tail 10° wide [SHA02]. Apr. 30.35: in 31.7-cm *f*/5 L (86×), coma dia. 7′, DC 8, dia. of cond. ~ 2′ [JON].

May 1.41: in 15×80 B, tail 3.5° long in p.a. 100° [SEA]. May 1.84: also tail 0.5° long in p.a. 136° [GUB]. May 1.88: tail 12° wide [SHA02]. May 1.92: in 10×70 B, coma dia. 16′, tail 3° long in p.a. 97° [DEA]. May 2.42: in 31.7-cm *f*/5 L (86×), m_2 = 10 (BD −16°3141), "diffuse coma gradually brighter towards small bright nucleus" [JON]. May 2.89: in 20×80 B, also faint 2.2° tail in p.a. 78° [SHA02]. May 2.89: in 40-cm *f*/5 L (170×), plasma tail 0.07° long in p.a. 69° and jets of length 0.01°, 0.05°, 0.02°, and 0.01° in p.a. 195°, 265°, 278°, and 340°; at 81×, diffuse tails 0.28° and 0.17° long in p.a. 114° and 142° [MER]. May 3.37: in 31.7-cm *f*/5 L (86×), m_2 = 9.8 (BD), "diffuse coma, strongly condensed about small nucleus" [JON]. May 3.50: in 15×80 B, tail 3° long in p.a. 105° [SEA]. May 5.09: in 10×70 B, coma dia. 18′, tail 2.7° long in p.a. 110° [DEA]. May 6.38: in 31.7-cm *f*/5 L (86×), DC 8, "large, diffuse coma with small, strong condensation" [JON]. May 6.46: in 15×80 B, tail 2.6° long in p.a. 107° [SEA]. May 7.39: in 7.8-cm *f*/7.5 R (30×), DC 4, 0.4° tail at p.a. 107° [JON]. May 7.90: in 40-cm *f*/5 L (170×), fountains toward p.a. 146° and 34° and tails of length 0.03°, 0.02°, 0.01°, and 0.01° in p.a. 61°, 201°, 242°, and 303° [MER]. May 9.42: in 15×80 B, tail 2° long in p.a. 105° [SEA]. May 9.86: possible broad tail toward p.a. 80°; possible narrow, straight tail toward p.a. 130° [ZAN]. May 10.10: in 15-cm *f*/5 R (31×), tail 0.47° long in p.a. 115° [MOR03]. May 10.58: "comet less condensed" than on May 4.61 [BRY02]. May 10.88: "quite broad tail" suspected [ZAN]. May 12.12: in 15-cm *f*/5 R (31×), tail 0.47° long in p.a. 110° [MOR03]. May 14.10: in 15-cm *f*/5 R (31×), tail 0.40° long in p.a. 110° [MOR03]. June 5.36: tail broad and faint [SEA].

The remaining P/Halley observations which follow were all made by SEA with 15×80 B. May 12.36: 1.5° tail in p.a. 100°. May 13.36: 1.6° tail in p.a. 105°. May 16.45: 1.4° tail in p.a. 107°. May 19.36: 1.5° tail in p.a. 107°. May 21.36: tail ~ 1° long in p.a. 105°. May 22.36: 1° tail in p.a. ~ 107°. May 25.35: 1.4° tail in p.a. 108°. May 27.35: 1° tail in p.a. ~ 100°; hint of a fan between p.a. ~ 60° and 150°. May 28.37: tails 1.6° and 1.9° long in p.a. 108° and 150°. June 1.41: 2° tail in p.a. 108°. June 3.36: 2° tail in p.a. 110°. June 4.36: broad tail 1° long in p.a. 108°.

◇ *P/Giacobini-Zinner* 1984*e*: 1985 July 10.96: there was also a 1′ jet toward p.a. 14° and a 4′ extension toward p.a. 198° [KEI]. July 14.95: in 29.8-cm L, broad tail 2′ long in p.a. 180° and a 1′ jet in p.a. 17° [KEI]. July 16.96: in 29.8-cm L, "numerous appendages" in W-SW direction [KEI]. July 17.92: "fan-shaped coma oriented toward p.a. 215°" [GUA]. J.-C. Merlin [MER] noted that this comet showed a "quasi-systematic sunward spike from July 20 until the end of Sept." July 20.02: in 20×80 B, also a 2′ jet in p.a. 15° [KEI]. July 20.1: "no fan configuration visible; bright central condensation" [GUA]. July 20.95: in 29.8-cm L, "numerous appendages and streamers" visible [KEI]. Aug. 7.95: tail fanned in p.a. 250°–335° [KEI]. Aug. 11.95: much structure was visible in 29.8-cm L (68×) [KEI]. Aug. 14.92: in 20×80 B, fan tail also visible in p.a. 241°–300°, with jets in p.a. 54° and 132° [KEI]. Aug. 17.00: in 20×80 B, fan tail toward p.a. 270°–228° and 3′ jet toward p.a. 38°; in 50-mm B, the fan covered p.a. 319°–230° [KEI]. Aug. 25.08: in 20×80 B, also a tail 0.10° long in p.a. 255° [KEI]. Sept. 11.10: in 20×80 B, fan tail covering p.a. 309°–324° [KEI]. Sept. 12.33: in 31.7-cm L, coma was fanshaped [BOR]. Sept. 13.11: in 20×80 B, fan tail covering p.a. 267°–284° [KEI]. Sept. 14.34: comet much fainter tonight than on Sept. 12; in 31.7-cm L, the coma and tail were very wide; in 50-cm *f*/5 L (96×), coma dia. = 1.6′ [BOR]. Sept. 15.34: in 20×80 B, the coma contained a 2′ condensation [BOR].

◇ *Comet Levy-Rudenko* 1984 *XXIII:* 1984 Dec. 24.76: fanned in p.a. 70°–180° [KEI]. 1985 Jan. 23.78: asymmetric coma [KEI].

◇ *Comet Hartley-Good* 1985*l*: Merlin [MER] found a well-condensed, fan-shaped coma which extended a few arcmin toward the N (tailward); the comet showed a "quasi-sunward spike (toward S)" on 1985 Sept. 22 and 24. Oct. 1.50: very vague outer coma [PEA]. Oct. 8.09: in 31.7-cm L, condensation offset well to the W [BOR]. Oct. 10.08: in 20×80 B, coma dia. 10′, DC 3; in 31.7-cm *f*/6 L (55×), coma dia. 9′, with very vague, diffuse outer halo [BOR]. Oct. 12.02: in 31.7-cm *f*/6 L (68×), coma dia. 8′, DC 5, not-quite-stellar nucleus [BOR]. Oct. 18.02: in 10×50 B, "huge, faint halo suspected"; in 31.7-cm *f*/6 L (55×), coma dia. 8′, DC 5, tail 0.2° long suspected in p.a. 100° [BOR]. Oct. 31.97: in 31.7-cm L, 68×, coma dia. 3.0′ [BOR]. Nov. 18.98: in 50-cm *f*/5 L (78×), coma dia. ~ 3′, DC 5 [BOR].

◇ *Comet Thiele* 1985*m*: 1985 Oct. 23.35: in 31.7-cm L, "sharp, starlike nucleus" [BOR]. Oct. 26.39: in 31.7-cm L, "sharp nucleus offset east of center" [BOR]. Nov. 9.01: in 20×80 B, coma dia. 8.5′, DC 2; in 31.7-cm *f*/6 L (55×), coma dia. ~ 7′, "strange object with 1′ condensation and almost stellar nucleus of mag ~ 12" [BOR].

◇ *P/Boethin* 1985*n*: 1985 Dec. 4.49: "diffuse and condensed" [BOE]. 1986 Jan. 12.00: in 50-cm *f*/5 L (78×), coma dia. 3.0′, DC = 4, "bright, broad central area" [BOR]. Feb. 4.78: "elliptical shape" [MOE]. Mar. 2.48 and 7.49: "very diffuse" [BOE]. Mar. 28.82: "slightly elliptical coma" [MOE].

◇ *P/Wirtanen* 1985*q*: 1986 Apr. 28.20: hint of a short tail toward the SW (sunward) [MOR]. May 3.21: hint of a faint central condensation [MOR].

◇ *P/Machholz* 1986*e*: May 12.45: discovery [MAC]. May 28.32: "the comet seemed to change from DC = 3 to 1 in 0.7 hr as observed in 36-cm L" [MAC]. June 7.99: extremely diffuse, no condensation [ZAN]. June 10.22: in 16-inch C, the comet's strong central condensation made the magnitude estimate difficult; outside of the innermost 30″, the coma was extremely faint and tenuous (no doubt lost quickly due to the long focal length and high magnification employed, when compared with observations by other observers using smaller telescopes during June) [GRE].

◇ *P/Schwassmann-Wachmann 1*: J.-C. Merlin [MER] writes concerning his recent observation from V. F. de Assis Neto's Observatório do Perau in Brazil (latitude –21°): "When detected on Apr. 4 with a 31-cm L, it was a round and diffuse 0.9′ patch with a 20″ central condensation. The outburst was confirmed the next night, when the comet's central region was slightly more condensed and now seen with 61× (even though 120× was required on Apr. 4); there was a spiral streamer starting at the W edge of the central condensation and then curving to the N. A third observation on Apr. 7 showed that the outburst was declining: only a faint, diffuse, rather uniform patch was detected at 150×." On June 26.46, Jim Gibson at Palomar (60-inch C + CCD) found mag ~ 20 in Gunn *r* filter.

Key to observers with observations published in this issue [those with asterisks (*) preceding the 5-character code are new additions to the Observer Key (cf. ICQ 8, 44)]:

BAR		Sandro Baroni, Italy
BAT01		Hilma Batza, Australia
BEM		C. S. Bembrick, Australia
BOR		John E. Bortle, NY, U.S.A.
BOU	11	Reinder J. Bouma, The Netherlands
*BRY02	14	K. Bryant, Australia
BUS01	11	E. P. Bus, The Netherlands
CLA	07	Maurice L. Clark, Australia
COM	05	Georg Comello, The Netherlands
DEA		V. F. de Assis Neto, Brazil
FEI	11	H. Feijth, The Netherlands
*FIT	14	P. Fitzgerald, Australia
GEE	11	J. Geenen, The Netherlands
GRE		Daniel W. E. Green, U.S.A.
GUA		Carlo Gualdoni, Italy
GUB		Herbert Gubo, West Germany
HAL		Alan Hale, U.S.A.
HAS02		Werner Hasubick, West Germany
*HAV		Roberto Haver, Italy
HUR	01	Guy M. Hurst, England
JAN	11	D. Jannink, The Netherlands
JON	09	Albert F. Jones, New Zealand
KEE	05	Richard A. Keen, CO, U.S.A.
KEE01	07	David Russell Keedy, England
KEI	01	Graham Keitch, England
KES01		Sa'ndor Keszthelyi, Hungary
KOC		Bernd Koch, West Germany
KOC01		Volkmar Koch, West Germany
KUI	11	G. Kuipers, The Netherlands
MAA		W. J. Maat, The Netherlands
MAC		Donald E. Machholz, CA, U.S.A.
MAT01		Vic L. Matchett, Australia
*MCB		Paul V. McBride, AR, U.S.A.
MER		Jean-Claude Merlin, France
MOE		Michael Moeller, West Germany
MOR		Charles S. Morris, U.S.A.
MOR03		Warren C. Morrison, Canada
NOL		Michael Nolle, West Germany
PAN	01	R. W. Panther, England
PEA		Andrew R. Pearce, Australia
REI01		Johann Reifberger, Austria
SCH04		A. H. Scholten, The Netherlands
SEA		David A. J. Seargent, Australia
SHA02	07	Jonathan D. Shanklin, England
THO		Gregg D. Thompson, Australia
WEG	11	R. L. W. van der Weg, The Netherlands
WIL03		P. Wils, Belgium
WOO		Jeff Wood, Australia
ZAN		Mauro Zanotta, Italy
ZAN01		W. T. Zanstra, The Netherlands

Comet Černis (1983 XII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 08 15.10	S	10.3	VB	20	R	14	40	2.6	3			SHA02
1983 08 16.10	S	10.2	VB	33	L	4	45	2.2	4/			SHA02
1983 08 19.11	S	10.2	VB	20	R	14	120	1.1	3			SHA02
1983 09 05.02	S	10.2	VB	33	L	4	45	2.6	3/			SHA02
1983 09 05.04	S	10.2	VB	8.0	B		20	3.2	4			SHA02
1983 09 19.11	S	10.1	V	20	L	4	35	4.5	3			PAN
1983 10 14.05	S	10.8	V	33	L	4	45	2.0	5			SHA02

Comet Shoemaker (1983 XV)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 09 18.84	S	11.3	A	26	L		120	2.5	2			HUR
1983 09 19.82	S	11.2	A	26	L		80	2.5	2			HUR

Comet Austin (1984 XIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 09 01.14	S	7.3	V	8.0	B		20	1.8	7/	0.33	325	SHA02
1984 09 02.13	S	6.6	A	8.0	B		20	2.1	7	0.38	302	SHA02
1984 09 05.10	S	6.9	V	8.0	B		20	4.3	7	0.33	320	SHA02
1984 09 10.16	S	7.6	A	8.0	B		15	7				PAN
1984 09 13.13	S	7.8	A	8.0	B		15	5	3			PAN
1984 09 15.06	S	7.8	A	8.0	B		15	5	3			PAN
1984 09 24.13	S	8.2	A	8.0	B		15	6.8	3			PAN
1984 09 25.00	S	8.5	A	20	R	14	40	2	4			SHA02
1984 09 25.14	S	8.1	A	8.0	B		15	4.3	3			PAN
1984 09 29.99	S	9.9	A	20	R	14	40	1.4	3/			SHA02
1984 10 02.15	S	8.4	A	8.0	B		15	5	2			PAN
1984 10 04.08	S	9.4	V	33	L	4	4	7.7	4			SHA02
1984 10 04.14	S	8.5	V	8.0	B		20	7	3			SHA02
1984 10 04.15	S	8.7	A	8.0	B		15	5	2			PAN
1984 10 06.16	S	8.9	A	8.0	B		15	5	2			PAN
1984 10 18.85	S	9.1	V	8.0	B		20	2.7	2			SHA02
1984 10 20.13	S	9.6	V	8.0	B		20	5.4	1/			SHA02
1984 10 20.89	S	9.5	A	20	L	4	35	6	1			PAN
1984 10 25.92	S	9.9	A	20	L	4	35	4	1			PAN
1984 10 26.08	S	10.2	V	8.0	B		20	5.4	0			SHA02
1984 10 26.19	S	10.7	V	33	L	4	45	9.7	0			SHA02
1984 10 26.88	S	10.1	A	20	L	4	35	6	0/			PAN
1984 10 27.11	S	10.6	V	8.0	B		20	4.1	0/			SHA02
1984 11 04.13	S	10.7	V	33	L	4	45	8.6	1			SHA02

Comet Levy-Rudenko (1984 XXIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 11 15.83	S	9.0	AA	29.8	L	5	62	3.0	2/			KEI
1984 11 25.77	S	9.0	AA	8.0	B		20	3.0		0.17	45	KEI
1984 12 24.76	S	8.0	AA	8.0	B		20	2.0		0.33	108	KEI
1985 01 12.75	S	8.1	A	8.0	B	5	20	6	5			BUS01
1985 01 12.78	S	8.2	AA	8.0	B		20	2.4				KEI
1985 01 13.76	S	8.2	AA	8.0	B		20	4.8				KEI
1985 01 22.78	S	7.9	AA	8.0	B		20	4.0	2/			KEI
1985 01 23.78	S	7.7	AA	5.0	B		10	7.4				KEI
1985 01 23.78	S	7.9	AA	8.0	B		20	6.5	2/			KEI
1985 02 10.88	S	8.4	A	10.8	L	4	17	6	1/			BUS01
1985 02 18.88	S	8.7	A	25.4	J	6	48	5	2			BUS01

Comet Shoemaker (1984s)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 11 02.98	S	11.1	A	29.8	L	5	62	1.4	5/			KEI
1984 11 24.04	S	12.3	WA	33	L	4	45	1.9	6			SHA02
1985 01 22.92	S	10.4	A	29.8	L	5	62	1.2	3			KEI
1985 01 23.86	S	10.9	A	29.8	L	5	62	1.1				KEI

Comet Hartley-Good (19851)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 10 05.83	S	7.6	A	15.6	L	5	24	12	0/			BUS01
1985 10 06.82	S	7.8	A	6.0	B	5	12	10	2			WEG
1985 10 08.80	S	8.6	A	11.0	R	10	22	15	2	0.33	125	COM
1985 10 08.83	S	7.8	A	15.6	L	5	24	13	0/			BOU
1985 10 08.85	S	7.6	A	6.0	B	5	12	12	2/			WEG
1985 10 09.87	S	9.0	A	11.0	R	10	22					COM
1985 10 10.89	M	8.0	AA	10	L	6	28	7.5	3			GUA
1985 10 11.80	S	7.8	A	8.0	B	5	15	10	1			SCH04
1985 10 11.82	S	7.6	A	6.0	B	5	12	12	2/	0.17	120	WEG
1985 10 11.83	S	7.5	A	15.6	L	5	24	11	2			BOU
1985 10 11.84	S	7.4	A	5.0	B	5	10		1			BOU
1985 10 11.84	S	7.5	A	15.6	L	5	24	12	2/			BUS01
1985 10 12.81	S	7.4	A	15.6	L	5	24	10	2			BOU
1985 10 12.82	S	7.3	A	5.0	B	5	10	13	0/			BOU
1985 10 12.82	S	7.5	A	5.0	B	5	10		3			FEI
1985 10 12.84	S	7.5	A	6.8	R	5	13	12	3	0.17	130	WEG
1985 10 12.84	S	7.8	A	8.0	B	5	15	10	1			SCH04
1985 10 12.85	S	7.7	A	5.0	B	5	10	15	1			COM
1985 10 13.79	S	7.5	A	6.0	B	5	12	12	2/			WEG
1985 10 15.80	S	7.4	A	6.0	B	5	12	12	2/	0.17	128	WEG
1985 10 20.87	B	7.5	A	6.0	B	5	12	15	2/			WEG
1985 10 20.88	S	7.2	A	6.0	B	5	12	15	2/	0.30	95	WEG
1985 10 20.89	S	7.0	A	15.6	L	5	29	9	2			BOU
1985 10 28.73	M	7.3	AA	10	L	6	28	10.0	4			GUA
1985 11 02.75	S	7.0	A	6.0	B	5	12	15	5			WEG
1985 11 02.76	B	7.3	A	6.0	B	5	12	15	5			WEG
1985 11 03.75	B	8.2	A	10.0	L	10	21	5	4			GEE
1985 11 03.77	B	7.3	A	6.0	B	5	12					WEG
1985 11 03.77	S	7.0	A	6.0	B	5	12	15	4/			WEG
1985 11 03.79	S	7.5	A	8.0	B	5	15		5			SCH04
1985 11 05.73	S	6.7	A	5.0	B	5	10	6	3			COM
1985 11 05.74	S	7.3	A	8.0	B	5	15	5	6			SCH04
1985 11 05.79	S	6.9	A	8.0	B	5	20	9	3			BOU
1985 11 05.82	B	7.2	A	6.0	B	5	12	15	4/			WEG
1985 11 05.82	S	6.9	A	6.0	B	5	12	15	4/			WEG
1985 11 07.76	S	6.9	A	8.0	B	5	20	7	3/			BOU
1985 11 07.80	S	6.9	A	6.0	B	5	12	15	4/			WEG
1985 11 10.78	B	7.2	A	6.0	B	5	12	12	4/			WEG
1985 11 10.78	S	6.8	A	6.0	B	5	12	12	4/			WEG
1985 11 11.75	S	7.2	A	5.0	B	5	10		3			COM
1985 11 12.74	S	7.3	A	5.0	B	5	10		2/			COM
1985 11 12.75	S	7.0	A	8.0	B	5	20	6	4			BOU
1985 11 12.78	S	7.3	A	15.5	L	10		6	3			ZAN01
1985 11 12.87	S	7.3	A	15.0	L		40	7.5	3			MAA
1985 12 22.23	S	7.0	A	6.0	B	5	12	10	6/	1.0	330	WEG
1985 12 22.23	S	7.6	A	8.0	B	5	15		4			SCH04
1985 12 24.22	B	7.7	A	6.0	B	5	12					WEG
1985 12 24.22	S	7.3	A	6.0	B	5	12	10	7/	1.7	333	WEG
1986 01 11.22	S	8.4	A	6.0	B	5	12	10	3			WEG
1986 02 08.79	S	10.6	AA	31.7	L	5	63	4	1			PEA

Comet Thiele (1985m)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 10 20.18	S	9.2	A	10.0	L	9	23	10	2			WEG
1985 10 20.93	S	9.1	A	15.6	L	5	29	12	2			BUS01
1985 10 20.97	S	9.0	A	15.6	L	5	29	7	1/			BOU
1985 10 21.04	S	9.4	WA	29.8	L	5	62	3.3	2/			KEI
1985 10 21.05	S	9.8	A	20.0	S	10	65	10	1/			COM
1985 10 21.05	S	10.0	A	25.4	L	5	70	3	3/			KUI
1985 10 21.17	S	9.2	A	10.0	L	9	23	10	2			WEG
1985 10 22.00	S	9.6	A	20.0	S	10	65	10	1/			COM
1985 10 23.00	S	8.5	A	15.6	L	5	24	8	1			BOU
1985 10 23.18	S	8.9	A	10.0	L	9	23	15	2			WEG
1985 10 24.05	S	9.2	A	11.0	L	6	31	5	3			FEI
1985 10 24.09	S	8.4	A	15.6	L	5	24	8	2/			BOU
1985 10 24.18	S	8.9	A	10.0	L	9	23	15	1/			WEG
1985 10 25.13	S	8.9	AA	8.0	B		20	8.0	1			KEI
1985 10 25.16	S	8.8	A	10.0	L	9	23	15	2			WEG
1985 10 26.19	S	8.7	A	10.0	L	9	23	15	2			WEG
1985 11 02.77	S	8.1	A	6.0	B	5	12	15	2			WEG
1985 11 02.79	S	7.5	AA	5.0	B		10	5.0				KEI
1985 11 02.79	S	7.5	AA	8.0	B		20	8.0				KEI
1985 11 03.77	S	7.9	A	8.0	B	5	20	12	1/			BOU
1985 11 03.80	S	8.0	A	6.0	B	5	12	17	2/			WEG
1985 11 05.75	S	7.9	A	8.0	B	5	15	10	2			SCH04
1985 11 05.79	S	7.0	AA	5.0	B		10	10	1/			KEI
1985 11 05.85	S	7.9	A	6.0	B	5	12	22	2/			WEG
1985 11 07.77	S	7.8	A	8.0	B	5	20	10	1/			BOU
1985 11 07.85	S	7.7	A	6.0	B	5	12	15	2			WEG
1985 11 07.86	B	8.2	A	6.0	B	5	12	15	2			WEG
1985 11 07.94	S	7.9	A	11.5	L	5	23	12	2/			KUI
1985 11 07.94	S	8.7	A	11.0	R	10	25	5	2			COM
1985 11 07.99	S	8.2	A	8.0	B	5	15	10	1			SCH04
1985 11 08.78	S	7.2	AA	5.0	B		10	10.2				KEI
1985 11 08.78	S	7.7	AA	8.0	B		20	11	3			KEI
1985 11 09.94	S	7.4	AA	5.0	B		10	10.4				KEI
1985 11 10.89	S	7.7	A	6.0	B	5	12	20	2			WEG
1985 11 10.92	S	7.5	A	5.0	B	5	10	16	1			BOU
1985 11 10.96	S	8.3	A	11.0	R	10	40		2			COM
1985 11 11.90	S	7.9	A	8.0	B	5	15	10	1/			FEI
1985 11 11.96	S	7.7	A	11.0	R	10	40		2			COM
1985 11 12.76	S	7.7	A	8.0	B	5	20	12	1/			BOU
1985 11 12.79	S	7.2	AA	5.0	B		10	12.3				KEI
1985 11 12.87	S	7.5	A	5.0	B	5	10	15	1/			BOU
1985 11 12.88	S	8.1	A	4.5	B	5	9		2			COM
1985 12 10.78	S	8.7	A	6.0	B	5	12	6	2/			WEG

Comet Churyumov-Solodovnikov (1986i)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 07 19.47	S	12.8	AC	25.6	L	4	111	1.3	3/	0.02	280	MOR
1986 07 29.28	S	12.6	AA	20	L	6	163		4			HAL

Periodic comet Encke (1984 VI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 03 07.82	S	9.2	A	33	L	4	45	2.4	4/			SHA02

Periodic comet Tempel 2 (1983 X)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 08 15.05	S	10.6	A	15.6	L	5	36	4.5	1/			BOU
1983 08 15.06	S	10.4	A	25.4	J	6	59					BOU
1983 08 15.06	S	10.5	A	25.4	J	6	59	5	3			BUS01
1983 08 16.10	S	10.4	VB	33	L	4	45	3.9	1			SHA02
1983 09 05.05	S	10.0	VB	8.0	B		20	5.6	2			SHA02
1983 09 05.06	S	10.4	VB	33	L	4	45	2.4	3			SHA02
1983 10 14.07	S	10.6	VB	33	L	4	45	2.2	2			SHA02

Periodic comet Machholz (1986e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 05 12.45	S	11.0:		13.0	R	7	27	1.5	2			MAC
1986 05 13.46	S	10.8:	S	13.0	R	7	27	2	3			MAC
1986 05 13.48	S	9.8	AA	20	L	6	61		3/			HAL
1986 05 15.48	S	10.3:	S	15.2	L	8	76	2	2			MAC
1986 05 17.47	S	10.6:		25.4	L	4	32	4	4			MAC
1986 05 18.48	S	10.4:		25.4	L	4	32	3	4			MAC
1986 05 27.00	S	11.2	AC	15.2	L	5	44	& 1.5	2			MOE
1986 05 27.96	S	10.7	AC	25.4	J	6	48	& 4	0/			BOU
1986 05 27.97	S	11.0	AC	22.5	R	10	65	& 5	0/			COM
1986 05 28.32	S	11.2:		25.4	L	4	32	3	1			MAC
1986 05 28.99	S	11.0	AC	20.3	T	10	50	& 7	0/			COM
1986 05 30.00	S	11.0:	AC	25.4	J	6	48		0			BOU
1986 05 30.97	S	11.3	AC	15.2	L	5	44	& 1.5	2			MOE
1986 05 31.00	S	10.7	AC	20.3	T	10	50	& 5	1			COM
1986 05 31.24	M	9.5:	S	32	L	4	33	7	0			KEE
1986 06 02.31	S	11.5	AA	20	L	6	61		0/			HAL
1986 06 03.36	S	11.5:		25.4	L	4	64	3	1			MAC
1986 06 03.98	S	11.2	AC	40.6	L	6	67		0			BOU
1986 06 03.99	S	11.4:	AC	20.3	T	10	50		1			COM
1986 06 07.34	M	10.0:	S	32	L	4	33	5	0			KEE
1986 06 07.99	S	10.5	A	30.5	L	5	47	5.4	0	?	215	ZAN
1986 06 09.21	S	11.9	AA	31.7	L	6	68	1.6	1			BOR
1986 06 09.93	S	12.4	AC	20.3	T	10	85	1.1	2			HAS02
1986 06 10.15	S	12.0	AA	31.7	L	6	68	1.8	0			BOR
1986 06 10.22	M	12.6	EB	40.6	C	18	229					GRE
1986 06 10.22	S	12.9	EB	40.6	C	18	229	& 0.75	6			GRE
1986 06 10.36	S	12 :	S	25.4	L	4	64	1.4	1			MAC
1986 06 12.24	S	11.0:	AA	32	L	4	33	4	1			KEE
1986 06 12.38	S	11.5:	S	25.4	L	4	64	5	2			MAC
1986 06 14.41	S	11.5:	S	25.4	L	4	64	1.5	2			MAC
1986 06 15.19	S	12.2	AA	50.0	L	5	96	1.8	1			BOR
1986 06 16.34	S	11.5:	S	25.4	L	4	64	1.5	2			MAC
1986 06 17.39	S	11.8:	S	25.4	L	4	64	5	1			MAC
1986 06 19.46	S	11.5:	S	25.4	L	4	64	5	1			MAC
1986 06 25.26	S	11.8:	S	25.4	L	4	64	2	3			MAC
1986 06 29.27	S	12 :	S	25.4	L	4	64	4	1			MAC
1986 06 30.32	S	12 :	S	25.4	L	4	64	4	2			MAC
1986 07 02.35	S	12.5:	S	25.4	L	4	64	4	3			MAC

Periodic comet d'Arrest (1982 VII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 21.82	S	7.9	A	8.0	B		20	2.8				KEI
1982 09 21.82	S	8.2	A	29.8	L	5	62	2.3	2/			KEI

Periodic comet d'Arrest (1982 VII) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 22.82	S	8.0	A	8.0	B		20					KEI

Periodic comet Kopff (1983 XIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1983 05 09.05	S	11.9	V	32	R	18	95	1.1	4/			SHA02
1983 05 10.09	S	11.5	V	20	R	14	40	2.4	4			SHA02
1983 05 12.01	S	11.6	V	20	R	14	40	2.2	4			SHA02
1983 05 13.05	S	11.6	V	20	R	14	40	3.9	4			SHA02
1983 05 13.06	S	9.3	V	8.0	B		20	9.1	3			SHA02
1983 05 14.93	S	11.5	V	33	L	4	45	2.4	5			SHA02
1983 05 14.98	S	9.4	V	8.0	B		20	5.4	2			SHA02
1983 05 15.01	S	11.8	V	20	R	14	40	1.4	5			SHA02
1983 05 16.04	S	11.5	V	20	R	14	40	1.8	4			SHA02
1983 05 17.05	S	9.6	V	8.0	B		20	4.3	3			SHA02
1983 05 17.05	S	11.1	V	20	R	14	40	2.9	3/			SHA02
1983 05 20.04	S	11.6	V	20	R	14	120	1.2	3/			SHA02
1983 06 02.96	S	10.8	V	20	R	14	40	2.3	3			SHA02
1983 06 06.96	S	9.1	V	8.0	B		20	3.6	2			SHA02
1983 06 06.97	S	10.3	V	20	R	14	40	1.6	4			SHA02
1983 06 13.01	S	10.5	V	20	R	14	40	2.7	4			SHA02
1983 06 13.02	S	8.3	V	8.0	B		10	5.4	4			SHA02
1983 06 14.97	S	8.8	V	8.0	B		20	4.3	3			SHA02
1983 06 14.98	S	9.4	V	20	R	14	40	7.3	4			SHA02
1983 06 15.00	S	9.3	V	20	L	4	35	2.3	2			PAN
1983 06 15.02	S	9.1	V	33	L	4	45	3.8	4/			SHA02
1983 06 19.01	S	9.4	V	20	L	4	35	2.3	1			PAN
1983 06 19.02	S	10.0	V	20	R	14	40	3.8	2			SHA02
1983 06 30.95	S	8.6	V	8.0	B		20	4.3	2			SHA02
1983 06 30.95	S	9.3	V	20	R	14	40	3.8	2			SHA02
1983 07 02.94	S	7.8	AA	8.0	B		20	6.6	5/			KEI
1983 07 03.95	S	7.8	AA	8.0	B		20	6				KEI
1983 07 04.95	S	9.5	V	20	R	14	40	1.6	2			SHA02
1983 07 28.92	S	8.0	AA	8.0	B		20	4.5				KEI
1983 07 29.93	S	10.1	V	20	R	14	40	2.5	3			SHA02
1983 08 01.92	S	8.0	AA	8.0	B		20	3.8	3/			KEI
1983 08 02.91	S	8.1	AA	8.0	B		20	2.5				KEI
1983 08 02.91	S	10.4	VB	20	R	14	40	1.2	3			SHA02
1983 09 04.86	S	10.2	V	20	R	14	40	3.6	2/			SHA02
1983 10 10.79	S	10.6	VB	20	R	14	40	1.9	3			SHA02
1983 10 24.77	S	10.5	VB	20	R	14	40	1.4	3			SHA02

Periodic comet Giacobini-Zinner (1984e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 07 05.97	S	10.6	A	29.8	L	5	62	1.4	3	0.03	225	KEI
1985 07 06.89	S	9.7	AA	8.0	B		15	5	4			HAV
1985 07 06.96	S	10.6	A	29.8	L	5	62	1.6	4	0.03	256	KEI
1985 07 10.96	S	10.3	A	29.8	L	5	62	1.5	4/	0.03	262	KEI
1985 07 14.94	S	9.5	AA	8.0	B		15	4.5	4			HAV
1985 07 14.95	S	9.7	A	8.0	B		20	3.3				KEI
1985 07 14.95	S	9.8	A	29.8	L	5	62	1.3	5/	0.05	242	KEI
1985 07 15.00	S	9.5	A	5.0	B		10	3.3				KEI
1985 07 16.96	S	9.6	A	8.0	B		20	3.2				KEI
1985 07 16.96	S	9.9	A	29.8	L	5	53	2.2	6	0.08	225	KEI

Periodic comet Giacobini-Zinner (1984e) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 07 17.00	S	9.4	A	5.0	B		10	3.6				KEI
1985 07 20.02	S	9.1	A	5.0	B		10	4				KEI
1985 07 20.02	S	9.1	A	8.0	B		20	3.6	5/	0.07	238	KEI
1985 07 20.95	S	8.9	NO	8.0	B		20	2.5	5/	0.13	244	KEI
1985 07 21.90	S	9.2	AA	8.0	B		15	4.5	4			HAV
1985 07 22.92	S	9.1	AA	8.0	B		15	4.5	5			HAV
1985 07 24.95	S	8.8	NO	8.0	B		20	3.4	6			KEI
1985 07 26.00	S	9.1	AA	8.0	B		15	4	4	0.13	250	HAV
1985 08 07.95	S	8.3	AA	8.0	B		20	5.3	6	0.18	250	KEI
1985 08 08.12	B	8.3	A	15	L	8	30	6.92	7			MCB
1985 08 09.15	B	9.0	A	15	L	8	30	6.38	5			MCB
1985 08 09.93	S	8.4	AA	8.0	B		15	5	5			HAV
1985 08 10.13	B	9.0	A	15	L	8	30	7.34	6			MCB
1985 08 11.95	S	8.1	AA	5.0	B		10	3.8				KEI
1985 08 11.95	S	8.2	AA	8.0	B		20	3.8		0.35	266	KEI
1985 08 14.92	S	7.7	NO	5.0	B		10	4.0				KEI
1985 08 14.92	S	7.9	NO	8.0	B		20	4.2		0.25	266	KEI
1985 08 17.00	S	7.8	NO	8.0	B		20	4.8	6	0.12	245	KEI
1985 08 17.08	S	7.8	NO	5.0	B		10	4.8	6	0.28	260	KEI
1985 08 17.22	M	8.8	A	15	L	8	30	7.40	9	0.31	272	MCB
1985 08 19.20	M	9.3	A	15	L	8	30	7.94	9	0.26	272	MCB
1985 08 19.95	S	8.0	AA	8.0	B		15	6	5	0.15	285	HAV
1985 08 22.03	S	8.0	AA	8.0	B		15	6	5	0.23	280	HAV
1985 08 23.04	S	8.0	AA	8.0	B		15	6	5	0.30	285	HAV
1985 08 25.06	S	7.9	AA	8.0	B		15	7	5/	0.43	280	HAV
1985 08 25.08	S	7.6	AA	5.0	B		10	5.6				KEI
1985 08 25.08	S	7.6	AA	8.0	B		20	5.0	6	0.17	300	KEI
1985 08 26.16	S	7.7	AA	5.0	B		10	4.8	6/	0.50	300	KEI
1985 09 07.00	S	7.5	AA	8.0	B		20	8.0				KEI
1985 09 11.03	S	8.1	AA	8.0	B		15	6	4	0.37	300	HAV
1985 09 11.10	S	7.5	AA	5.0	B		10		5/			KEI
1985 09 11.10	S	7.5	AA	8.0	B		20	7.1		0.33	317	KEI
1985 09 11.71	S	10.1	WB	31.7	L	5	86	0.6	2			JON
1985 09 12.10	S	7.9	AA	5.0	B		10					KEI
1985 09 12.10	S	7.9	AA	8.0	B		20	8.1	5/	0.23	278	KEI
1985 09 12.70	S	10.1	WB	31.7	L	5	86	1	3			JON
1985 09 13.11	S	8.2	AA	8.0	B		20	5.4	5/	0.20	275	KEI
1985 09 13.72	S	10.1	WB	31.7	L	5	86	& 1	5			JON
1985 09 17.68	S	10.0	WB	31.7	L	5	86	1.25	5/			JON
1985 09 18.70	S	10.1	WB	31.7	L	5	86	1	5			JON
1985 09 19.71	S	10.0:	WB	31.7	L	5	86	1.4	5/			JON
1985 09 20.72	S	10.1	WB	31.7	L	5	86	1	4/			JON
1985 09 21.71	S	10.1	WB	31.7	L	5	86	1	4/			JON
1985 09 22.08	S	8.8	AA	8.0	B		15	5	3	0.23	280	HAV
1985 09 25.14	S	8.9	AA	8.0	B		15	4	2/	0.20	295	HAV
1985 09 26.19	S	8.9	AA	8.0	B		20	3.9	2	0.20	281	KEI
1985 10 01.70	S	11.6:	VN	31.7	L	5	86					JON
1985 10 02.69	S	11.6:	VN	31.7	L	5	86					JON
1985 10 07.68	S	12.1:	VN	31.7	L	5	86	1	2			JON
1985 10 11.04	S	9.6	AA	8.0	B		15	4.5	2			HAV
1985 10 13.69	S	11.4	VN	31.7	L	5	86	& 1	6			JON
1985 10 14.18	S	9.4	A	29.8	L	5	62	2.6	4			KEI
1985 10 16.67	S	10.8	VN	31.7	L	5	86	0.8	5/			JON
1985 10 17.68	S	10.6	VN	31.7	L	5	86	2	6/			JON
1985 10 18.67	S	10.6	VN	31.7	L	5	86	1.5	6			JON

Periodic comet Giacobini-Zinner (1984e) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 10 19.68	S	10.6	VN	31.7	L	5	86	1.5	5			JON
1985 11 04.66	S	11.1	AC	31.7	L	5	86					JON
1985 11 07.65	S	12.0	AC	31.7	L	5	86		2			JON
1985 11 08.66	S	11.6	AC	31.7	L	5	86		4			JON
1985 11 20.63	S	11.0	VN	31.7	L	5	86	1.5	5			JON
1985 12 05.57	S	12.1	VN	31.7	L	5	86	1.4	4			JON
1985 12 09.48	S	12.8	VN	31.7	L	5	86	0.8	1			JON
1985 12 10.45	S	12.9	VN	31.7	L	5	86		1			JON

Periodic comet Wirtanen (1985q)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 02 04.77	S	11.3	AC	25.4	J	6	90	2	2/			BOU
1986 02 10.15	S	10.9	AC	25.6	L	4	67	2.9	2			MOR
1986 02 26.80	S	10.1	AC	25.4	J	6	59	& 2	3			BOU
1986 02 27.80	S	10.1	AC	25.4	J	6	59	2.5	1/			BOU
1986 03 02.80	S	9.9	AC	25.4	J	6	59	2.8	2			BOU
1986 03 03.79	S	9.8	AC	25.4	J	6	59	2.6	2/			BOU
1986 03 09.81	S	10.3	AC	40.0	L	5	81	2.4	4			MER
1986 03 29.81	S	10.4	PA	20.3	T	10	92	1.3	2			HAS02
1986 04 06.87	B	9.1	S	8.0	B		20	1.0	2			HAS02
1986 04 28.20	S	10.5	AC	25.6	L	4	67	2.3	2/			MOR
1986 04 30.20	S	10.8	AC	25.6	L	4	67	2.6	2			MOR
1986 05 03.21	S	10.7	AC	25.6	L	4	67	3.0	2/			MOR
1986 05 10.19	S	10.9	AC	25.6	L	4	67	2.3	2			MOR

Periodic comet Arend-Rigaux (1984 XXI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 01 23.23	S	12.5	V	33	L	4	45	0.9	3			SHA02
1985 01 24.20	S	12.3	V	33	L	4	45	0.5	3/			SHA02
1985 01 27.22	S	12.2	V	33	L	4	45	0.3	3			SHA02
1985 02 10.96	S	12.5:	A	25.4	J	6	117					BUS01

Periodic comet Tsuchinshan 1 (1984p)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 02 10.92	S	11.2	A	25.4	J	6	49	3	2			BUS01
1985 02 17.24	S	10.7	V	33	L	4	45	1.8	2			SHA02
1985 03 14.97	S	12.5	V	33	L	4	45	2.3	2/			SHA02

Periodic comet Takamizawa (1984 VII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 08 30.91	S	10.4	V	33	L	4	45	1.7	1/			SHA02

Periodic comet Schaumasse (1984 XXII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 10 26.20	S	11.0	V	33	L	4	45	2.9	2/			SHA02
1984 11 02.20	S	11.8	V	33	L	4	120	1.7	2			SHA02
1984 11 04.14	S	11.5	V	33	L	4	45	2.0	4/			SHA02
1984 11 25.21	S	10.6	V	33	L	4	45	3.5	2/			SHA02
1984 12 26.25	S	10.5	V	8.0	B		20	3.6	2			SHA02
1985 01 24.22	S	11.7	V	33	L	4	45	2.6	2			SHA02

Periodic comet Schaumasse (1984 XXII) Cont.

DATE (UT)		MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 01 27.24		S	11.2	V	33	L	4	45	2.3	2			SHA02

Periodic comet Halley (1982i)

DATE (UT)		MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 08 15.11		S	13.5:	WA	33	L	5	125	2.0	3			SHA02
1985 08 27.13		S	13.4:	WA	33	L	5	125	0.5	3			SHA02
1985 09 12.50		S	13.2	WA	20	L	6	122		4			HAL
1985 09 14.48		S	13.0	WA	20	L	6	244					HAL
1985 09 17.49		S	12.5	WA	20	L	6	122					HAL
1985 09 21.45		S	12.2	WA	20	L	6	122					HAL
1985 09 21.70		S	13.3	WB	31.7	L	5	86					JON
1985 09 22.06		S	12.5	WA	20	L	4	115	0.6	2		290	GUA
1985 09 22.50	*	S	12.2	A	25.4	L	4	64	1.2	2			MAC
1985 10 07.67		S	12.4	WB	31.7	L	5	86					JON
1985 10 08.48		M	11.4	WA	20	L	6	122		5			HAL
1985 10 11.00		M	11.5	WA	20	L	4	115	1.2	5			GUA
1985 10 11.35		M	10.9	WA	20	L	6	61		4/			HAL
1985 10 11.35		M	10.9	WA	20	L	6	122		4/			HAL
1985 10 12.68		S	11.9	WB	31.7	L	5	86	1	3/			JON
1985 10 13.12		S	11.7	WA	20	R	12	120	0.9	2			SHA02
1985 10 13.50		M	10.6	WA	20	L	6	61					HAL
1985 10 13.67		S	11.1	WB	31.7	L	5	86	1	4/			JON
1985 10 14.65		S	11.1	WB	31.7	L	5	86	1	6			JON
1985 10 15.38		M	10.4	WA	20	L	6	61					HAL
1985 10 16.36		M	10.3	WA	20	L	6	61					HAL
1985 10 16.65		S	11.0	WB	31.7	L	5	86	2	5			JON
1985 10 17.41		M	10.3	WA	20	L	6	61					HAL
1985 10 17.65		S	10.9	WB	31.7	L	5	86	1.5	5/			JON
1985 10 18.65		S	10.9	WB	31.7	L	5	86	2	6/			JON
1985 10 19.18		S	9.5	AA	8.0	B		11					KEE01
1985 10 19.65		S	11.0	WB	31.7	L	5	86	1.5	5			JON
1985 10 20.02		S	10.5	WA	8.0	B		20	1.3	4			SHA02
1985 10 20.02		S	10.7	WA	20	R	12	40	2.4	4			SHA02
1985 10 20.30		M	9.8	WC	20	L	6	61					HAL
1985 10 21.15		S	10.5	WA	20	R	12	40	1.2	4			SHA02
1985 10 26.14		M	8.8	WC	20	L	4	40	5.3	5			GUA
1985 10 27.67		S	10.3	WC	31.7	L	5	86	2				JON
1985 11 02.22		M	8.4	WC	20	L	6	61					HAL
1985 11 04.64		S	9.0	WC	31.7	L	5	86	& 1.5	5			JON
1985 11 05.60		S	8.1	AA	31.7	L	5	86	2.2	5/			JON
1985 11 05.96					8.0	B		20	9	3			JAN
1985 11 05.97		S	8.6	AA	20	R	12	40	4.5	5/			SHA02
1985 11 05.98		S	8.2	AA	8.0	B		20	9.6	3			SHA02
1985 11 05.98		S	8.3	AA	8.0	B		11	10				KEE01
1985 11 06.11		S	7.7	VB	5.0	B		7	12	3			SHA02
1985 11 06.28		M	7.3	WC	10.8	L	4	20					HAL
1985 11 06.29		M	7.1	WC	5.0	B		10					HAL
1985 11 06.30		M	7.4	WC	20	L	6	61			0.25	90	HAL
1985 11 06.94		B	8.7	W	8.0	B		20	13	3			JAN
1985 11 07.62		S	7.9	WD	4.5	R	6	13					JON
1985 11 07.62		S	8.0	AA	4.5	R	6	13					JON
1985 11 07.62		S	8.2	AA	7.8	R	8	30					JON
1985 11 07.63		S	8.0	WD	7.8	R	8	30	3.5	7			JON
1985 11 08.41	*	S	6.3:	AA	0.8	E		1	35	2			MOR

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 11 08.62	S	7.5	AA	4.5	R	6	13					JON
1985 11 08.62	S	7.7	AA	7.8	R	8	30	5				JON
1985 11 09.89	S	6.9	AA	8.0	B		10	10	4			SHA02
1985 11 10.88	S	7.5	AA	8.0	B		11	15				KEE01
1985 11 10.92	S	6.7	AA	8.0	B		10	10	5			SHA02
1985 11 11.82	S	7.5	D	8.0	B		15	8	5/			WIL03
1985 11 11.89	B	8.6	W	8.0	B		20	7	5			JAN
1985 11 12.13	S	6.7	AA	8.0	B		10	9.6	5			SHA02
1985 11 12.21	S	7.7	VB	20	R	12	40	4.5	6			SHA02
1985 11 12.22	S	6.6	VB	5.0	B		7	10	4/			SHA02
1985 11 12.92	B	8.4	W	8.0	B		20	7	4			JAN
1985 11 12.94	S	6.5	VB	8.0	B		10	8.4	3			SHA02
1985 11 12.95	S	5.6:	AA	0.0	E		1	18	2			SHA02
1985 11 13.02	S	7.1	VB	20	R	12	40	4.5	6			SHA02
1985 11 13.10	S	5.6	AA	0.0	E		1	17	2			SHA02
1985 11 13.32	M	6.8	AA	5.0	B		10					HAL
1985 11 13.85	S	7.5	AA	8.0	B		11	10				KEE01
1985 11 13.95	S	6.3	AA	8.0	B		10	4.2	3/			SHA02
1985 11 13.95	S	7.3	AA	20	R	12	40	4.2	6			SHA02
1985 11 14.04	S	5.6	AA	0.0	E		1	25	2/			SHA02
1985 11 14.29	M	6.6	AA	5.0	B		10			1	80	HAL
1985 11 14.91	M	6.3	AA	5.0	B		12	16	4			GUA
1985 11 15.33	M	6.6	AA	5.0	B		10					HAL
1985 11 15.43	S	6.7	AA	4.5	R	6	13	5				JON
1985 11 15.45	S	6.6	AA	8.0	B		11					JON
1985 11 15.61	S	6.6	AA	4.5	R	6	13					JON
1985 11 15.95	S	5.9	AA	5.0	B		7	6.7	5			SHA02
1985 11 16.01	S	5.1	AA	0.0	E		1	17	2			SHA02
1985 11 16.04	S	6.9	AA	20	R	12	40	6	7	0.12	130	SHA02
1985 11 16.94	M	6.0	AA	5.0	B		12	19	5			GUA
1985 11 16.94	S	7.0	AA	8.0	B		11		5			KEE01
1985 11 17.49	M	6.4	AA	5.0	B		10			1	125	HAL
1985 11 17.83	B	8.0	W	8.0	B		20	10	5			JAN
1985 11 17.89	S	5.7	D	5.0	B		10					WIL03
1985 11 17.89	S	5.8	D	8.0	B		15	12	3			WIL03
1985 11 18.05	S	6.2	AA	8.0	B		10	18	6			SHA02
1985 11 18.06	S	5.2:	AA	0.0	E		1	18	3			SHA02
1985 11 18.30	M	6.3	AA	5.0	B		10					HAL
1985 11 18.90	S	5.7	PB	5.0	B		7	9	3			SHA02
1985 11 20.45	M	6.1	AA	5.0	B		10					HAL
1985 11 20.46	B	5.9	AA	0.8	E		1					HAL
1985 11 20.59	S	6.7	AA	4.5	R	6	13	8				JON
1985 11 21.06	B	6.1	AA	15	L	8	30	7.7	9			MCB
1985 11 21.60	S	6.2	AA	4.5	R	6	13	7.5				JON
1985 11 27.76	S	5.6	AA	8.0	B		10	9	4/			SHA02
1985 11 28.14	S	5.3:	AA	5.0	R		8					MOR
1985 11 28.73	S	5.3	AA	8.0	B		10	12	4/			SHA02
1985 11 28.75	S	5.9	D	5.0	B		10	10	6/			WIL03
1985 11 28.79	B	7.0	W	8.0	B		20	12	5			JAN
1985 11 29.83	S	5.0:	AA	8.0	B		11					KEE01
1985 12 01.10	M	4.9	AA	5.0	R		8	22	6	1.0		MOR
1985 12 01.73	S	5.2	D	5.0	R		8					WIL03
1985 12 01.73	S	5.4	D	5.0	B		10	12	5			WIL03
1985 12 01.76	B	6.5	W	8.0	B		20	14	4			JAN
1985 12 01.92	S	5.0:	AA	8.0	B		11					KEE01

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 12 02.77	B	5.7	W	5.0	B		7	16	4			JAN
1985 12 03.21	S	5.1:	AA	5.0	R		8					MOR
1985 12 03.74	S	5.3	AA	8.0	B		10	9	4			SHA02
1985 12 04.21	M	4.7	AA	5.0	R		8	15	8			MOR
1985 12 04.23				8.0	B		20			0.83	114	MOR
1985 12 04.23	M	4.7	AA	8.0	B		20	15	7/	0.93	70	MOR
1985 12 04.27	B	5.4	AA	0.8	E		1					HAL
1985 12 04.27	M	5.5	AA	5.0	B		10			1	95	HAL
1985 12 05.51	S	5.7	AA	5.0	B		7					JON
1985 12 05.96	S	5.3	AA	8.0	B		10	22	5/			SHA02
1985 12 06.14		5.5	AA	0.0	E		1	15	1			MCB
1985 12 06.14	B	5.5	AA	15	L	8	30	15	9	0.75	45	MCB
1985 12 06.14	S	4.0	AA	0.8	E		1	90	2			MOR
1985 12 06.16	M	4.5	AA	5.0	R		8	20	7	2.5	70	MOR
1985 12 06.17	M	4.5	AA	8.0	B		20	16	7	2.5	70	MOR
1985 12 06.28	B	5.2	AA	0.8	E		1					HAL
1985 12 06.28	M	5.2	AA	5.0	B		10			1.5	75	HAL
1985 12 06.39				31.7	L	5	86		8	?	65	JON
1985 12 06.39	S	5.6	AA	4.9	B		3	11	6			JON
1985 12 07.08	B	5.4	AA	15	L	8	30	15	9	1	45	MCB
1985 12 07.10	M	4.5	AA	5.0	R		8	20	7			MOR
1985 12 07.10	M	4.5	AA	8.0	B		20	16	7	1.5	70	MOR
1985 12 07.74	S	5.7	AA	0.0	E		1	18	3			SHA02
1985 12 07.74	S	5.9	AA	5.0	B		7	14	5			SHA02
1985 12 07.74	S	5.9	AA	8.0	B		10	14	5	1.5	70	SHA02
1985 12 08.11				0.8	E		1	&90	2			MOR
1985 12 08.15	M	4.6	AA	5.0	R		8	15	6			MOR
1985 12 08.15	M	4.6	AA	8.0	B		20	12	7	2.5	70	MOR
1985 12 08.72	S	6.0	AA	8.0	B		10	11	5			SHA02
1985 12 08.73	S	5.6	AA	8.0	B		11	10	5			KEE01
1985 12 09.08	M	4.8	AA	5.0	R		8	19	6			MOR
1985 12 09.24	M	4.9	AA	0.8	E		1					HAL
1985 12 09.43	S	5.6	AA	4.9	B		3	9				JON
1985 12 09.44	S	5.8	AA	4.9	B		3					JON
1985 12 09.45				31.7	L	5	86	5	6/		60	JON
1985 12 10.18	S	4.0:	AA	0.8	E		1	&80	3/			MOR
1985 12 10.19				1.5	B		6	&10	8			MOR
1985 12 10.22	M	5.0	AA	5.0	R		8	14	8	1.33	70	MOR
1985 12 10.24	M	5.0	AA	8.0	B		20	14	7	2.67	70	MOR
1985 12 10.41	S	5.7	AA	4.9	B		3	8				JON
1985 12 11.41	S	5.7	AA	4.9	B		3					JON
1985 12 12.09	M	5.1	AA	5.0	R		8	16	6/			MOR
1985 12 13.09	M	4.8	AA	5.0	R		8	14	7/			MOR
1985 12 13.10	M	4.8	AA	8.0	B		20	12	7	2.5	68	MOR
1985 12 13.73	S	5.2	AA	8.0	B		10	12	5			SHA02
1985 12 14.08	M	4.8	AA	5.0	B		8					MOR
1985 12 14.08	M	4.8	AA	8.0	B		20	15	7	1.75	68	MOR
1985 12 14.79	S	4.8	AA	8.0	B		10	16	6	1.5	65	SHA02
1985 12 15.10	S	4.3:	AA	0.8	E		1	&45	3			MOR
1985 12 15.11	M	4.9	AA	5.0	R		8	16.5	7			MOR
1985 12 15.14	M	4.9	AA	8.0	B		20	13	7	1.75	65	MOR
1985 12 15.28	M	4.9	AA	5.0	B		10			1.5	50	HAL
1985 12 15.79	M	4.5	AA	5.0	B		12	17	4	0.5	64	GUA
1985 12 16.80	S	5.7	AA	8.0	B		11	7.5	4			KEE01
1985 12 17.09	M	4.9	AA	8.0	B		20		6/	1.58	58	MOR

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1985 12 18.08	M	4.9	AA	8.0	B		20		6	1.25	60	MOR
1985 12 18.22	M	5.0	AA	5.0	B		10			1.2	50	HAL
1985 12 18.73	S	5.0	AA	8.0	B		20	12	6/	1.0	67	SHA02
1985 12 18.87	B	5.5	W	8.0	B		20	10	5			JAN
1985 12 19.11	M	4.9	AA	8.0	B		20		6	1.17	63	MOR
1985 12 19.41	S	5.7	AA	4.5	R	6	13					JON
1985 12 19.73	B	5.8	W	5.0	B		7	10	5			JAN
1985 12 19.74	S	4.9	D	5.0	R		8	12	4	0.33	25	WIL03
1985 12 20.10	M	4.9	AA	8.0	B		20		6/			MOR
1985 12 21.09	M	5.0	AA	8.0	B		20		6/			MOR
1985 12 22.10	M	5.2	AA	8.0	B		20		6			MOR
1985 12 22.73	B	5.7	W	5.0	B		7	10	6			JAN
1985 12 22.73	S	5.0	AA	8.0	B		20	9	6			SHA02
1985 12 23.74	S	5.6	AA	8.0	B		20	9	6	0.5	57	SHA02
1985 12 27.10	M	5.2	AA	8.0	B		20		7/	0.5		MOR
1985 12 27.11	M	5.2	AA	5.0	R		8		6			MOR
1985 12 27.18	M	4.8	AA	5.0	B		10					HAL
1985 12 27.73	B	5.7	W	8.0	R	5	22	8	6			JAN
1985 12 27.74	S	4.7	AA	8.0	B		20	9	6/	0.75	62	SHA02
1985 12 28.09	B	5.0	AA	8.0	B		20					MOR
1985 12 28.09	M	4.9	AA	8.0	B		20		7	1.25	68	MOR
1985 12 28.74	S	5.0	AA	0.0	E		1	18	5			SHA02
1985 12 28.74	S	5.0	AA	8.0	B		11	5	4	0.33		KEE01
1985 12 28.74	S	5.4	AA	5.0	B		7	9	7			SHA02
1985 12 28.74	S	5.4	AA	8.0	B		20	9	7	0.67	70	SHA02
1985 12 29.73	S	5.0	WW	8.0	B		11	6				KEE01
1985 12 29.73	S	5.5	AA	8.0	B		20	9	7	1.0	59	SHA02
1985 12 30.02	B	5.4	AA	15	L	8	30	8.87	8	2.0	68	MCB
1985 12 31.10	M	4.7	AA	8.0	B		20		7	3.75	63	MOR
1985 12 31.75	S	5.1	WW	8.0	B		11					KEE01
1986 01 02.10	M	4.7	AA	8.0	B		20	8	7	2.0	65	MOR
1986 01 03.74	S	5.4	AA	8.0	B		20	12	7	1.7	68	SHA02
1986 01 03.76	B	5.0	W	8.0	B		20	8	5			JAN
1986 01 03.80	S	5.5	AA	20	R	12	40	5	7			SHA02
1986 01 04.73	B	4.9	W	5.0	B		7	6	6			JAN
1986 01 05.74	S	4.9	AA	8.0	B		10	6.0	7			SHA02
1986 01 06.75	S	4.9	AA	8.0	B		10	4.3	7/	1.5	70	SHA02
1986 01 06.75	S	5.8	AA	20	R	12	40			0.67		SHA02
1986 01 07.13	M	4.7	AA	8.0	B		20	5.5	8	5.0	64	MOR
1986 01 07.14	M	4.8	AA	5.0	B		12					MOR
1986 01 07.15	B	4.7	AA	0.8	E		1			1	70	HAL
1986 01 07.15	M	4.7	AA	0.8	E		1			5	64	MOR
1986 01 07.15	M	4.7	AA	5.0	B		10			3.5	70	HAL
1986 01 07.15	M	5.1	AA	25.6	L	4	45					MOR
1986 01 07.15	M	5.5	AA	25.6	L	4	156	3.5				MOR
1986 01 08.09	M	4.5	AA	8.0	B		20	5.5	7/	5.33	64	MOR
1986 01 08.10	I	4.5	AA	0.8	E		1			4.5	64	MOR
1986 01 08.12	M	4.4	AA	1.5	B		6					MOR
1986 01 08.13	B	4.6	AA	0.8	E		1			1	65	HAL
1986 01 08.13	M	4.4	AA	0.8	E		1					MOR
1986 01 08.13	M	4.4	AA	5.0	B		12					MOR
1986 01 08.13	M	4.4	AA	8.0	B		20					MOR
1986 01 08.13	M	4.7	AA	5.0	B		10			4	65	HAL
1986 01 09.13	M	4.5	AA	8.0	B		20					MOR
1986 01 10.10	I	4.5	AA	0.8	E		1		9	6	60	MOR

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 01 10.11	M	4.5	AA	8.0	B		20	5.5	8	6.0	60	MOR
1986 01 10.13	M	4.5	AA	5.0	B		12					MOR
1986 01 10.13	M	4.6	AA	1.5	B		6					MOR
1986 01 10.13	M	4.7	AA	5.0	B		10					HAL
1986 01 10.72	S	4.8	WW	8.0	B		11					KEE01
1986 01 10.74	S	5.0	WW	8.0	B		20	10	8	3.0	63	SHA02
1986 01 10.76	S	5.1	WW	20	R	12	40	4.0	6/	0.75	63	SHA02
1986 01 11.10	M	4.6	AA	8.0	B		20			7.0	64	MOR
1986 01 11.11	M	4.6	AA	5.0	B		12					MOR
1986 01 11.13	B	4.5	AA	0.8	E		1			2.5	65	HAL
1986 01 11.13	M	4.6	AA	0.8	E		1					MOR
1986 01 11.13	M	4.7	AA	5.0	B		10			5	65	HAL
1986 01 11.75	S	4.9	WW	8.0	B		20	6.5	7/	2.0	63	SHA02
1986 01 12.10	I	4.3	AA	0.8	E		1			7	62	MOR
1986 01 12.11	M	4.4	AA	8.0	B		20	6.5	8	5.67	58	MOR
1986 01 13.10	I	4.1	AA	0.8	E		1					MOR
1986 01 13.11	M	4.1	AA	8.0	B		20	5.5	8	6.0	60	MOR
1986 01 13.73	S	4.8	WW	8.0	B		11					KEE01
1986 01 14.74	S	4.2	D	8.0	B		15	6	7	0.5	75	WIL03
1986 01 14.75	S	4.8	WW	8.0	B		10	4.3	7/			SHA02
1986 01 15.75	B	4.7	W	5.0	B		7	10	7			JAN
1986 01 16.11	M	4.5	AA	5.0	B		10					HAL
1986 01 16.74	S	4.0	D	8.0	B		15	6	7/	0.75	60	WIL03
1986 01 18.10				8.0	B		20			0.5	68	MOR
1986 01 18.10	I	4.1	AA	0.8	E		1		9			MOR
1986 01 18.10	M	4.1	AA	5.0	B		12		9			MOR
1986 01 18.10	M	4.1	AA	8.0	B		20	3	8/	1.0	62	MOR
1986 01 18.10	M	4.4	AA	5.0	B		10			4.5	65	HAL
1986 01 18.11	B	4.3	AA	0.8	E		1					HAL
1986 01 19.09				8.0	B		20			1.0	65	MOR
1986 01 19.09	M	4.1	AA	8.0	B		20	3	8	2.0	56	MOR
1986 01 19.10	I	4.1	AA	0.8	E		1		9			MOR
1986 01 19.11	M	4.4	AA	5.0	B		10			2	65	HAL
1986 01 19.75	S	4.5	WW	8.0	B		11					KEE01
1986 01 20.09	M	4.1	AA	5.0	B		12					MOR
1986 01 20.09	M	4.1	AA	8.0	B		20		8/	1.0		MOR
1986 01 20.74	B	3.8	W	8.0	R	5	22	5	7			JAN
1986 01 21.10	M	3.7	AA	5.0	B		12					MOR
1986 01 21.10	M	3.7	AA	8.0	B		20		8/	1.0		MOR
1986 01 21.10	M	4.2	AA	5.0	B		10			2.5	65	HAL
1986 01 21.73	S	4.1	WW	8.0	B		20	5	7/	1.0	62	SHA02
1986 01 21.96				12.0	B		20	1.9	7/	1.5	55	BOR
1986 01 21.96	B	4.2	WH	5.0	B		10	4	8	1.0		BOR
1986 01 21.96	S	4.3	WH	5.0	B		10					BOR
1986 01 23.74	B	3.6	W	5.0	B		7	4	7			JAN
1986 01 23.74	S	4.1	WW	8.0	B		20	4.0	8	1.0	68	SHA02
1986 01 23.96	B	4.1	WH	5.0	B		10	3	8	1	51	BOR
1986 01 24.09	M	4.1	AA	8.0	B		20		8/	1.0		MOR
1986 01 24.73	S	4.1	WW	8.0	B		20	5	7			SHA02
1986 01 24.75	S	3.9	WW	8.0	B		11					KEE01
1986 01 24.96	B	4.0	WH	5.0	B		10	3	7			BOR
1986 01 24.96	S	4.0	WH	5.0	B		10					BOR
1986 01 25.10	M	4.0	AA	8.0	B		20		8/	2.0		MOR
1986 01 25.74	S	3.8	WW	8.0	B		11					KEE01
1986 01 25.74	S	4.0	WW	8.0	B		20	3	8	0.5	65	SHA02

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 01 26.10	! M	3.9:	AA	8.0	B		20		8/	2.0	50	MOR
1986 01 26.10	M	4.2:	AA	5.0	B		10			1.5	65	HAL
1986 01 26.73	B	3.5	W	8.0	R	5	22	3	7			JAN
1986 01 27.09	! M	3.8:	AA	8.0	B		20		9			MOR
1986 01 28.09	! M	3.8:	AA	8.0	B		20		9			MOR
1986 01 28.10	M	3.8	AA	5.0	B		10					HAL
1986 01 28.96	S	4.2:	AA	12.0	B		20	& 1.5	7/			BOR
1986 02 20.57	M	3.0:	AA	5.0	B		10			0.3	275	HAL
1986 02 22.56	B	3.0:	AA	0.8	E		1					HAL
1986 02 22.56	M	3.0:	AA	5.0	B		10			0.5	275	HAL
1986 02 23.76	S	4.0	W	5.0	B		7	4		0.25	290	BRY02
1986 02 25.30	S	5.2	WW	8.0	B		20	2	7			SHA02
1986 02 25.56	B	2.9:	AA	0.8	E		1			0.5	275	HAL
1986 02 25.56	M	3.0:	AA	5.0	B		10			1	275	HAL
1986 02 25.70	S	3.6	AA	2.3	B		2					JON
1986 02 25.76	S	3.9	W	5.0	B		7	5		0.42	290	BRY02
1986 02 26.44	B	3.2	WH	5.0	B		10	5	8	1	280	BOR
1986 02 26.77	S	3.9	W	5.0	B		7	5		0.42	290	BRY02
1986 02 27.70	S	3.5	AA	2.3	B		2					JON
1986 02 28.44	B	2.8	WH	5.0	B		10	3	8	1.5	273	BOR
1986 02 28.70	S	3.4	AA	2.3	B		2					JON
1986 03 01.26	S	3.9	WW	8.0	B		20	3.1	8	1.5	280	SHA02
1986 03 01.28	S	3.7	WW	0.0	E		1	3	7			SHA02
1986 03 01.43	B	3.2	WH	5.0	B		10	4	7	1.7	270	BOR
1986 03 01.74	B	3.3	WW	5.0	B		7	3	8	1	275	BEM
1986 03 02.27	S	4.1	WW	8.0	B		20	3	8	0.5	280	SHA02
1986 03 02.43				12.0	B		20	2.5	7/			BOR
1986 03 02.43	B	3.1	WH	5.0	B		10	3	7/	1.5	270	BOR
1986 03 02.55	B	2.9	AA	0.8	E		1			2	270	HAL
1986 03 02.56	M	3.0	AA	5.0	B		10			2	270	HAL
1986 03 02.77	S	3.8	W	5.0	B		7	5		1.3	270	BRY02
1986 03 03.43	B	3.5	WH	5.0	B		10	4	6/	2.8	270	BOR
1986 03 03.67	S	3.6	WW	5.0	B		12	3	8	1	250	BAT01
1986 03 04.70		3.7	AA	0.0	E		1					JON
1986 03 04.70	S	3.5	AA	2.3	B		2					JON
1986 03 04.77	S	3.6	WW	5.0	B		12	3	8	1.5	250	BAT01
1986 03 05.55	B	2.9	AA	0.8	E		1			1.5	270	HAL
1986 03 05.70	S	3.4	AA	2.3	B		2					JON
1986 03 05.77	S	3.8	W	5.0	B		7	4		1.7	270	BRY02
1986 03 06.70	S	3.5	AA	2.3	B		2					JON
1986 03 06.75	B	3.2	WW	5.0	B		7	4	9	1	275	BEM
1986 03 06.77	S	3.8	W	5.0	B		7	4		1.9	270	BRY02
1986 03 06.80	S	3.6	WW	5.0	B		12	3	8	&1.75	260	BAT01
1986 03 07.28	S	3.6	WW	0.0	E		1					SHA02
1986 03 07.28	S	3.6	WW	5.0	B		7	6.1	8	2.3	265	SHA02
1986 03 07.54	B	2.8	AA	0.8	E		1			4	270	HAL
1986 03 08.26	S	3.0	WW	5.0	B		7	6.1	8	4.0	265	SHA02
1986 03 08.69	S	3.4	AA	2.3	B		2					JON
1986 03 09.55	B	2.9	AA	0.8	E		1					HAL
1986 03 09.69	S	3.2	AA	2.3	B		2					JON
1986 03 09.85	S	3.0	WW	0.0	E		1			3.3		CLA
1986 03 10.69	S	2.9	AA	2.3	B		2					JON
1986 03 10.74	* G	2.8	W	0.8	E		1					BOU
1986 03 10.75	B	3.0	WW	5.0	B		7	4.5	9	2.5	275	BEM
1986 03 10.78	S	3.4	WW	5.0	B		12	5	8	3.5	270	BAT01

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 03 10.79	B	2.8	WW	0.0	E		1			3.5		CLA
1986 03 11.73	B	3.0	WW	5.0	B		7		9	3.5	275	BEM
1986 03 11.75	* G	2.9	W	0.8	E		1			11	262	BOU
1986 03 11.77	S	3.4	WW	5.0	B		12	5	8	4	270	BAT01
1986 03 11.77	S	3.8	W	5.0	B		7	4		2.2	270	BRY02
1986 03 12.41				31.7	L	6	55	3.5	7			BOR
1986 03 12.41	B	3.6	WH	5.0	B		10	5	7	4.5	267	BOR
1986 03 12.41	S	3.3	WH	0.0	E		1			3		BOR
1986 03 12.54	B	2.9:	AA	0.8	E		1			3.8	270	HAL
1986 03 12.72	B	3.0	WW	5.0	B		7		9	4.0	275	BEM
1986 03 12.77	* G	2.8	W	0.8	E		1			12	262	BOU
1986 03 12.78	S	3.4	WW	5.0	B		12	5	8	4	270	BAT01
1986 03 12.78	S	3.8	W	5.0	B		7	4		2.5	270	BRY02
1986 03 13.70	S	3.3	AA	2.3	B		2					JON
1986 03 13.75	* G	2.8	W	0.8	E		1			10	261	BOU
1986 03 13.77	B	3.0	WW	5.0	B		7		9	4.5	270	BEM
1986 03 13.77	S	3.4	WW	5.0	B		12	5	8	3	275	BAT01
1986 03 13.77	S	3.6	W	5.0	B		7	5		2.5	270	BRY02
1986 03 13.79	B	2.8	WW	0.0	E		1			3.1		CLA
1986 03 14.73	* G	2.9	W	0.8	E		1			11	259	BOU
1986 03 14.78	B	3.0	WW	5.0	B		7		9	4.0	265	BEM
1986 03 15.21	S	3.1	WW	0.0	E		1	10	8	3.9	265	SHA02
1986 03 15.23	B	3.4	D	1.8	B		3					BUS01
1986 03 15.23	S	3.2	D	1.8	B		3	12	7/	10	264	BUS01
1986 03 15.23	S	3.4	D	5.0	B		10	& 5	6/	10		COM
1986 03 15.24		2.7	D	0.8	E		1					BUS01
1986 03 15.50	B	2.8	AA	0.8	E		1			7	270	HAL
1986 03 15.70	S	3.2	AA	2.3	B		2					JON
1986 03 15.73	B	3.0	WW	5.0	B		7		9	4.0	265	BEM
1986 03 15.78	B	2.8	WW	0.0	E		1			4.0		CLA
1986 03 15.78	* G	2.8	W	0.8	E		1					BOU
1986 03 15.80	S	3.2	WW	5.0	B		10			6.1		CLA
1986 03 16.18	S	3.0	WW	0.0	E		1	6.8	8	14.3	259	SHA02
1986 03 16.23	S	3.1	D	1.8	B		3	13	8	10	264	BUS01
1986 03 16.23	S	3.4	D	5.0	B		10	& 6	6/	10		COM
1986 03 16.24		2.7	D	0.8	E		1					BUS01
1986 03 16.24	B	3.3	D	1.8	B		3					BUS01
1986 03 16.50	B	2.8	AA	0.8	E		1			7	270	HAL
1986 03 16.70				8.0	B		11	9	7	3.7	266	JON
1986 03 16.70	S	3.4	AA	2.3	B		2					JON
1986 03 16.78	S	3.8	W	5.0	B		7	6		2.5	270	BRY02
1986 03 17.41	B	3.5	WH	5.0	B		10	6	7	4	265	BOR
1986 03 17.41	S	3.2	WH	0.0	E		1					BOR
1986 03 17.70				8.0	B		11	7	7	3.6	268	JON
1986 03 17.70	S	3.3	AA	2.3	B		2					JON
1986 03 17.75	* G	2.9	W	0.8	E		1					BOU
1986 03 17.76	B	3.2	WW	5.0	B		7		8	2.5	265	BEM
1986 03 17.78	S	3.6	W	5.0	B		7	5		1.8	270	BRY02
1986 03 18.21	S	3.3	D	1.8	B		3	6	7	10		COM
1986 03 18.23	S	3.2	D	1.8	B		3	&15	7	10	263	BUS01
1986 03 18.24		2.7	D	0.8	E		1					BUS01
1986 03 18.24	B	3.4	D	1.8	B		3					BUS01
1986 03 18.41	B	3.4	WH	5.0	B		10	7	6/	3.5	267	BOR
1986 03 18.41	S	3.1	WH	0.0	E		1					BOR
1986 03 18.70				8.0	B		11	10	8	3.7	264	JON

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 03 18.70	S	3.3	AA	2.3	B		2		8/			JON
1986 03 18.73	* G	2.8	W	0.8	E		1			9	260	BOU
1986 03 19.23		2.7	D	0.8	E		1					BUS01
1986 03 19.23		2.8	D	0.8	E		1					COM
1986 03 19.23	S	3.0	D	1.8	B		3	18	7/	13	262	BUS01
1986 03 19.23	S	3.1	D	1.8	B		3	6	7	13		COM
1986 03 19.24	B	3.2	D	1.8	B		3					BUS01
1986 03 19.54	B	2.8	AA	0.8	E		1			7.5	270	HAL
1986 03 19.71				8.0	B		11	9	7/	3.7	271	JON
1986 03 19.71	S	3.4	AA	2.3	B		2					JON
1986 03 19.73	* G	2.9	W	0.8	E		1			9	260	BOU
1986 03 19.77	B	3.1	WW	5.0	B		7		8	2.0	265	BEM
1986 03 19.79	S	3.8	W	5.0	B		7	6		2.2	260	BRY02
1986 03 19.79	S	4.0	WW	5.0	B		12	8	5	3	270	BAT01
1986 03 20.23		2.9	D	0.8	E		1			10		COM
1986 03 20.24		2.6	D	0.8	E		1					BUS01
1986 03 20.24	B	3.2	D	1.8	B		3					BUS01
1986 03 20.24	S	2.9	D	1.8	B		3	18	7	13	263	BUS01
1986 03 20.24	S	3.2	D	1.8	B		3	6	7	12		COM
1986 03 20.76	* G	2.8	W	0.8	E		1			11	262	BOU
1986 03 20.78	B	3.2	WW	5.0	B		7		8	2.5	270	BEM
1986 03 21.74	* G	2.7	W	0.8	E		1			8	262	BOU
1986 03 21.79	S	3.8	W	5.0	B		7	6		2.2	270	BRY02
1986 03 21.80	B	2.8	WW	0.0	E		1					CLA
1986 03 22.53	B	2.9	AA	0.8	E		1			5	270	HAL
1986 03 22.73	B	2.7	WW	0.0	E		1					CLA
1986 03 22.75	* G	2.6	W	0.8	E		1					BOU
1986 03 23.24		2.7	D	0.8	E		1					BUS01
1986 03 23.24	S	3.1	D	1.8	B		3	&17	7	10	264	BUS01
1986 03 23.25	B	3.3	D	1.8	B		3					BUS01
1986 03 23.41	B	3.4	WH	5.0	B		10	11	5/	4	270	BOR
1986 03 23.41	S	3.1	WH	0.0	E		1					BOR
1986 03 23.69	S	3.1	AA	2.3	B		2					JON
1986 03 23.74	* G	2.7	W	0.8	E		1			12	258	BOU
1986 03 23.79	S	3.3	WW	5.0	B		12	9	5	3	270	BAT01
1986 03 24.72	S	3.3	AA	2.3	B		2					JON
1986 03 24.81	* G	2.7	W	0.8	E		1					BOU
1986 03 25.41	B	3.2	WH	5.0	B		10	8	5/			BOR
1986 03 25.41	S	2.9	WH	0.0	E		1					BOR
1986 03 25.69				7.8	R	8	30	9	8	1.8	269	JON
1986 03 25.69	S	3.3	AA	2.3	B		2		8/			JON
1986 03 26.41	B	3.2	WH	5.0	B		10	11	5			BOR
1986 03 26.70				7.8	R	8	30	6	5/	1.3	274	JON
1986 03 26.70	S	3.2	AA	2.3	B		2					JON
1986 03 26.79	S	3.2	WW	5.0	B		12	10	5	3	250	BAT01
1986 03 27.66				7.8	R	8	30	6	6/	1	266	JON
1986 03 27.66	S	3.3	AA	2.3	B		2					JON
1986 03 27.80	* G	3.1	W	0.8	E		1					BOU
1986 03 28.67	S	3.2	WW	8.0	B		20	12	5	2	250	BAT01
1986 03 28.81	* G	3.0	W	0.8	E		1					BOU
1986 03 29.05	S	3.1	WW	5.0	B		7	15	6	2.3	263	SHA02
1986 03 29.62	S	3.2	WW	8.0	B		20	12	7			BAT01
1986 03 29.79	S	3.3	W	5.0	B		7	7				BRY02
1986 03 30.11	S	3.4	WW	8.0	B		20	15	6	2.5	283	SHA02
1986 03 30.69				7.8	R	8	30	10	7	1.5	259	JON

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 03 30.69	S	3.1	AA	2.3	B		2					JON
1986 03 30.70	G	2.7	AA	0.0	E		1					JON
1986 03 30.80	* G	2.7	W	0.8	E		1					BOU
1986 03 31.04	S	2.7	WW	5.0	B		7	10	6	2.4	280	SHA02
1986 03 31.71				5.0	B		7	14	5/			JON
1986 03 31.71				7.8	R	8	30	6		0.5	275	JON
1986 03 31.71	S	3.1	AA	2.3	B		2					JON
1986 03 31.72	* G	2.8	W	0.8	E		1					BOU
1986 03 31.99	S	3.2	WW	5.0	B		7	15	5/	4.5	280	SHA02
1986 04 01.08	S	3.3	WW	0.0	E		1					SHA02
1986 04 01.15	M	4.5:	WW	5.0	B	5	7	12	2			KES01
1986 04 01.53	* G	2.5	W	0.8	E		1			7.0	278	BOU
1986 04 01.60	S	3.0	WW	8.0	B		20	12	7			BAT01
1986 04 01.62	B	2.6	WW	0.0	E		1					CLA
1986 04 01.71				5.0	B		7	18	6			JON
1986 04 01.71	S	2.9	AA	2.3	B		2					JON
1986 04 02.10				7.0	B		10	30	6	4	270	MER
1986 04 02.10	B	3.0	A	0.0	E		1		6			MER
1986 04 02.20	B	2.8	A	0.0	E		1		6			MER
1986 04 02.52	B	3.2	W	5.0	B	4	7		1			MAT01
1986 04 02.56	* G	2.4	W	0.8	E		1					BOU
1986 04 02.60	S	3.0	WW	8.0	B		20	12	8	2.5	250	BAT01
1986 04 02.65	B	2.6	WW	0.0	E		1					CLA
1986 04 02.66	S	3.0	WW	5.0	B		10	25	7	2.1	279	CLA
1986 04 02.68				5.0	B		7	20	7			JON
1986 04 02.68	S	2.8	AA	2.3	B		2					JON
1986 04 02.71	B	3.5	WW	5.0	B		7	15	7	2.0	265	BEM
1986 04 03.09	S	2.7	WW	5.0	B		7	15	5	8.8	281	SHA02
1986 04 03.09	S	2.8	WW	0.0	E		1					SHA02
1986 04 03.11	B	2.6	A	0.0	E		1	40	5			MER
1986 04 03.15				8.0	B		20	29	5	3.2	295	HAS02
1986 04 03.15	B	3.0	D	0.0	E		1					HAS02
1986 04 03.15	B	3.0	D	3.0	B		8			6	295	HAS02
1986 04 03.16				7.0	E		10	18		2.7	292	DEA
1986 04 03.16		2.5	WH	0.0	E		1					DEA
1986 04 03.52	B	3.2	W	5.0	B	4	7		1			MAT01
1986 04 03.53	* G	2.4	W	0.8	E		1			6.0	285	BOU
1986 04 03.60	S	3.0	WW	8.0	B		20	12	8	3	250	BAT01
1986 04 03.61	B	2.5	WW	0.0	E		1					CLA
1986 04 03.80	M	3.3	AA	5.0	B		10			1.5	315	HAL
1986 04 04.10	B	2.9	A	0.0	E		1	30	4			MER
1986 04 04.49	B	3.2	W	5.0	B	4	7		1			MAT01
1986 04 04.51	B	2.3	WW	0.0	E		1					CLA
1986 04 04.54	* G	2.4	W	0.8	E		1	&30				BOU
1986 04 04.62				5.0	B		10	45		3	290	HAL
1986 04 04.62	B	2.8	AA	0.8	E		1			3	290	HAL
1986 04 04.71				5.0	B		7	15	5/			JON
1986 04 04.71	S	3.6	AA	2.3	B		2					JON
1986 04 05.11	B	2.8	A	0.0	E		1		4			MER
1986 04 05.25				7.0	B		10	20		2	290	MER
1986 04 05.56	* G	2.3	W	0.8	E		1	&30	2/			BOU
1986 04 05.62	B	3.6	WW	5.0	B		7	20	8	1.5	295	BEM
1986 04 05.63	B	2.4	WW	0.0	E		1					CLA
1986 04 05.70	B	2.7	AA	0.8	E		1			3	310	HAL
1986 04 06.09				8.0	B		20	29	5	5.3	322	HAS02

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 04 06.09	B	2.7	D	0.0	E		1					HAS02
1986 04 06.09	B	2.7	D	3.0	B		8			8	322	HAS02
1986 04 06.09	S	2.9	WW	5.0	B		7	27	5/	5.1	250	SHA02
1986 04 06.47				8.0	B		11	18	8	1.5	298	JON
1986 04 06.47	S	3.0	AA	2.3	B		2					JON
1986 04 06.52	B	2.7	WH	0.0	E		1	23				BOR
1986 04 06.56	* G	2.4	W	0.8	E		1		3			BOU
1986 04 06.75	B	2.2	AA	0.8	E		1			4	310	HAL
1986 04 06.81	B	1.9	AA	0.8	E		1			4	310	HAL
1986 04 06.96	S	2.9:	WW	5.0	B		7	35	5			SHA02
1986 04 07.07	B	2.4	A	0.0	E		1		5			MER
1986 04 07.11				7.0	B		10	25		1.5	325	MER
1986 04 07.48	S	3.0	AA	2.3	B		2					JON
1986 04 07.49				8.0	B		11	25	7/	2.0	298	JON
1986 04 07.49	S	2.3	AA	2.3	B		2	27	7			JON
1986 04 07.53	B	3.3	W	5.0	B	4	7		4			MAT01
1986 04 07.58	B	3.5	W	5.0	B		7	20	8	2.5	280	BEM
1986 04 07.59	* G	1.9	W	0.8	E		1		4			BOU
1986 04 07.59	S	3.0	W	5.0	B		7	20		1	290	BRY02
1986 04 07.60	S	3.0	WW	8.0	B		20	14	7	3.5	250	BAT01
1986 04 07.71	B	2.4	WW	0.0	E		1					CLA
1986 04 07.76	B	1.9	AA	0.8	E		1			3	315	HAL
1986 04 07.77	* G	1.9	W	0.8	E		1					BOU
1986 04 07.97	S	2.6	WW	0.0	E		1	35	5	5.5	307	SHA02
1986 04 08.08	M	3.5:	WW	5.0	B	5	7	25	5	3	310	KES01
1986 04 08.43	S	3.0	AA	2.3	B		2	45	5/			JON
1986 04 08.48	S	3.0	WW	8.0	B		20	14	7			BAT01
1986 04 08.54	B	3.0	WH	0.0	E		1	31	5	4.6	320	BOR
1986 04 08.62	B	2.4	WW	0.0	E		1					CLA
1986 04 08.67	* G	2.0	W	0.8	E		1		4/			BOU
1986 04 08.68	B	2.4	W	0.0	E		1			4		FIT
1986 04 08.69	S	3.3	W	7.6	S	8	15					FIT
1986 04 08.70	S	3.4	W	25	L	5	38					FIT
1986 04 08.95	S	2.7	WW	0.0	E		1	36	5/	3.9	312	SHA02
1986 04 09.48	S	3.0	WW	8.0	B		20	14	7			BAT01
1986 04 09.50	B	3.3	W	5.0	B	4	7		4			MAT01
1986 04 09.52	B	2.8	WH	0.0	E		1	42		2.5	0	BOR
1986 04 09.55	* G	1.9	W	0.8	E		1	&32	4			BOU
1986 04 09.59	B	2.0	AA	0.8	E		1			2	335	HAL
1986 04 09.59	S	3.2	W	5.0	B		7	20		1.3	310	BRY02
1986 04 09.62	B	2.5	WW	0.0	E		1					CLA
1986 04 09.88	S	3.2	WW	0.0	E		1	34	5	3.9	320	SHA02
1986 04 10.03	B	2.8	D	0.0	E		1	29	5	3	315	HAS02
1986 04 10.04	B	2.8	D	3.0	B		8	29	5	10	315	HAS02
1986 04 10.55	B	3.4	W	5.0	B	4	7		2			MAT01
1986 04 10.55	S	3.3	AA	2.3	B		2	50	5			JON
1986 04 10.57	* G	2.2	W	0.8	E		1	32	3			BOU
1986 04 10.57	G	2.9	AA	0.0	E		1					JON
1986 04 10.76	B	2.5	WW	0.0	E		1					CLA
1986 04 10.91	B	2.6	WW	0.0	E		1	47	5	6.6	321	SHA02
1986 04 11.02				8.0	B		20	30	5			HAS02
1986 04 11.02	B	2.9	D	0.0	E		1			3.7	325	HAS02
1986 04 11.02	B	2.9	D	3.0	B		8			6.5	325	HAS02
1986 04 11.49	* G	2.3	W	0.8	E		1	35	3/			BOU
1986 04 11.50	B	3.9	W	5.0	B		7	40	7	3.25	330	BEM

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 04 11.53	B	3.5	W	5.0	B	4	7		2			MAT01
1986 04 11.75	B	2.3	AA	0.8	E		1			1.5	5	HAL
1986 04 11.91	B	3.0	WW	0.0	E		1	47	4/	2.3	341	SHA02
1986 04 12.01	M	4.0:	WW	5.0	B	5	7	20	6	4	350	KES01
1986 04 12.08				3.0	B		8	&11	5	2.7	22	HAS02
1986 04 12.30	B	3.1	WW	0.0	E		1	47	5/	3.3	337	SHA02
1986 04 12.43	B	3.7	W	5.0	B	4	7		2			MAT01
1986 04 12.44	S	3.4	WW	8.0	B		20	10	6			BAT01
1986 04 12.49				5.0	B		7			5.5	85	BOR
1986 04 12.49				5.0	B		7	19	5	5.3	335	BOR
1986 04 12.49	B	3.0	WH	0.0	E		1	29	5			BOR
1986 04 12.59	B	2.5	WW	0.0	E		1					CLA
1986 04 12.73	S	3.3:	AA	2.3	B		2	27				JON
1986 04 12.93	B	3.2	WW	0.0	E		1	31	5	4.2	346	SHA02
1986 04 13.25	B	3.2	WW	0.0	E		1	24	5	3.4	83	SHA02
1986 04 13.40	S	3.5	WW	8.0	B		20	10	6			BAT01
1986 04 13.45	B	4.0	W	5.0	B	4	7		2			MAT01
1986 04 13.45	S	3.3	AA	2.3	B		2		5			JON
1986 04 13.51				5.0	B		7			8.0	95	BOR
1986 04 13.51				5.0	B		7	24	5	2.2	345	BOR
1986 04 13.51	B	3.0	WH	0.0	E		1	29	4	5		BOR
1986 04 13.54	* G	2.5	W	0.8	E		1					BOU
1986 04 13.60	B	2.2:	W	0.0	E		1			14	108	THO
1986 04 13.69	S	2.9	AA	2.3	B		2	40	6			JON
1986 04 13.91	B	3.2	WW	0.0	E		1	31	5	5.6	326	SHA02
1986 04 14.4	S	2.8	AA	2.3	B		2	36	5			JON
1986 04 14.46	* G	2.4	W	0.8	E		1					BOU
1986 04 14.58	S	3.2	WW	8.0	B		20	9	6			BAT01
1986 04 14.62	B	2.6	WW	0.0	E		1					CLA
1986 04 14.77	* G	2.3	W	0.8	E		1					BOU
1986 04 14.90	B	3.8	WW	0.0	E		1	24	3/			SHA02
1986 04 15.49	B	3.7	W	5.0	B	4	7		2			MAT01
1986 04 15.49	* G	2.4	W	0.8	E		1					BOU
1986 04 15.50				5.0	B		7			6.0	87	BOR
1986 04 15.50				5.0	B		7	29	5/	3.3	12	BOR
1986 04 15.50	B	2.9	WH	0.0	E		1	36	4/	9	57	BOR
1986 04 15.55	B	2.7	WW	0.0	E		1					CLA
1986 04 15.57				5.0	B		7			6.0	65	BOR
1986 04 15.57				5.0	B		7	19	5	2.0	0	BOR
1986 04 15.57	B	2.9	WH	0.0	E		1	32	5	3		BOR
1986 04 15.69	S	3.1	AA	2.3	B		2	30	5			JON
1986 04 15.79	* G	2.3	W	0.8	E		1					BOU
1986 04 16.48	B	2.4	AA	0.8	E		1			4	35	HAL
1986 04 16.50	S	3.0	WW	8.0	B		20	12	8	2	240	BAT01
1986 04 16.56	* G	2.5	W	0.8	E		1		4	10	62	BOU
1986 04 16.61				5.0	B		7	19	4	3.2	70	BOR
1986 04 16.61	B	3.1	WH	0.0	E		1	36	4			BOR
1986 04 16.67	S	3.1	AA	2.3	B		2	22	5		55	JON
1986 04 17.02	B	3.3	WW	0.0	E		1	31	5	4.9	60	SHA02
1986 04 17.45	S	3.0	AA	2.3	B		2	33	6			JON
1986 04 17.47	B	3.7	W	5.0	B	4	7		2			MAT01
1986 04 17.70	B	3.0	WW	0.0	E		1					CLA
1986 04 17.84	M	4.2:	WW	5.0	B	5	7	12	2	0.3	360	KES01
1986 04 18.13	B	3.7	WW	0.0	E		1	35	5	9.3	93	SHA02
1986 04 18.42	S	3.1	AA	2.3	B		2	18	5			JON

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 04 18.59	S	3.0	WH	0.0	E		1	48	4	12.5	90	BOR
1986 04 18.67	* G	2.4	W	0.8	E		1		3/	20	82	BOU
1986 04 18.73	B	3.1	WW	0.0	E		1					CLA
1986 04 18.75	B	2.9	W	5.0	B		7		6	5.0	85	BEM
1986 04 18.90	B	3.7	WW	0.0	E		1	31	5	3.5	74	SHA02
1986 04 18.91	S	4.0	WW	8.0	B		20	4	1			BAR
1986 04 19.61	B	3.2	WW	0.0	E		1					CLA
1986 04 19.67	S	3.0	WW	8.0	B		20	14	8	3		BAT01
1986 04 19.68	* G	2.7	W	0.8	E		1		3	23	80	BOU
1986 04 19.71	B	3 :	W	0.0	E		1	30		25	86	THO
1986 04 19.90	B	3.8	WW	0.0	E		1	26	4/	1.1	86	SHA02
1986 04 20.30	B	3.5	AA	0.8	E		1					HAL
1986 04 20.71	* G	2.9	W	0.8	E		1		3	17	95	BOU
1986 04 20.73	B	3.3	WW	0.0	E		1					CLA
1986 04 20.88	B	3.8	WW	0.0	E		1	19	5	2.1	92	SHA02
1986 04 21.39				7.8	R	8	30	11	7	?		JON
1986 04 21.39	S	3.6	AA	2.3	B		2	24	4			JON
1986 04 21.44	B	5.2	W	5.0	B	4	7					MAT01
1986 04 21.67	S	3.4	AA	2.3	B		2	35	5			JON
1986 04 21.72	B	3.4	WW	0.0	E		1					CLA
1986 04 21.72	B	3.5:	W	0.0	E		1			16	81	THO
1986 04 21.73	* G	3.0	W	0.8	E		1		3	14	90	BOU
1986 04 22.49	B	5.1	W	5.0	B	4	7					MAT01
1986 04 23.40	S	3.9	AA	2.3	B		2		6			JON
1986 04 24.50	S	3.5	W	0.0	E		1	14		25	88	SEA
1986 04 24.51	B	3.5	WW	0.0	E		1					CLA
1986 04 24.51	B	4.7	W	5.0	B	4	7					MAT01
1986 04 24.51	* G	3.2	W	0.8	E		1		3/	35	92	BOU
1986 04 24.53	B	3.0	W	5.0	B		7		6	8	90	BEM
1986 04 24.54	S	3.2	AA	8.0	B		20	12	7	4		BAT01
1986 04 24.54	S	3.5	W	0.0	E		1			17.5	90	WOO
1986 04 25.89	B	4.4	WW	0.0	E		1	43	3	4.0	83	SHA02
1986 04 25.89	S	4.8	WW	5.0	B		7	31	4/	4.2	83	SHA02
1986 04 26.35	S	3.8	W	0.0	E		1			12	100	SEA
1986 04 26.88	B	4.4	WW	0.0	E		1	53	3			SHA02
1986 04 26.88	S	4.8	WW	5.0	B		7	21	4			SHA02
1986 04 26.89	S	5.3	WW	8.0	B		20	20	5	3.6	105	SHA02
1986 04 27.36	S	4.2	W	0.0	E		1			12	100	SEA
1986 04 27.40				5.0	B		7	12	3			JON
1986 04 27.40	S	4.9	AA	2.3	B		2		1			JON
1986 04 27.88	B	4.7	WW	0.0	E		1	20	4	5.8	107	SHA02
1986 04 28.05				5.0	B		10	12	5	4.3	100	BOR
1986 04 28.05		4.1	WH	0.0	E		1	30	3			BOR
1986 04 28.18	B	4.9	AA	0.8	E		1					HAL
1986 04 28.18	M	4.9	AA	5.0	B		10			2	90	HAL
1986 04 28.54	S	3.9	W	0.0	E		1					WOO
1986 04 28.88	B	4.3:	WW	0.0	E		1	15	4	1.5	109	SHA02
1986 04 29.09	S	5.1	AA	3.5	B		7	14	4	1.2	100	MOR03
1986 04 29.12				5.0	B		10	15	4	6.0	100	BOR
1986 04 29.12		4.2	WH	0.0	E		1	43				BOR
1986 04 29.36	S	4.3	AA	2.3	B		2	23	5			JON
1986 04 29.38	S	4.6	W	0.0	E		1			&5	105	SEA
1986 04 29.54	S	4.0	W	0.0	E		1			5.2	90	WOO
1986 04 29.56	S	4.0	AA	8.0	B		20	9	6	2		BAT01
1986 04 29.61	B	3.8	AA	0.0	E		1					CLA

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 04 29.62	S	3.9	AA	3.0	R		6					CLA
1986 04 29.90	B	3.9	WW	0.0	E		1	24	3			SHA02
1986 04 29.90	S	4.5	WW	5.0	B		7	14	4	6.0	103	SHA02
1986 04 30.31	B	4.6	AA	0.8	E		1			25	95	HAL
1986 04 30.31	M	4.7	AA	5.0	B		10					HAL
1986 04 30.35				5.0	B		7	20	5	3	100	JON
1986 04 30.35	S	4.6	AA	2.3	B		2	30	3			JON
1986 04 30.46	S	4.6	W	0.0	E		1			5	100	SEA
1986 05 01.10	B	4.9	WH	5.0	B		10					BOR
1986 05 01.10	S	4.7	WH	5.0	B		10	12	5	5.0	105	BOR
1986 05 01.38	S	4.9	AA	2.3	B		2					JON
1986 05 01.41	S	4.7	W	0.0	E		1					SEA
1986 05 01.84	B	5.5	D	3.0	B		8					HAS02
1986 05 01.84	B	5.5	D	10.0	B		14	7.8	4			HAS02
1986 05 01.84	M	5.4	D	8.0	B		11	&15	6/	1.8	45	GUB
1986 05 01.85	S	4.5	W	15.2	L	5	44	15	6	3	100	MOE
1986 05 01.87	S	4.2	W	5.0	B		7	26	6	2	100	MOE
1986 05 01.88	B	5.2	WW	0.0	E		1	18	3			SHA02
1986 05 01.88	S	5.5	WW	5.0	B		7	14	4	6.6	104	SHA02
1986 05 01.88	S	5.7	WW	8.0	B		20	12	5			SHA02
1986 05 01.89	B	4.8	A	5.0	B		7	12	5			MER
1986 05 02.40	S	5.0	AA	2.3	B		2	40	3			JON
1986 05 02.56	S	4.5	AA	8.0	B		20	7	5	2		BAT01
1986 05 02.85	B	5.6	D	3.0	B		8					HAS02
1986 05 02.85	B	5.6	D	10.0	B		14	4.7	3			HAS02
1986 05 02.89	B	4.7	A	5.0	B		7	12	4	2	103	MER
1986 05 02.89	B	5.3	WW	0.0	E		1	18	3			SHA02
1986 05 02.89	S	5.6	WW	5.0	B		7	12	4/	7.8	101	SHA02
1986 05 02.89	S	6.0	WW	8.0	B		20	14	5	5.1	102	SHA02
1986 05 02.90	S	4.6	W	15.2	L	5	44	23	7	2.5	100	MOE
1986 05 03.07	B	5.4	WH	5.0	B		10					BOR
1986 05 03.07	S	5.0	WH	0.0	E		1					BOR
1986 05 03.07	S	5.1	WH	5.0	B		10	12	5	4.7	110	BOR
1986 05 03.31	M	4.9	AA	5.0	B		10					HAL
1986 05 03.45	S	5.1	AA	2.3	B		2	26	3			JON
1986 05 03.47	S	5.4	W	5.0	B		7	12		1.2	90	BRY02
1986 05 03.50	S	5.2	W	0.0	E		1					SEA
1986 05 03.83	B	5.8	D	5.6	B		8	4.5	4			KOC01
1986 05 03.88	B	5.9	D	8.0	B		20	6.0	4			KOC
1986 05 03.88	S	4.9	W	15.2	L	5	44	20	7	2	100	MOE
1986 05 04.08	S	5.1	WH	5.0	B		10	12	4	3.0	113	BOR
1986 05 04.09	S	5.9	AA	3.5	B		7	12				MOR03
1986 05 04.25	S	5.1	D	8.0	B		20	10	5			MAC
1986 05 04.38	S	5.6	AA	8.0	B		20	5	3	1		BAT01
1986 05 04.41	S	5.1	AA	2.3	B		2	25	3			JON
1986 05 04.61	S	5.4	W	5.0	B		7	10				BRY02
1986 05 04.78	B	5.4	AA	5.0	B		10					REI01
1986 05 05.31	B	5.1	AA	0.8	E		1			15	105	HAL
1986 05 05.31	M	5.1	AA	5.0	B		10					HAL
1986 05 05.50				8.0	B		15	12	4	2	105	SEA
1986 05 05.50	S	5.0	W	0.0	E		1					SEA
1986 05 05.85	B	5.2	A	5.0	B		7	12	4	0.5	83	MER
1986 05 05.87	S	5.5	AA	5.0	B		7	9.6	4			SHA02
1986 05 06.38	S	5.1	AA	2.3	B		2	20	3			JON
1986 05 06.46	S	5.1	W	0.0	E		1					SEA

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 05 06.85	B	6.0	D	3.0	B		8	9.9	3			HAS02
1986 05 06.85	S	6.0	D	10.0	B		14	9.9	3	0.41	90	HAS02
1986 05 06.87	S	5.1	W	15.2	L	5	44	12	5	1	100	MOE
1986 05 07.18	S	5.6	D	8.0	B		20	12	5			MAC
1986 05 07.39	S	5.6	AA	2.3	B		2					JON
1986 05 07.39	S	5.7	AA	4.9	B		3	13	3			JON
1986 05 07.90	B	5.4	A	5.0	B		7	14	3	2.5	95	MER
1986 05 07.90	S	6.0	AA	8.0	B		10	12	3/	1.5	90	SHA02
1986 05 08.12	S	5.9	AA	3.5	B		7	20	4			MOR03
1986 05 08.41				8.0	B		15	11	5	4	110	SEA
1986 05 08.41	S	5.7	AA	4.9	B		3	20				JON
1986 05 08.41	S	5.8	W	2.5	B		2					SEA
1986 05 08.51	S	5.7	AA	0.0	E		1					CLA
1986 05 08.51	S	5.9	AA	3.0	R		6	21				CLA
1986 05 08.83	S	5.4	AA	8.0	B		20	5	2			BAR
1986 05 08.85	B	6.2	D	8.0	B		11	11.1	4	0.37	90	KOC01
1986 05 08.85	B	6.2	D	10.0	B		14	10.8	4			HAS02
1986 05 08.85	B	6.4	D	8.0	B		20	8.6	4	0.42	90	KOC
1986 05 08.85	M	6.1	D	8.0	B		11	&16	4	1.5	102	GUB
1986 05 08.85	S	6.1	D	10.0	B		14	10.8	4			HAS02
1986 05 08.86	B	6.3	D	3.0	B		8	13.0	3			HAS02
1986 05 08.92	S	6.3	AA	8.0	B		10	9.6	3			SHA02
1986 05 08.92	S	6.4	AA	8.0	B		20	5.4	4	0.37	137	SHA02
1986 05 09.30	M	5.2	AA	5.0	B		10			6	105	HAL
1986 05 09.36	S	5.9	D	13.0	R	7	27	8	2			MAC
1986 05 09.42	S	5.9	W	2.5	B		2					SEA
1986 05 09.86	S	5.6	AA	8.0	B		20	12	5	?	80	ZAN
1986 05 10.08	S	5.2	WH	5.0	B		10	14	4	2.8	105	BOR
1986 05 10.10	S	6.4	AA	3.5	B		7	11	3			MOR03
1986 05 10.27	S	6.1	D	8.0	B		20	8	3			MAC
1986 05 10.42				8.0	B		15	11		1.2	100	SEA
1986 05 10.42	S	6.0	W	2.5	B		2					SEA
1986 05 10.44	B	5.1	W	8.0	B		11		3	4	105	BEM
1986 05 10.58	S	6.2	W	5.0	B		7	10				BRY02
1986 05 10.84	S	5.7	AA	8.0	B		20	5	1			BAR
1986 05 10.85	B	5.9	A	5.0	B		7	10	3			MER
1986 05 10.88	S	5.7	AA	8.0	B		20	9.5	5	?	80	ZAN
1986 05 10.88	S	6.3	D	10.0	B		14	6.9	3			HAS02
1986 05 10.92	S	6.4	AA	8.0	B		10	9.0	3			SHA02
1986 05 11.08	S	5.4	WH	5.0	B		10	14	4/	2.7	112	BOR
1986 05 11.26	S	6.3	D	8.0	B		20	8	2			MAC
1986 05 11.31	M	5.5	AA	5.0	B		10			5	105	HAL
1986 05 11.46				8.0	B		15	9	4	>1	110	SEA
1986 05 11.46	S	5.9	W	2.5	B		2					SEA
1986 05 11.54	B	5.4	W	8.0	B		11		5	3	110	BEM
1986 05 12.12	S	6.1	AA	3.5	B		7	10	3			MOR03
1986 05 12.36	S	5.9	AA	4.9	B		3	13	3			JON
1986 05 12.36	S	6.0	W	2.5	B		2					SEA
1986 05 12.86	B	6.4	D	10.0	B		14	8.6	4			HAS02
1986 05 12.88	S	6.8	AA	8.0	B		20	4.3	3	0.71	120	SHA02
1986 05 12.91	S	6.4	AA	5.0	B		7	6.0	3			SHA02
1986 05 13.09	S	6.3	AA	3.5	B		7	11.5	3			MOR03
1986 05 13.09	S	6.8	AA	15	R	5	31	6	5	0.47	110	MOR03
1986 05 13.36	S	5.9	W	2.5	B		2					SEA
1986 05 13.54	S	4.5	W	5.0	B		7	14	5	3.4	95	WOO

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 05 13.90	S	6.8	AA	8.0	B		20	6.3	3	1.1	114	SHA02
1986 05 13.92	S	5.5	W	5.0	B		10	&15	4			BOU
1986 05 13.93	S	7.1	AA	20	R	12	40	4.6	3/	0.34	121	SHA02
1986 05 14.10	S	5.7	WH	5.0	B		10	14	4	4.0	105	BOR
1986 05 14.10	S	6.4	AA	3.5	B		7	11	3			MOR03
1986 05 14.35	S	6.1	AA	5.0	B		7	13	3			JON
1986 05 14.35	S	6.3	AA	4.9	B		3					JON
1986 05 14.86	B	6.7	A	5.0	B		7	15	3			MER
1986 05 15.07	S	5.7	WH	5.0	B		10	14	4	1.3	120	BOR
1986 05 15.20	S	6.5	D	13.0	R	7	27	6	4			MAC
1986 05 15.44				8.0	B		15	12	6	2.0	107	SEA
1986 05 15.44	S	6.0	W	2.5	B		2					SEA
1986 05 15.89	S	7.1	AA	8.0	B		20	4.5	3			SHA02
1986 05 15.90	S	7.5	AA	20	R	12	40	3.9	4			SHA02
1986 05 15.91	S	6.2	W	8.0	B		20	&10	2			BOU
1986 05 16.18	M	5.9	AA	5.0	B		10			4	105	HAL
1986 05 16.45	S	6.1	W	2.5	B		2					SEA
1986 05 16.90	S	7.2	AA	8.0	B		20	3.6	2/			SHA02
1986 05 17.19	S	6.9	D	8.0	B		20	7	2			MAC
1986 05 17.50	S	6.3	W	6	R	10	18	10	5	1.3	95	WOO
1986 05 18.90	S	7.3	AA	8.0	B		20	2.7	2			SHA02
1986 05 18.94	S	8.1	AA	20	R	12	40	2.0	4			SHA02
1986 05 19.36	S	6.5	W	5.0	B		10					SEA
1986 05 19.90	S	8.0	AA	20	R	12	40	1.7	3			SHA02
1986 05 20.44	S	6.6	W	5.0	B		10					SEA
1986 05 21.36	S	6.6	W	5.0	B		10					SEA
1986 05 21.91	S	8.1	AA	20	R	12	40	4.3	3			SHA02
1986 05 22.36	S	6.8	W	5.0	B		10					SEA
1986 05 24.43	S	8.4	AA	31.7	L	5	86	2	3			JON
1986 05 24.86	S	6.9	AA	8.0	B		20	7	4			ZAN
1986 05 25.18	S	7.4	S	13.0	R	7	27	6	5	0.57	86	MAC
1986 05 25.20	M	6.7	AA	5.0	B		10			1.5	105	HAL
1986 05 25.35	S	6.7	W	5.0	B		10					SEA
1986 05 25.90	S	7.2	D	5.0	B		16	20	3			NOL
1986 05 26.08				31.7	L	6	55	7.2	4			BOR
1986 05 26.08	S	6.4	WH	5.0	B		10	16	4			BOR
1986 05 26.10	S	7.9	AA	6	R	15	36	4.5	4			MOR03
1986 05 26.10	S	8.0	AA	3.5	B		7	& 8				MOR03
1986 05 26.17	S	7.7	S	13.0	R	7	27	6	4	0.29	90	MAC
1986 05 26.21	M	6.8	AA	5.0	B		10			1.5	105	HAL
1986 05 26.93	S	8.4	AA	20	R	12	40	2	2/			SHA02
1986 05 27.09	S	6.3	WH	5.0	B		10	15	3/			BOR
1986 05 27.33				7.8	R	8	30	7	5			JON
1986 05 27.33				31.7	L	5	86		6	0.25	115	JON
1986 05 27.33	S	7.0	AA	5.0	B		7					JON
1986 05 27.35	S	6.8	W	5.0	B		10	9				SEA
1986 05 27.89	B	7.5	A	15.0	L	5	25	5.6	3/	0.63	112	MER
1986 05 28.19	M	6.9	AA	5.0	B		10					HAL
1986 05 28.21	S	6.9	S	8.0	B		20	6	3	0.43	92	MAC
1986 05 28.37	S	6.8	W	5.0	B		10					SEA
1986 05 29.10	S	7.8	AA	6	R	15	36	6	3			MOR03
1986 05 29.36	S	6.9	W	5.0	B		10			3	108	SEA
1986 05 30.19	K	6.8	WH	4.0	B		8	15	3	0.5	100	KEE
1986 05 30.21	S	7.2	S	32	L	4	33	10	4	1.5	100	KEE
1986 05 30.36	S	7.1	W	5.0	B		10			2	110	SEA

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 05 30.90	S	7.2	AA	8.0	B		20	7	4/	?	80	ZAN
1986 05 31.18	K	7.0	WH	4.0	B		8	15	3	0.4	100	KEE
1986 05 31.24	S	7.6	S	13.0	R	7	27	4	2			MAC
1986 05 31.35				8.0	B		15	8	6	&2	110	SEA
1986 05 31.35	S	7.0	W	5.0	B		10					SEA
1986 05 31.84	S	7.7	AA	8.0	B		20					BAR
1986 05 31.89	S	7.2	AA	8.0	B		20	7	4			ZAN
1986 06 01.05	B	7.6	WH	7.0	B		10	8.0		1.0	100	DEA
1986 06 01.19	K	7.0	WH	4.0	B		8					KEE
1986 06 01.41	S	7.0	W	5.0	B		10					SEA
1986 06 02.11				15	R	5	31	5	4	0.20	115	MOR03
1986 06 02.11	S	7.9	AA	3.5	B		7	& 6.5				MOR03
1986 06 02.11	S	7.9	AA	6	R	15	36	6.5	3			MOR03
1986 06 02.20	M	7.3	AA	5.0	B		10			1.5	105	HAL
1986 06 02.35	S	7.1	W	5.0	B		10					SEA
1986 06 03.10				31.7	L	6	55	6.5	3			BOR
1986 06 03.10	S	6.8	WH	5.0	B		10	7	2			BOR
1986 06 03.12	S	8.2	AA	15	R	5	31	3.6	4			MOR03
1986 06 03.36	S	7.1	W	5.0	B		10					SEA
1986 06 03.90	S	7.4	W	8.0	B		20		3			BOU
1986 06 04.36	S	7.1	W	5.0	B		10					SEA
1986 06 04.87	S	7.5	W	8.0	B		20	7	4			BOU
1986 06 05.20	K	7.2	S	4.0	B		8	13	2			KEE
1986 06 05.36	S	7.2	W	5.0	B		10			1	100	SEA
1986 06 05.88	B	7.9	D	10.0	B		14	3.7	2			HAS02
1986 06 05.89	S	7.6	W	8.0	B		20	7	3			BOU
1986 06 06.38	S	7.4	W	5.0	B		10					SEA
1986 06 06.88	B	8.0	W	8.0	B		20					BOU
1986 06 06.89	S	7.7	W	5.0	B		10		3			BOU
1986 06 06.89	S	7.7	W	8.0	B		20	7	4			BOU
1986 06 07.05	B	7.9	WH	7.0	B		10	5.3		0.8	110	DEA
1986 06 07.20	K	7.4	S	4.0	B		8	12	2			KEE
1986 06 07.20	M	7.5	AA	5.0	B		10					HAL
1986 06 07.88	S	7.9	W	8.0	B		20	7	2/			BOU
1986 06 07.89	S	8.0:	W	5.0	B		10		2			BOU
1986 06 08.22	S	7.8	D	25.4	L	4	32	4	5			MAC
1986 06 08.38	S	7.5	W	5.0	B		10					SEA
1986 06 08.89	S	7.8	W	5.0	B		10		2			BOU
1986 06 08.89	S	7.8	W	8.0	B		20	7.5	3/			BOU
1986 06 09.08	S	7.4	AA	8.0	B		20	& 7	1			GRE
1986 06 09.09				31.7	L	6	55	3.5	4			BOR
1986 06 09.09	M	7.9	AA	22.9	R	12	86					GRE
1986 06 09.09	S	7.1:	WH	5.0	B		10	9	1			BOR
1986 06 09.09	S	7.4	WH	8.0	B		20	7	3			BOR
1986 06 09.09	S	8.1	AA	22.9	R	12	86	& 3	4/			GRE
1986 06 09.12	S	8.2	AA	15	R	5	31	4.5	3			MOR03
1986 06 09.42				8.0	B		15			2	110	SEA
1986 06 09.42	S	7.6	W	5.0	B		10	11	3			SEA
1986 06 09.88	S	7.9	W	8.0	B		20		2/			BOU
1986 06 10.08	S	7.2	AA	8.0	B		20	& 8	4/			GRE
1986 06 10.09	S	7.2	AA	5.0	B		7	& 9	1			GRE
1986 06 10.09	S	7.3	WH	8.0	B		20	7	2/			BOR
1986 06 10.09	S	7.8	WH	31.7	L	6	55	5.3	4			BOR
1986 06 11.19	K	7.5	S	4.0	B		8	10	1			KEE
1986 06 11.19	M	7.5	AA	5.0	B		10			1	110	HAL

Periodic comet Halley (1982i) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 06 12.19	K	7.6	S	4.0	B		8	10	1			KEE
1986 06 12.20	M	8.0	S	32	L	4	33			0.3	105	KEE
1986 06 13.19	K	7.7	S	4.0	B		8	12	1			KEE
1986 06 15.09	S	6.8:	AA	8.0	B		20	& 8	1			GRE
1986 06 17.09	S	8.5:	AA	22.9	R	12	86	& 2	1			GRE
1986 06 18.08	S	7.8:	AA	22.9	R	12	86	& 2.5	1/			GRE
1986 06 18.35	S	8.0	W	8.0	B		15			<1	110	SEA
1986 06 23.08	S	8.9:	AA	20.3	L	6	49	& 2	1			GRE
1986 06 23.17	S	9.0	S	32	L	4	33	6	1			KEE
1986 06 23.35	S	8.1	W	8.0	B		15					SEA
1986 06 24.36	S	8.2	W	8.0	B		15					SEA
1986 06 25.09	S	8.9	S	20.3	L	6	68	& 2.5	1			GRE
1986 06 25.20	S	7.9	AA	20	L	6	61					HAL
1986 06 25.21	S	9.1	AA	8.0	B		20	5	2			MAC
1986 06 25.22	S	9.0	AA	25.4	L	4	32	5	3			MAC
1986 06 26.34	S	8.2	W	8.0	B		15	10	4	0.5	95	SEA
1986 06 28.05	S	8.1	WH	7.0	B		10	8.0				DEA
1986 06 29.22	S	9.5	AA	25.4	L	4	32	3	1			MAC
1986 06 29.35	S	8.3	W	8.0	B		15					SEA
1986 06 30.22	S	9.5	AA	25.4	L	4	32	4	2			MAC
1986 06 30.95	S	8.4	WH	7.0	B		10					DEA
1986 07 02.18	S	9.0	S	32	L	4	33	5	1			KEE
1986 07 02.18	S	9.1	S	32	L	4	66	4	1			KEE
1986 07 02.21	S	9.5	S	25.4	L	4	64	3	2			MAC
1986 07 03.36	S	8.5:	W	8.0	B		15					SEA
1986 07 05.21	S	9.5	S	25.4	L	4	64	3	2			MAC
1986 07 05.35	S	8.7	AC	8.0	B		15					SEA
1986 07 06.35	S	8.8	AC	8.0	B		15	& 6	4			SEA
1986 07 07.91	S	8.6	WH	7.0	B		10					DEA
1986 07 08.35	S	9.0	AC	8.0	B		15		4			SEA
1986 07 09.35	S	9.0	AC	8.0	B		15					SEA
1986 07 12.17	S	9 :	AA	20	L	6	55					HAL
1986 07 13.15	S	9 :	AA	20	L	6	55					HAL

Periodic comet Boethin (1985n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 01 03.53	S	7.5	AA	20.3	L	6	38	4.5	4/			PEA
1986 01 05.54	S	7.5	AA	6.5	B		20					PEA
1986 01 28.78	S	8.2	A	8.0	B	5	15		2			SCH04
1986 02 12.79	S	8.8	AC	8.0	B		20	& 4	0/			BOU
1986 02 26.78	S	9.6	S	20.3	T	10	92	1.1	4			HAS02
1986 02 26.81	S	9.2	AC	25.4	J	6	59	3	3			BOU
1986 02 27.80	S	9.4	AC	25.4	J	6	59	3	3			BOU
1986 02 27.81	S	9.5:	AC	8.0	B		20		1			BOU
1986 03 02.80	S	9.3	AC	25.4	J	6	59	3.8	2/			BOU
1986 03 03.80	S	9.2	AC	25.4	J	6	48	3.7	3			BOU
1986 03 05.84	S	9.4	S	20.3	T	10	92	1.1	4			HAS02
1986 03 09.84	S	9.2	AC	40.0	L	5	81	4.3	2/			MER
1986 03 14.41	S	9.7	AC	15.2	L	5	36	& 4	1			BOU

Periodic comet Schwassmann-Wachmann 1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 03 22.51	S[	12.0	AA	20	L	6	122					HAL

Periodic comet Schwassmann-Wachmann 1 (Cont.)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 04 04.22	S	12.0	AC	31.0	L	8	120	0.9	3			MER
1986 04 04.63	S[	12.5	AA	20	L	6	122					HAL
1986 04 05.24	S	12.0	AC	31.0	L	8	61	1.0	4			MER
1986 04 07.17	S	12.7	AC	31.0	L	8	150	0.8	2			MER
1986 04 11.77	S[	12.5	AA	20	L	6	122					HAL
1986 04 24.50	S[	11.5	AA	20	L	6	122					HAL
1986 05 03.42	S[	12.5	AA	20	L	6	122					HAL
1986 05 11.40	S[	12.5	AA	20	L	6	122					HAL
1986 05 18.45	S[	12.0	AA	20	L	6	122					HAL
1986 05 28.31	S[	12.0	AA	20	L	6	122					HAL
1986 06 07.38	S[	12.0	AA	20	L	6	122					HAL
1986 06 15.46	S[	12.5	AA	20	L	6	111					HAL
1986 07 12.23	S[	12.5	AA	20	L	6	111					HAL
1986 07 27.19	S[	12.5	AA	20	L	6	163					HAL
1986 07 30.31	S[	12.0	AA	20	L	6	163					HAL

Periodic comet Hartley-IRAS (1984 III)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1984 01 03.76	S	10.4	A	20	R	14	40	2.6	3			SHA02
1984 01 04.78	S	10.1	A	20	R	14	40	2.2	2			SHA02
1984 01 20.76	S	10.1	VB	33	L	4	60	2	2			SHA02
1984 01 29.76	S	10.6	VB	33	L	4	45	2.0	4			SHA02
1984 02 03.76	S	10.8	VB	33	L	4	45	2.4	3			SHA02
1984 02 09.24	S	9.5	VB	33	L	4	45	2.5	4			SHA02
1984 02 14.23	S	10.6	VB	33	L	4	45	2.7	2			SHA02
1984 04 02.00	S	10.5	VB	33	L	4	45	2.5	4		360	SHA02
1984 04 03.93	S	11.0	VB	20	R	14	40	2.5	1			SHA02
1984 04 23.01	S	11.4	VB	33	L	4	45	2.1	1			SHA02
1984 04 27.95	S	11.5	VB	33	L	4	45	2.6	1			SHA02

Periodic comet Shoemaker 3 (1986a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 02 04.84	S	13.1	AC	25.4	J	6	90	0.8	1			BOU

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RECENT NEWS AND RESEARCH CONCERNING COMETS

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Since this column was written for the April issue, six comets have been given new provisional letter designations: four were recoveries (P/Forbes 1986*g*, P/Schwassmann-Wachmann 2 1986*h*, P/Comas Solá 1986*j*, and P/Kohoutek 1986*k*) and two were new discoveries (comets Churyumov-Solodovnikov 1986*i* and Wilson 1986*l*).

In addition, Naval Research Laboratory (Washington, DC) scientists reported their discovery of a sixth apparent *SOLWIND* comet on images obtained by the now-extinct coronograph when it was functioning in orbit around the earth. IAU Commission 20 assigned the roman-numeral designation 1983 *XX* to "comet *SOLWIND* 6" (**IAUC** 4229). Marsden finds that the orbits of all six *SOLWIND* comets can be represented by elements similar to the so-called Kreutz group of sungrazing comets. Again, there was no trace of comet *SOLWIND* 6 appearing on the opposite side of the solar disk following its perihelion, and it apparently was not seen from ground-based sites.

Jim Gibson recovered both P/Forbes (*IAUC* 4229) and P/Schwassmann-Wachmann 2 (*IAUC* 4231) using the 60-inch reflector at Palomar (equipped with a CCD); he found the former comet to be stellar ($m_2 \simeq 20.5$) on Apr. 8.27 UT, and located the latter comet at $m_1 \sim 20$ on June 26.5. G. Edward Danielson and J. Holtzman helped confirm Gibson's Apr. 8 recovery by obtaining images with the same telescope on May 9. While the Palomar observations were being reduced (and before announcement of the recovery had been made), John Briggs and Edgar Everhart reported their independent recovery of P/Forbes from a photograph taken with a 16-inch reflector from Colorado; the comet appeared very weak and of $m_2 \sim 19$.

This is the seventh recorded apparition of P/Forbes (discovered in 1929), which has an orbital period of ~ 6.3 years. Unfortunately, when the comet should be brightest ($m_1 \sim 14$?) near perihelion in January 1987, it will be very close to the sun from our viewpoint (elongation $< 10^o$). P/Schwassmann-Wachmann 2 is making its tenth recorded return ($P \sim 6.4$ years); this comet should be added to those I mentioned in the last issue (*ICQ* **8**, 72) as being good candidates for detection by visual observers with large instruments, as comet 1986*h* will be well placed in early 1987 and perhaps as bright as $m_1 \sim 13.5$–14.

T. Gehrels and J. Scotti recovered both P/Kohoutek and P/Comas Solá on July 30 and 31 using the so-called *SPACEWATCH* camera (which is a CCD detector used with the 91-cm telescope at Kitt Peak). The latter comet was fairly close to the prediction, with a suspected short tail and $m_1 \sim 20$. The former comet was rather far from its predicted orbit, which Brian Marsden attributes (*IAUC* 4240) to unusually large nongravitational forces. This observation, along with the reported appearance of P/Kohoutek at recovery (diffuse and uncondensed, $m_1 \sim 19.5$), leads Marsden to remark that this comet may be physically rather unstable.

K. I. Churyumov and V. V. Solodovnikov reported their discovery in mid-July of a new comet ($m_1 \sim 13$) moving southwestwards near the Aquarius-Capricornus border (*IAUC* 4233). Initial calculations by Marsden indicate that the comet is of long period and travelling in a retrograde orbit ($i \sim 115^o$), with perihelion having occured in early May at a distance of $q \sim 2.7$ AU.

Christine Wilson, a graduate student at the California Institute of Technology, discovered a new comet on a plate exposed August 5 during the course of the new Palomar Observatory Sky Survey (II) with the 48-inch Schmidt telescope. Comet Wilson 1986*l* was moving southwestwards in Pegasus at $m_1 \sim$ 11-12 at the time of discovery, and it was found on a prediscovery plate exposed at Oak Ridge Observatory (Massachusetts) with a wide-field Damon patrol camera. Early orbital calculations suggest that the comet will become an easy binocular object ($m_1 \sim 5$ on 1987 Apr. 29 when $\delta \sim -78^o$ and the comet is near its brightest) for southern-hemisphere observers in the first half of 1987. Charles Morris found the comet nearly stellar visually in a 10-inch reflector on Aug. 8.43, with $m_1 = 12.1$ at 111× (coma diameter 0.7′) and 12.7 at 45× (stellar appearance). John Bortle found the comet to be well-condensed (coma diameter = 0.6′–0.7′ and $m_1 = 12.3$ on Aug. 12.11 and 14.18 in a 32-cm reflector; a condensation 20″ across of mag 12.9 reminded Bortle of the appearance of P/Schwassmann-Wachmann 1 when that comet is in outburst.

Meanwhile, P/Halley faded to $m_1 \sim$ 9–10 in July, as it became lost in the evening twilight for northern-hemisphere observers enroute to conjunction with the sun in September. Southern-hemisphere observers were able to follow the comet for another few weeks; the last known observation (as of this writing) was made by Richard Fleet of Harare, Zimbabwe, with a 30-cm reflector, on August 9.71, who estimated $m_1 = 11.9$ (comet at very low altitude; Australian observers were finding the comet some 2 magnitudes brighter than did Fleet in late July).

There is a good chance that P/Grigg-Skjellerup will be recovered between now and the end of 1986; it is due at perihelion next June ($T \simeq$ 1987 June 18.0 ET). This comet is of interest because it currently has high potential for being the next comet to be visited by a spacecraft (*Giotto*, as I mentioned in this column last month). Ľubor Kresák of Bratislava, Czechoslovakia, has found (*IAUC* 4234) that a comet discovery reported in 1808, by the famous comet hunter Jean-Louis Pons, was actually an appearance of P/Grigg-Skjellerup! This comet (P now ~ 5.1 years) was discovered by John Grigg of New Zealand on July 22, 1902, so the identification of Pons' observations in early Feb. 1808 extends the arc by nearly a hundred years (although Pons did not provide accurate positions, unfortunately). Pons' comet is not included in Marsden's *Catalogue of Cometary Orbits* (see below for information on obtaining a copy of the new 1986 edition), because no orbit could be computed from the scanty information provided by Pons. However, the orbit can now be run back, and "the identification appears to be certain". Pons noted that the comet was $\sim 1^o$ across, and this is consistent with P/Grigg-Skjellerup, which was then passing only $\sim$ 0.12 AU from the earth.

Pons' name will not be added to the name P/Grigg-Skjellerup, but Kresák's finding does add one more definite comet discovery to Pons' record number of finds. Marsden's *Catalogue* lists 26 comets which were actually named for Pons, and also credits the French observer with 4 "recoveries" (which were actually outright discoveries of P/Encke in 1805 and 1818, P/Biela in 1806, and P/Crommelin in 1818). The custom of naming comets in the 19th century usually allowed only one name per comet (based on who was determined to have discovered a comet first). If the current policy for naming comets was in effect when Pons was living, he would likely have his names also on comets 1822 *I*, 1824 *II*, and 1819 *IV* (P/Blanpain). Pons also is credited (*cf.* S. K. Vsekhsvyatskii 1964, *Physical Characteristics of Comets*, Jerusalem, NASA TT F-80, *pp.* 141–157) with independently discovering the so-called "Great Comets" 1807 and 1811 *I* (and possibly also 1823?). Add to this his discovery of P/Grigg-Skjellerup, and Pons has 36 discoveries of 35 different comets during 1801–1827 (not including his possible independent discovery of the Great Comet of 1823). Johann G. Galle (1894, *Verzeichniss de Elemente der bisher berechneten Cometenbahnen*, Leipzig, p. 186) notes that Pons also reported a comet discovery in early July 1808 (observed on only two dates) which was never confirmed elsewhere; based on Pons' record, there's a good chance that the July object was also a real comet.

P/Machholz 1986*e* will continue to puzzle astronomers, who are wondering how long it could have been in its current unusual orbit. I decided to search for objects previously reported as minor planets which might in fact be P/Machholz (nothing promising turned up). In the process, using a Digital MicroVAX, I ran the orbit of P/Machholz back to 1886 and forward to 2086; the integration included perturbations of the nine largest planets (Mercury-Pluto).

Some qualifications are in order, namely that no nongravitational forces were incorporated and also that the starting orbit is from observations consisting only of an arc from 1986 May 13–July 27. Some comets exhibit very little in the way of nongravitational forces, although it might be expected that an object approaching as close as P/Machholz to the sun would have much more of this type of force influencing it. The observational arc only spans some 75 days, and while the orbit seemed to "settle down" after about 3 weeks' worth of observations were available, slight changes in orbital elements are magnified considerably over decades of integrations outside the actual observational arc. Thus, an integration backwards and forwards some 100 years cannot be expected to be perfect with so short an arc of observation. The mean residual of 45 observations was 1.0″.

The integrations of P/Machholz's orbit should give an idea of close approaches to major planets which might cause large changes in the comet's orbit. No really significant close approaches to any of the major planets were noted between 1886–2086, the closest being approaches to a distance of ~ 0.85 AU of Jupiter (in Feb. 1925 and Oct. 2055). Interestingly, the closest approach of P/Machholz to the earth at this current apparition ($\Delta = 0.404$ AU on 1986 June 5–6) was also the closest approach to Earth during the entire period 1886–2086. Indeed, it is curious as to how long an object like P/Machholz could have been in its current orbit and how long it will remain there. Three sets of orbital elements from my integrations are shown in *Table I.* The orbital period of P/Machholz changes very little during the 200-year span, but note that the perihelion distance (q) is steadily decreasing; at such close distances to the sun, this is very significant. Preliminary calculations suggest that q may have been ~ 0.23 AU in 1786 and will be perhaps < 0.07 AU in the late 22nd century.

Here's an interesting statistic: 13% of all known short-period comets have been discovered within the past 4 years (18 out of 139 total). Of the 139 periodic comets, 85 have been seen at 2 or more returns. Before 1980, there were 116 known short-period comets, of which 73 had been seen at 2 or more returns. Before 1970, the numbers were 95 and 56; before 1950, 81 and 42; before 1930, 65 and 30; before 1900, 44 and 20; before 1880, 29 and 12.

And, speaking of statistics, the 5th edition of Brian Marsden's *Catalogue of Cometary Orbits* was published around the time of P/Halley's perihelion passage in February. The 102-page paperbound volume is a "must" for all serious comet researchers, with the new edition containing orbital elements for 1187 cometary apparitions of 748 individual comets observed up through the end of 1985. It includes 135 short-period comets; four more have since been discovered in the first half of 1986. In addition to one set of orbital elements per apparition, the *Catalogue* contains a useful 4-page introduction, the arc of observation for each apparition, the comets' names and designations (with last names of recoverers — and discoverers whose names were not assigned to the comet — given parenthetically), references to literature sources for further information on orbital elements, and several statistical tables. The *Catalogue* is available for US$12.00 (airmail postpaid) from the Minor Planet Center, Smithsonian Astrophysical Observatory, 60 Garden St., Cambridge, MA 02138, U.S.A.

Some comet meetings scheduled for the next 6 months include a professional meeting in Heidelberg, West Germany, in late October to discuss space-based and ground-based observations of P/Halley, and two amateur/semi-professional meetings in Belgium and California. The 4^{th} American Workshop on Cometary Astronomy (AWCA IV) is scheduled for 1987 Feb. 21–22 at the Jet Propulsion Laboratory in Pasadena, the site of AWCA II in October 1983 (information can be obtained by writing: Comet Workshop, I.H.W.; M.S. 169-214, J.P.L.; 4800 Oak Grove Dr.; Pasadena, CA 91109, U.S.A.); the AWCAs are co-sponsored by the *ICQ* and the International Halley Watch. An "International Halley Seminar" will be held at Alden Biesen, Belgium, during 1986 October 24–26 (information: International Halley Seminar; Kattevennen 19; 3600 B-Genk; Belgium). The Heidelberg meeting (Oct. 27–31) is called the "20th ESLAB Symposium on the Exploration of Halley's Comet"; information can be obtained from Dr. R. Reinhard; ESA Space Science Department; ESTEC; Postbus 299; 2200 AG Noordwijk; Holland.

Correction. In the January issue, page 39, the printer chopped off the top and right edges, which included that the scale on the right side was 20′ long and the line-pointer at top right along the tail points to the east. (1986 August 20)

TABLE I. ORBITAL ELEMENTS (Equinox 1950.0) FOR P/MACHHOLZ

Epoch	1886 June 23.0 ET	1986 May 10.0 ET	2086 May 5.0 ET
T	1886 July 11.6 ET	1986 Apr. 23.51676 ET	2086 June 3.3 ET
Arg. of Peri.	14.0	14.52729	15.6
Node	95.2	93.80530	91.8
i	64.0	59.99107	53.4
q	0.177 AU	0.1267760 AU	0.094 AU
e	0.942	0.9580181	0.969
Period	5.27 years	5.25 years	5.28 years

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THE LAST 20 COMETS TO RECEIVE PROVISIONAL LETTER DESIGNATIONS

Listed below, for handy reference, are the last 20 comets which have been given letter designations (1985a is the first comet to be discovered or recovered in 1985, 1985b is the second comet..., etc.). Room is given after the first "equal sign" for the "Roman numeral designation" [listed here in Arabic numeral form; not yet given for most of the last 20 comets], which gives the year of perihelion. After the second "equal sign" is given the name, preceded by an asterisk (*) if the comet is a new discovery (as opposed to a recovery from predictions of a previously-known short-period comet). Also given parenthetically are such values as the date of perihelion, T (month/date), and the perihelion distance, q (in AU).

1985j = 1985 = P/Daniel (T = 8/4, q = 1.7)
1985k = 1985 = * P/Maury (T = 6/8, q = 2.0)
1985l = 1985 = * Hartley-Good (T = 12/9, q = 0.69)
1985m = 1985 = * Thiele (T = 12/19, q = 1.32)
1985n = 1986 = P/Boethin (T = 1/16, q = 1.11)

1985o = 1986 = P/Kojima (T = 4/4, q = 2.4)
1985p = 1985 = * P/Ciffreo (T = 10/30, q = 1.70)
1985q = 1986 = P/Wirtanen (T = 3/19, q = 1.08)
1986a = 1985 = * P/Shoemaker 3 (T = 12/18, q = 1.8)
1986b = 1986 = * Shoemaker (T = 3/11, q = 3.6)

1986c = 1985 = * P/Hartley 2 (T = 6/4, q = 0.96)
1986d = 1986 = * P/Singer Brewster (T = 6/5, q = 1.93)
1986e = 1986 = * P/Machholz (T = 4/23, q = 0.13)
1986f = 1986 = P/Holmes (T = 3/14, q = 2.17)
1986g = 1987 = P/Forbes (T = 1/1, q = 1.47)

1986h = 1987 = P/Schwassmann-Wachmann 2 (T = 8/30, q = 2.07)
1986i = 1986 = * Churyumov-Solodovnikov (T = 5/5, q = 2.6)
1986j = 1987 = P/Comas Sola (T = 8/18, q = 1.83, P = 8.8)
1986k = 1987 = P/Kohoutek (T = 10/29, q = 1.77, P = 6.6)
1986l = 1987 = * Wilson (T = 4/21, q = 1.2)