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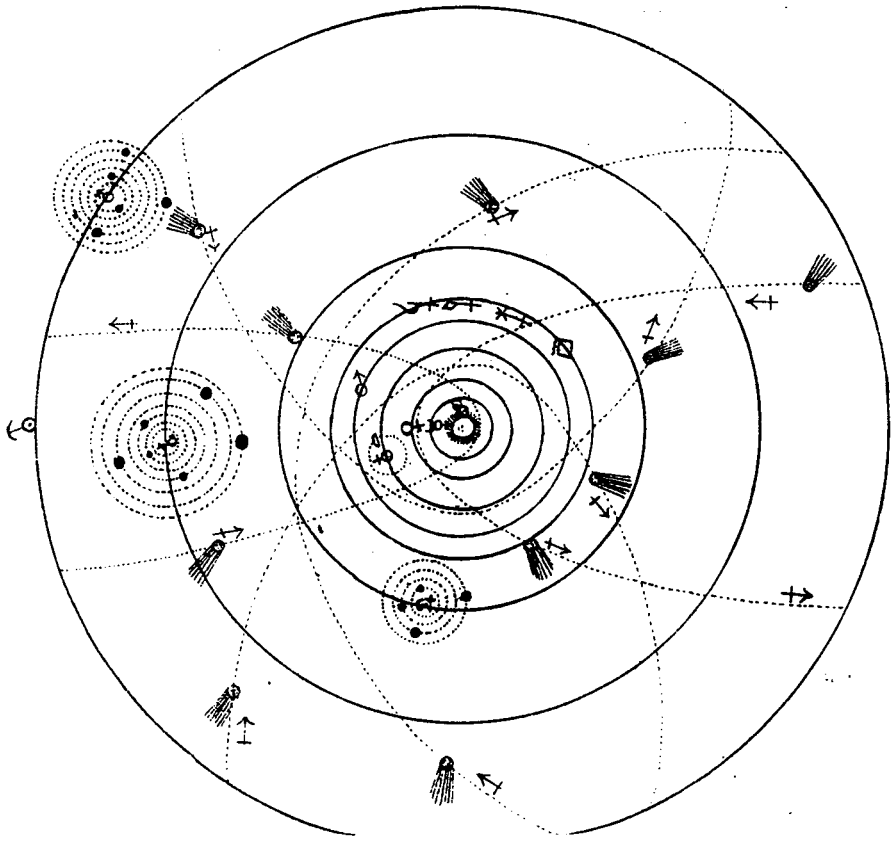

The orbits of several comets with respect to the planets, from a 70-page monograph entitled *Der schoene Hallen, ein Komet, den wir mit dem Jahre 1834 wieder zu erwarten haben*, by Heinrich August Hecht (Jlmenau, 1834).

SMITHSONIAN ASTROPHYSICAL OBSERVATORY
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Centennial Year 1990

The International Comet Quarterly (*ICQ*) is a journal devoted to news and observation of comets, published by the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts. Regular issues are published 4 times per year (January, April, July, and October), with an annual *Comet Handbook* of ephemerides published normally as a special fifth issue. An index to each volume normally is published in every other January issue (even-numbered years); the *ICQ* is also indexed in *Astronomy and Astrophysics Abstracts* and in *Science Abstracts Section A*.

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Manuscripts will be reviewed for possible publication (send 2 copies of typed, double-spaced copy to the Editor at the Cambridge address above); authors should first obtain a copy of "Information and Guidelines for Authors" from the Editor. 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, which can be obtained upon request from the Editor. Those who can send manuscripts and observational data in machine-readable form are encouraged to do so [especially through mail via the computer networks *BITNET* (GREEN@CFA) or *SPAN* (CFAPS2::GREEN), or via floppy disks], and should contact the Editor for further information.

Among the Observation Coordinators (OCs) listed below, those with postal addresses have e-mail contacts with the *ICQ* Editor; observers in the general area of such OCs who lack access to e-mail networks may send data to the OC for relay to the *ICQ* in electronic form.

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— CORRIGENDA —

• In the April 1980 issue, page 33, the second observation on 1975 07 29.08 *should read* MCC01 *instead of* MCCC0 for the observer.

• In the January 1981 issue, page 18, the observation by OME on 1975 08 21.08 *should read* 1975 08 20.08

• In the July 1981 issue, p. 69, references at end of paper, the reference to Morris (1980) *should read ICQ* **2**, 69.

• In the October 1989 issue, page 54, last line, for m_1 *sim* 10 read $m_1 \sim 10$

• In the April 1990 issue (*ICQ* **12**), pages 45, 49, 51, 61, and 65: the observer with code "TOM" should read "TOM01". That is, Maura Tombelli has code TOM01, while Akira Tominaga has code TOM.

• In the April 1990 issue (*ICQ* **12**, 50), the observation of comet Aarseth-Brewington 1989a_1 by KEE listed as "1989 12 22.56" *should read* "1989 12 23.56".

• In the April and July 1990 issues, two erroneous codes were published: ANB and ANO. ANB (Birger Andresen) *should read* AND05; the only observation affected in the tabulated data is an Apr. 7.8 observation of comet Austin 1989c_1 in *ICQ* 75. ANO (O. I. Andersen) *should read* AND06; affected observations are of comets Okazaki-Levy-Rudenko 1989r (Sept. 3.92) and P/Brorsen-Metcalf 1989o (Sept. 4.09) in *ICQ* 74 and comet Austin 1989c_1 (Apr. 13.92) in *ICQ* 75.

• In the July 1990 issue, page 77, in the list of observers, observer KOR01 is from the U.S.S.R.; on page 75, Periodic Comet Schwassmann-Wachmann 3 (1989d_1), line 4, *for* coma dia. = 3′′ *read* coma dia. = 3′

• In the *1991 Comet Handbook*, page H60, last paragraph, line 5, *for* SP-250 (Noordwijk, *read* SP-250; Noordwijk,

o page H2, under "Introduction", "Orbital Elements" explanation, line 6, for (11) dT is the read (11) ΔT is the

PERIODIC COMETS FOR THE VISUAL OBSERVER IN 1991

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There are no bright short-period comets expected to become visible during 1991. Perhaps four comets will become bright enough for observation with smaller visual telescopes, and a handful of others may come within the range of larger instruments. Ephemerides for all of the comets described below are available in the *1991 Comet Handbook* (Nakano and Green 1990).

The Brighter Comets

P/Wild 2 1989t

This comet, currently the "back-up" target for the Comet Rendezvous/Asteroid Flyby (CRAF) mission, is at perihelion on 1990 Dec. 16 (q = 1.58 AU), and will be well-placed for observation during the first several months of 1991. Opposition, in fact, will not occur until mid-June. The brightness analyses at the two previously-observed apparitions (Bortle 1978; Morris 1985) suggest a peak brightness of $m_1 \sim 10.5$ occurring at the beginning of the year, and also suggest the comet may still be as bright as $m_1 \sim 12$ at opposition. It should be noted that both of the above analyses are based entirely on pre-perihelion brightness estimates — the comet being badly placed for post-perihelion visual observations in both 1978 and 1984 — and thus it is quite possible they may not accurately predict the comet's brightness behavior in 1991.

P/Hartley 2

This comet was discovered in 1986 and makes its first predicted return in 1991; the predicted perihelion date is Sept. 17, at q = 0.95 AU. Since Hartley's discovery did not occur until over nine months past perihelion, no visual observations were obtained then, but the comet's rather small perihelion distance suggests it should be moderately bright at favorable returns, as will be the case in 1991. It emerges into the morning sky about March, and may become bright enough for visual observations ($m_1 \sim$ 12-13) about June. Peak brightness should occur around August and September; the comet may be as bright as $m_1 \sim$ 9-10. It should remain visible in larger telescopes until about the end of the year.

P/Wirtanen

The 1991 return of this comet is similar in quality to that of 1986, the primary difference being that while the 1986 return was an evening apparition, that of 1991 is in the morning sky. The comet reached 10th magnitude in 1986, and thus a similar brightness may be expected around the time of perihelion (September 20, at q = 1.08 AU). Visual observers with larger telescopes may be able to pick it up as early as June, and may follow it until perhaps January 1992.

Although both P/Wirtanen and P/Hartley 2 are in the morning sky and at a similar brightness around the time of their respective perihelion passages (which are three days apart), the two comets are never very close together. The smallest separation between them occurs about September 28, when P/Hartley 2 passes 11° west of P/Wirtanen.

P/Faye

This will probably be the best short-period comet of 1991. Perihelion occurs on November 16 (q = 1.59 AU) and opposition will have occurred less than a month earlier. The comet may become visually observable in the morning sky ($m_1 \sim$ 13) as early as June or July, and should reach a peak brightness of 9th or 10th magnitude around perihelion. Afterward, it may remain within range of visual telescopes until February or March 1992.

The Fainter Comets

P/Schwassmann-Wachmann 1

Having passed opposition in October 1990, this annual comet remains accessible in the evening sky during the first three months of 1991. It emerges into the morning sky by the end of June, and will pass opposition in mid-November. It will then be accessible in the evening sky through early 1992. The comet is conveniently placed for northern hemisphere observers throughout this viewing season, remaining near $\delta = +30°$.

The comet has been quite active for the past few years, although only one weak outburst has been reported (as of this writing) so far in 1990. Visual observers are always encouraged to monitor the comet for additional outbursts.

P/Kearns-Kwee 1989u

This comet, having passed perihelion on November 22, 1990 (q = 2.22 AU), is at opposition during the first week of January 1991. Its brightness behavior during previous returns suggests the comet is fading by 0.5 to 1.0 magnitude per return (Morris 1983); whether this trend will continue through the current apparition remains to be seen. Since the peak brightness was no brighter than $m_1 \sim 13.5$ at the last return in 1981, it is unlikely the comet will be any brighter than this during 1990-91; whether or not it is any fainter, and by how much, depends on how strongly the fading trend has been maintained.

(Continued on next page...)

P/Swift-Gehrels

This comet, at perihelion on February 22 (q = 1.36 AU), returns under rather unfavorable conditions in 1991. It may reach 14th magnitude around the time of perihelion, but will be fairly low in the evening sky (elongation $\sim$ 40°). By about mid-April the comet will disappear into the solar glare.

P/Wolf-Harrington 1990e

This comet is at opposition in mid-September 1990, and is therefore in the evening sky during the first few months of 1991. Perihelion is on April 4, at q = 1.61 AU. Although not especially well placed during this return — the elongation being just over 40° at perihelion — the comet should become bright enough for visual observations with larger telescopes. This return is similar to that of 1952 (during which it was rediscovered by Harrington) and is also similar in quality to that of 1984 (that being a morning apparition); in both cases the comet reached a peak brightness of $m_1 \sim$ 12.0-12.5. It may become visually observable at $m_1 \sim$ 13 in late 1990, and remain visible until entering the solar glare about mid-May 1991.

P/Hartley 1

Discovered in 1985, this comet makes its first predicted return in 1991. The predicted perihelion date is April 28, at q = 1.80 AU; if this prediction is not too far off, the observing circumstances will be extremely favorable, with opposition occurring almost simultaneously with perihelion. Unsuccessful attempts to observe the comet visually in 1985 (cf. McNaught 1985) suggest the comet is very faint intrinsically ($H_{10} \sim$ 11.5 or fainter) — but, even so, observations should be attempted in 1991 because of the favorable conditions. An absolute magnitude of 11.5 would suggest a peak brightness of $m_1 \sim$ 13.5 occurring around perihelion.

P/Machholz

This unusual comet was discovered in May 1986; it was soon found to be traveling in an orbit with the unusually short period of 5.25 years; furthermore, it has the smallest perihelion distance of any known short-period comet, 0.13 AU. Long-term orbital integrations (Green *et al.* 1990) have shown that the comet's present orbit is relatively stable, although the perihelion distance is decreasing steadily with time. From studying its brightness behavior and tail structure Sekanina (1990) has concluded that the comet has only one primary active region on its nucleus, this being near its rotation pole. Images of P/Machholz have been obtained near its aphelion (Pizarro *et al.* 1989, Meech 1989); thus, the comet is an "annual" one.

The comet's next perihelion passage occurs on July 22, 1991. Before perihelion it is accessible in the morning sky, but only from the southern hemisphere; it disappears into sunlight by about the second week of July. By the second week of August it will become visible to the northern hemisphere in the evening sky, although the elongation will remain relatively small and the period of visibility quite brief.

Predicting the comet's brightness is rather difficult. Assuming it behaves in brightness as it did in 1986 — and it should be noted that it wasn't discovered until almost three weeks past perihelion — the comet should reach a peak brightness of about 11th magnitude both before and after perihelion. It is by no means certain that the comet's behavior will be anything like this, however; furthermore, Sekanina's results suggest that the comet's active region only becomes active around the time of perihelion. Clearly, P/Machholz is an object worthy of intense study, and visual observers in both hemispheres are encouraged to monitor it closely.

P/Takamizawa

When discovered in 1984 this comet was a relatively bright object of 9th or 10th magnitude, and was approximately two months past perihelion. Pre-discovery images soon revealed that less than a month before discovery it had been as faint as 16th magnitude, but had flared dramatically during the interim; one estimate (Seki 1984) indicated that the comet had been as bright as m_1 = 6.5 a few days before discovery. After it was discovered the comet faded steadily, remaining visually observable for about two months.

The comet makes its first predicted return in 1991; perihelion, at q = 1.59 AU, is predicted for August 18. The observing geometry is moderately favorable; opposition will have occurred in mid-April, but the elongation will still be rather large (just $<$ 90°) by perihelion passage. The comet's brightness is pretty much impossible to predict; its post-discovery brightness in 1984 would suggest a peak brightness of $m_1 \sim$ 10 lasting from April through August, but this must be regarded as extremely unlikely; the comet will probably be much fainter than this. It is quite possible, in fact, that the 1984 flare was a unique event that will not be repeated, and if this should be the case the comet will very probably remain beyond the range of visual observations in 1991. If, for some reason, the comet were to experience a flare in 1991 similar to that of 1984 and at about the same point in its orbit, this would occur in late October, the peak brightness reaching perhaps $m_1 \sim$ 11. With an elongation of $\sim$ 70° then the comet would still be accessible without much difficulty, although its declination at the time (−24°) would favor observers in the southern hemisphere.

P/Arend-Rigaux

This comet has long been regarded as a "transition" object between comets and asteroids; this is primarily due to both low activity observed at the early returns and to dynamical considerations (see Degewij and Tedesco 1982, and references therein, for discussion). At the two most recent returns (1978 and 1984, both of which occurred under favorable viewing conditions), however, the comet has displayed definite, albeit weak, cometary activity. Images of the comet at aphelion have recently been obtained (Meech 1988) — thus, P/Arend-Rigaux is another "annual" comet.

The 1991 return, with perihelion occurring on October 2 (q = 1.44 AU) is not as favorable as the previous two, but the comet should theoretically be visually observable with larger telescopes. A peak brightness of perhaps $m_1 \sim 14$ should be reached in October and November, but the comet will probably fade beyond the range of visual observations by the end of the year.

P/Shoemaker 1

Discovered in 1984, this is another short-period comet making its first predicted return in 1991. Perihelion passage is expected on December 18, at q = 1.99 AU. This return is not quite as good as that of 1984, when it reached a peak brightness of 11th magnitude, but is still reasonably favorable; opposition will have occurred in early August. Based on the comet's brightness in 1984, a peak brightness of perhaps $m_1 \sim 12$ might be reached in September and October; this will probably decrease to $m_1 \sim 13$ by the end of the year.

P/Chernykh

This comet is expected to pass perihelion on 1992 Jan. 27 (q = 2.36 AU), but is well placed for observation during the last few months of 1991; opposition occurs in mid-September. If the comet's brightness is similar to that of its discovery apparition in 1977-78 (which occurred under similar geometry, although the perihelion distance was somewhat larger then), a peak brightness of $m_1 \sim 11.5$ may be reached in October and November. The comet might be picked up visually as early as June or July (at $m_1 \sim$ 13-14) and remain observable through about March 1992.

The following comets would normally not be expected to be bright enough for inclusion in a survey of visually observable comets, and have not been observed visually for many returns (if indeed at all). Nevertheless, experienced visual observers with larger telescopes may find attempts worthwhile.

P/Taylor (unrecovered as of this writing) is expected to pass perihelion on 1990 Dec. 28 (at q = 1.95 AU), and is at opposition in early January 1991; the viewing circumstances are thus very favorable. Although it reached 9th magnitude during its discovery apparition in 1915-16, this was almost certainly because of splitting; at recent returns photographic estimates have given a peak brightness of $m_1 \sim 16$.

P/Van Biesbroeck 1989h$_1$ is at perihelion on 1991 Apr. 24, at q = 2.40 AU; opposition will occur in early August. Photographic estimates at each of its returns have given a peak brightness of $m_1 \sim 15$. Dynamically, this comet is quite interesting: calculations by Kresák *et al.* (1984) have indicated that this comet and P/Neujmin 3 are probably remnants of a single comet which split prior to a close approach to Jupiter in the mid-19th Century.

P/Kowal 2, discovered in 1979, was badly placed in 1985 and remained unrecovered, but should be recoverable in 1991. Perihelion is predicted to occur on Dec. 28, at q = 1.50 AU, although this is very uncertain. Photographic estimates in 1979 ($m_1 \sim$ 16-17) suggest the comet is intrinsically very faint, but because of good viewing conditions in 1991 (opposition occurring in mid-November), attempts for visual observation should be made if the comet is recovered.

In addition to the above comets, the following asteroids often mentioned in the context of comet-asteroid relationships are candidates for visual observation in 1991. For a discussion of these and other similar objects, see the review by Weissman *et al.* (1989).

(944) Hidalgo passes perihelion on 1991 Apr. 1, at q = 2.00 AU. The best time for observation occurs near opposition in October 1990, the brightness then being 13th or 14th magnitude. By the beginning of 1991 it will probably have faded about one magnitude; also, the viewing geometry becomes less favorable. By the time of perihelion passage the elongation will have decreased to $\sim 45°$, although since the object will then be north of declination +40° it should still be accessible from the northern hemisphere. Perhaps slight variations in brightness, as observed in the last couple of years with (2060) Chiron, might be detectable near perihelion.

(2212) Hephaistos remains at a geocentric distance of 0.8-1.0 AU from the beginning of 1991 through mid-March. (It actually approaches to within 0.60 AU in mid-April but is unobservable then.) The brightness may reach 15th magnitude before disappearing into the solar glare about the end of March. Perihelion will occur on April 21, at q = 0.36 AU.

(2060) Chiron is at opposition in mid-January 1991 and is well placed for observation for the next few months. It is accessible again later in the year, enroute to another opposition in January 1992. The brightness should be between 15th and 16th magnitude during both viewing seasons; since it is now moving out of the rich star fields it has occupied for the past few years, identification should not be as difficult as it recently has been. The coma first reported by Meech and Belton (1989) in April 1989 has been observed at several observatories during the 1989-90 viewing season (cf. reports by Meech 1990; West 1990; Luu and Jewitt 1990); the cometary nature of Chiron thus seems rather well established.

REFERENCES

Bortle, J. E. (1978). *Sky and Telesc.* **56**, 121.
Degewij, J.; and E. F. Tedesco (1982). in *Comets* (L.L. Wilkening, ed.; University of Arizona Press, Tucson), p. 665.
Green, D. W. E.; H. Rickman; A. C. Porter; and K. J. Meech (1990). *Science* **247**, 1063.
Kresak, L.; A. Carusi; E. Perozzi; and G. B. Valsecchi (1984). *IAU Circ.* No. 3940.
Luu, J. X.; and D. Jewitt (1990). *Sky and Telesc.* **80**, 119.
McNaught, R. H. (1985). *ICQ* **56**, 96.
Meech, K. J. (1988). *Minor Planet Circ.* 13356.
Meech, K. J. (1989). *Minor Planet Circ.* 14669-70.
Meech, K. J. (1990). *IAU Circ.* No. 4947.
Meech, K. J. and Belton, M. J. S. (1989). *IAU Circ.* No. 4770.
Morris, C. S. (1983). *ICQ* **5**, 37.

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Morris, C. S. (1985). *ICQ* **7**, 89.
Nakano, S.; and D. W. E. Green (1990). *ICQ* **12**, H1.
Pizarro, G.; O. Pizarro; and R. M. West (1989). *MPC* 14669.
Sekanina, Z. (1990). *Astron. J.* **99**, 1268.
Seki, T. (1984). *IAU Circ.* No. 3970.
Weissman, P. R.; M. F. A'Hearn; L. A. McFadden; and H. Rickman (1989). in *Asteroids II* (R. P. Binzel, T. Gehrels, and M. S. Matthews, eds.; University of Arizona Press, Tucson), p. 880.
West, R. M. (1990). *IAU Circ.* No. 4970.

Φ Φ Φ

TABULATION OF COMET OBSERVATIONS

In addition to A. Pereira, Herman Mikuz has agreed to forward observations by European observers to the *ICQ* via electronic (computer) mail; European observers outside of the countries listed on page 108 (under "Observation Coordinators"), who lack access to e-mail, may wish to consider requesting assistance from either Pereira or Mikuz.

We again ask that all observers make extra effort to prevent errors from entering their data; all published data should also be checked, so that errors can be corrected in print. Also, if observers use comparison stars from non-*ICQ*-listed sources, they should provide complete details concerning the source(s), so that appropriate new abbreviations can be assigned and published. Some of the descriptive information below refers to tabulated data in the July 1990 issue.

Descriptive Information (to complement the Tabulated Data):

◇ *Comet Thomas 1969 I* ⟹ 1969 Jan. 14.15-14.17: 55.9-cm *f*/15 M (85×, 132×) and 25.4-cm *f*/8 L (60×, 80×, 100×) used; "apparently round, weakly condensed coma visible w/ possible stellar nucleus of mag 14-15 (centrally located); coma boundaries completely undefined; coma dia. in both instruments is 0.′5 to 0.′75" [BOR].

◇ *Comet McNaught 1987 XXXII [observations by NAK01 with 20-cm f/6 L (46×)]* ⟹ 1988 Feb. 8.85: possible tail in p.a. 290°. Feb. 13.83: possible tail in p.a. 295°.

◇ *Comet Nishikawa-Takamizawa-Tago 1987 III* ⟹ 1987 Jan. 30.78: in 20×80 B, also 0.°25 tails in p.a. 89° and 332° [KEI].

◇ *Comet Bradfield 1987 XXIX* ⟹ 1987 Sept. 24.89: in 20.3-cm *f*/10 T (80×), DC = 6, 0.°25 in p.a. 100° [GRA04]. Oct. 10.80: also 0.°5 tail in p.a. 65° [KEI]. Oct. 21.79: also 0.°33 tail in p.a. 90° [KEI]. Nov. 10.76: tail spans p.a. 54°-74° [KEI]. Nov. 14.77: tail spans p.a. 41°-69° [KEI]. Nov. 16.81: tail spans p.a. 50°-61° [KEI]. Nov. 19.73: in 6.0-cm *f*/11 R (35×), 2.′5 coma, DC = 5 [HEE]. Nov. 22.75: tail spans p.a. 52°-72° [KEI]. Nov. 26.74: tail spans p.a. 62°-73° [KEI]. Nov. 27.75: 1° tail spans p.a. 40°-76°; also 0.°13 tail in p.a. 76° [KEI]. Nov. 28.83: in 7.6-cm *f*/13 R (40×), 4.′5 coma, DC = 6 [GRA04]. Nov. 29.73: in 20.3-cm *f*/10 T (80×), 4.′5 coma, DC = 7 [GRA04]. Dec. 6.81: in 20.3-cm *f*/10 T (80×), 6.′6 coma, DC = 7 [GRA04]. Dec. 7.72: in 6.0-cm *f*/11 R (35×), 0.°25 tail in p.a. 60° [HEE]. Dec. 8.76: tail spans p.a. 49°-62° [KEI]. Dec. 10.74: 1.°5 tail spans p.a. 46°-65°; also 0.°67 tail in p.a. 65° [KEI]. 1988 Jan. 7.77: also 0.°3 tail in p.a. 2°-20° [KEI].

◇ *Comet Liller 1988 V* ⟹ 1988 Apr. 18.41: in 20.3-cm *f*/10 T (80×), 5.′0 coma, DC = 7; at 40×, 30′ tail [DAH]. Apr. 23.88: in 6.7-cm R (12×), anti-tail of length ~ 30′ [BUS01]. Apr. 23.88: in 10×50 B, m_1 = 5.5, DC = 7, 0.°33 tail in p.a. 355° [BRE02]. Apr. 25.93: in 20.3-cm *f*/10 T (80×), 4.′5 coma, DC = 6; at 40×, 0.°55 tail in p.a. 335° [GRA04]. June 9.97: in 20.3-cm *f*/10 T (80×), 6.′7 coma, DC = 5 [GRA04]. June 10.98: in 20.3-cm *f*/10 T (40×), 8.′4 coma, DC = 6 [GRA04]. June 12.01: in 20.3-cm *f*/10 T (50×), 6.′3 coma, DC = 5 [GRA04]. June 17.03: in 20.3-cm *f*/10 T (80×), 6.′7 coma, DC = 4 [GRA04].

◇ *Comet Machholz 1988 XV* ⟹ 1988 Aug. 7.49: "slightly elongated toward W" [LEV].

◇ *Comet Okazaki-Levy-Rudenko 1989r* ⟹ 1989 Sept. 4.80: extension of 3′ in p.a. 80° [DIO]. Sept. 19.79: central cond. ~ 0.′8 in dia., $m_2 \simeq 12.5 \pm 0.5$ [DIO]. Sept. 20.78: central cond. ~ 1.′3 in dia., $m_2 \simeq 12.0 \pm 0.5$ [DIO]. Nov. 18.75 and 19.75: in 20×80 B, m_1 ~ 6, 8′ coma, DC = 2-3 [CAM03]. Nov. 21.74: in 20×80 B, m_1 ~ 5.5, 8′ coma, DC = 3 [CAM03]. Nov. 26.72: in 20-cm L, "dust tail" is 0.°33 long in p.a. 295°; longer tail is "gas tail" [CAM03]. Nov. 27.74: in 20-cm L, "dust tail" is 0.°41 long in p.a. 280°; longer tail is "gas tail" [CAM03]. Nov. 28.73: in 20-cm L, "dust tail" is 0.°5 long in p.a. 290°; longer tail is "gas tail"; strong starlike center [CAM03]. Dec. 2.72: in 20-cm L, "dust tail" is 0.°25 long in p.a. 295° and slightly curved; longer tail is "gas tail" [CAM03]. Dec. 3.27 and 16.23: comet is blue in color [DES01]. Dec. 17.48: broad tail [CAM03].

◇ *Comet Aarseth-Brewington 1989a*$_1$ *[all observations by CAM03; 20×80 B unless otherwise noted]* ⟹ 1989 Dec. 24.76: m_1 ~ 4-5, 4′ coma, DC = 6. Dec. 28.74: m_1 = 3.5, 4′ coma, DC = 7. Dec. 29.74: m_1 = 3.0 (MM = S), 6′ coma, DC = 9, 2° tail in p.a. 10°-90°; starlike center. Dec. 31.80: m_1 = 3.0 (MM = S), 5′ coma, DC = 9, 0.°25 tail in p.a. 10°-90°; "like P/Halley in late Feb. 1986." *(Cont. on next page...)*

(Cont. from previous page) 1990 Jan. 1.74: $m_1 = 2.5$ (MM = S), 1′ coma, DC = 9, 7° tail in p.a. 45°-120°; in 20-cm L (35×), 1′ coma, 2′ streamer at p.a. 110°. Jan. 13.51: also 0°.5 tail in p.a. 190°-270°. Jan. 15.51: tail spans p.a. 150°-210°. Jan. 16.48: tail spans p.a. 190°-260°. Jan. 18.47: tail spans p.a. 100°-200°. Jan. 20.48: tail spans p.a. 180°-280°. Jan. 21.47: tail spans p.a. 190°-270°. Jan. 26.48 and 28.48: tail spans p.a. 180°-270°.

◇ *Comet Austin 1989c*$_1$ ⟹ 1989 Dec. 22.53: in 20-cm *f*/4.6 L (71×), $m_1 = 10.5$ (MM: S; ref: photoelectric *V* sequence of NGC 55, exact source unknown), 2′ coma, DC = 6, comet elongated E-W [GAR01]. Dec. 23.47: in 20-cm *f*/8.8 L (74×), $m_1 = 10.3$ (MM: S; ref: same as on Dec. 22.53, above); 2′ coma, DC = 6 [GAR01]. 1990 Feb. 17.47: tail spans p.a. 180°-270° [CAM03]. Feb. 19.42 and 25.42: "broad, dusty tail" [GAR01]. Mar. 27.81: "small, starlike nuclear cond." [DAN01]. Apr. 3.87: "thin gas tail several arcmin long; hint of central cond." [KEE01]. Apr. 4.81: "very starlike central cond." Apr. 4.87: "thin gas tail hinted" [KEE01]. Apr. 5.81: has a more obvious central cond. of dia. ~ 1′- 2′ [DAN01]. Apr. 7.83: distinct central cond. with dia. 2′ [AND01]. Apr. 7.87: "hint of fanned dust tail, thin long gas tail" [KEE01]. Apr. 8.79: central cond. of dia. 50″ [CHE03]. Apr. 12.85: starlike central cond. of dia. 1′ [DAN01]. Apr. 16.86: "no central cond." [WES02]. Apr. 17.09: "tail straight and thin" [SCH07]. Apr. 19.10: "thin gas tail, coma much increased in size compared with earlier observations, fanned dust tail" [KEE01]. Apr. 21.45: in 31.8-cm *f*/4 L (33×), 1°.5 tail in p.a. 320° [KEE]. Apr. 22.13: in 20×80 B, 11′.8 coma, DC = 7-8 [FIE]. Apr. 22.40: in 10×50 B, main tail subtends ~ 15° w/ a suspected length of up to 1°.5; possible second tail ~ 15′ long seen in p.a. 20° ± 10°, subtending ~ 30° and curved eastward [MOD]. Apr. 22.40: in 20-cm L (35×), central cond. ~ 30″ in dia., tail subtends ~ 10°; at 88×, 2 or 3 streamers seen in tail, approximately radiating from coma [MOD]. Apr. 24.04-May 5.01: central cond. has dia. 2′ [AND01]. Apr. 25.04: in 15.0-cm *f*/8 L (200×), 4′ coma, DC = 3; at 67×, straight, diffuse 0°.2 tail in p.a. 320° [WAR01]. Apr. 25.10: 30-min exp. on 2415 hypered film (w/ 21-cm *f*/5 instrument) yields 4°.5 tail in p.a. 319° [CAV]. Apr. 26.05: in 15.0-cm *f*/8 L (67×), straight, diffuse 0°.3 tail in p.a. 315°; no distinct central cond. [WAR01]. Apr. 29.09: 7-min exp. on TP 2415 gas-hypered film with 20-cm *f*/2 Baker-Schmidt A shows coma dia. 6′.5, DC = 8, plasma tail of length 4°.1 in p.a. 305° w/ fish-spine-like structure very conspicuous during the first deg or so; fanlike dust tail ~ 20′ in p.a. 305°-350° [MIK]. Apr. 30.09: "thin gas tail w/in a diffuse, weak dust tail"; in 20.3-cm *f*/10 T (80×), 3′.5 coma, DC = 7-8, "pronounced inner coma, but a central cond. only glimpsed" [KAM01]. Apr. 30.10: 5-min exp. on TP 2415 gas-hypered film with 20-cm *f*/2 Baker-Schmidt A shows coma dia. 6′.0, DC = 8; plasma tail of length 3°.3 in p.a. 307°, straight and narrow until 39′ from the nucleus, then widening; fanlike dust tail ~ 25′ long in p.a. 320°-343° [MIK]. Apr. 30.46: 0°.3 "dust" tail; other tail was "gas" tail [PRY]. Apr. 30.46: "very broad dust tail; hint of ion tail" [SPR].

May 1.02: "obvious tail extending 0°.25, the rest being faintly visible; eastern tail edge sharper than western tail edge" [DAN01]. May 1.81: in 20-cm *f*/4.6 L (71×), 4′ coma, DC = 5 [GAR01]. May 1.97: 12-min exposure on Fujichrome 400 film (200-mm f.l. *f*/3.5 lens) shows 2°.6 tail in p.a. 295° [AND01]. May 2.07: in 11.0-cm *f*/7.3 L (32×), 0°.1 "dust" tail in p.a. 350°; other tail is "gas" tail [SCH04]. May 2.10: in 20-cm *f*/10 T, stellar cond. of mag ~ 11 [DIO]. May 3.01: straight, short, very diffuse tail [WAR01]. May 4.07: in 11.0-cm *f*/7.3 L (32×), 0°.1 and 0°.4 "dust" tails in p.a. 340° and 295°; other tail was "gas" tail [SCH04]. May 4.08: "tail significantly weaker"; in 20.3-cm *f*/10 T (51×), 5′.2 coma, DC = 7-8, central cond. visible [KAM01]. May 4.09: 5-min exp. on TP 2415 gas-hypered film with 20-cm *f*/2 Baker-Schmidt A shows coma dia. 6′.9, DC = 8; plasma tail of length 4°.3 in p.a. 289° with complex structure; conspicuous, narrow plasma ejection from the nucleus ~ 20′ long, then spread in many thin, nearly parallel streaks of material vanishing ~ 1°.2 from the nucleus; then remains only trace of plasma until the end; knots are present at distances 1°.1, 2°.7, and 3°.4 from the nucleus; fan of dust ~ 20′ in p.a. 305°-335° [MIK]. May 5.08: 7-min exp. on TP 2415 gas-hypered film with 20-cm *f*/2 Baker-Schmidt A shows coma dia. 7′.7, DC = 8; straight, unconspicuous plasma tail of length 3°.5 in p.a. 290°; trace of dust tail also present [MIK]. May 5.81: in 20-cm *f*/4.6 L (71×), 6′ coma, DC = 6 [GAR01]. May 6.44: in 8×40 B, 8′ coma, DC = 4, 2° tail in p.a. 285° [KEE]. May 7.08: 5-min exp. on TP 2415 gas-hypered film with 20-cm *f*/2 Baker-Schmidt A shows coma dia. 8′.6, DC = 7; unconspicuous plasma tail of length 3°.3 in p.a. 283°; trace of dust tail also present [MIK]. May 7.35: "small, bright central nucleus visible w/in larger, dimmer central cond." [HER02]. May 15.01: 0°.3 "dust" tail in p.a. 347°; other tail was "gas" tail [LAN01]. May 17.08: "round, diffuse coma and broad, diffuse central cond.; broad, diffuse, very faint fan tail" [PAN]. May 17.76: "stars close to comet influenced magnitude estimate" [JON]. May 18.71: in 20-cm *f*/4.6 L (71×), 8′ coma, DC = 5 [GAR01]. May 19.02: second tail 1° long in p.a. ~ 240° [DIO]. May 19.25: in 40-cm *f*/7 L (50×), tail was ~ 0°.25 long and ~ 2′ wide in p.a. 250°; also, "a spike ~ 30″ wide and 5′-10′ long was seen along the middle of tail, extending from coma" [MOD]. May 20.69: in 20-cm *f*/4.6 L (71×), 12′ coma, DC = 6 [GAR01]. May 22.02: "round, diffuse coma, w/ outer edge being very diffuse; broad, diffuse central cond.; wide, faint, diffuse fan tail" [PAN]. May 23.28: in 40-cm L, tail ~ 5′ wide and very faint; coma elongated toward p.a. 0° [MOD]. May 23.94: in 12.7-cm *f*/10 T (127×), brief glimpses of a very small starlike cond. at the center of coma [DAN01]. May 24.02: "circular, diffuse coma w/ broad diffuse central cond.; wide, faint fan tail" [PAN]. May 24.75: "comet visible to unaided eye w/ averted vision" [JON]. May 26.06: "oval (20′ × 24′), very diffuse coma w/ broad, diffuse cond. and wide, faint fan tail" [PAN]. May 26.27: "tail clearly complex in binoculars, consisting of a narrow, straight tail w/ a possible central spine; there was also a broad fan 2°.25 long, trailing edge (NE) of which was well defined, though leading (SW) edge was very diffuse and ill-defined (leading edge of fan at p.a. 270°, trailing edge at p.a. 320°; entire tail was 50° wide in p.a." [BOR]. May 26.73: in 5.0-cm R (7×), 15′ coma, DC = 2; in 31.7-cm *f*/5 L (86×), DC = 4-5 [JON]. May 27.05: "elliptical (30′ × 36′), diffuse coma w/ broad cond. and wide, diffuse fan tail; tail more prominent of late" [PAN]. May 27.27: in 20-cm *f*/5 L (35 ×), coma dia. ~ 5′, DC = 4; at 167×, central cond. ~ 15″ in dia. [MOD]. May 27.29: "tail decidedly shorter but still composed of a narrow straight component and a broad fan; edges of tail at p.a. 300° and 315°; slight suggestion of an anti-tail ~ 0°.75 long in p.a. 115°, but comet is in the Milky Way" [BOR]. May 27.74 and 28.73: in 31.7-cm *f*/5 L (86×), DC = 3 [JON]. May 28.75: "diffuse coma, small cond." [JON]. May 29.54: in 20×80 B, $m_1 \sim 6$ (ref: V; MM: S), dia. 30′, DC = 4 [CAM03]. May 29.74: "trace of wispy tail only suspected" [JON]. May 30.73: in 5.0-cm R (7×), 15′ coma, DC = 1-2 [JON]. May 31.01: 5-min exp. on TP 2415 HS film w/ 14-cm *f*/1.65 A shows 2° and 1° tails in p.a. 325° and 285° [HAS02]. May 31.71: in 5.0-cm R (7×), 11′ coma, DC = 1 [JON]. *(Continued...)*

(Continued from previous page) June 1.30: "tail at junction w/ coma only half as wide as coma's dia. (i.e., 10′) as seen w/ 10×50 B; no sign of fan tail tonight" [BOR]. June 1.30: in 10×50 B, tail width ~ 7′ at coma, ~ 13′ at end of tail [MOD]. June 2.84: in 25-cm L, 15′ anti-tail in p.a. 135° [CLA]. June 3.70: in 10×50 B, 3° tail [GAR01]. June 4.69 and 13.37: "faint, diffuse, broad tail" [JON]. June 4.69: in 7.8-cm *f*/8 R (30×), 1° tail in p.a. 340° [JON]. June 4.87: in 25-cm L, also 12′ and 14′ tails in p.a. 254° and 14° [CLA]. June 5.01: "faint fan tail" [PAN]. June 5.31: "very narrow, straight tail originating from the middle of the open parabolic coma; tail probably no more than 3′ or 4′ wide" [BOR]. June 5.34: in 20-cm *f*/5 L (35 ×), coma dia. 6′, DC = 4, 2°.0 tail in p.a. 325°; tail brighter than on June 1; tail width 4′ at coma, 12′ at end of tail [MOD]. June 14.36: "comet barely visible in 7.8-cm R" [JON]. June 16.28: "comet very diffuse; in 41-cm L, a broad, faint, low-surface-brightness tail pointing toward the N was suspected" [HAL]. June 17.46: in 20×80 B, tail spans p.a. 280°-350° and had a forklike structure [CAM03]. June 17.99: central cond. dia. 4′; outer coma extremely faint, possibly strongly elongated towards p.a. 235° [PER01]. June 19.28: "comet very vague and diffuse" [HAL]. June 20.50: in 20.3-cm *f*/7.2 L (35×), m_1 ~ 10, dia. ~ 12′, DC = 0 [CAM03]. June 21.47: in 20.3-cm *f*/7.2 L (35×), m_1 ~ 10.5, dia. ~ 18′, DC = 0 [CAM03]. June 23.27: comet little more than a large, dim smudge; the observation was hampered somewhat by the comet's proximity to a star of m_v ~ 10 [HAL]. July 11.43: "no cond." [CAM03]. July 13.22: "limiting magnitude based upon diffuse appearance that the comet exhibited in late June; attempts were made both with and without C_2 filter" [HAL]. July 24.23: "limiting magnitude based upon diffuse appearance that the comet exhibited in late June" [HAL].

◇ *Comet Skorichenko-George 1989e*$_1$ ⟹ 1990 Mar. 13.81: "circular coma w/ possible starlike nucleus" [DAN01]. Mar. 26.84: central cond. of dia. 1′ [YDE]. Mar. 30.84: "almost starlike" [EKL].

◇ *Comet Černis-Kiuchi-Nakamura 1990b* ⟹ 1990 Mar. 21.07: in 20-cm *f*/5 L (88×), DC = 7 [MOD]. Mar. 21.81: "starlike cond. of m_2 ~ 11.2 (Ref: SX And chart from AAVSO)" [DIO]. Mar. 26.81: AAVSO chart for RV And used for m_1 estimate [DIO]. Mar. 26.84: central cond. of dia. 1′ [YDE]. Mar. 26.87: "central cond. of dia. 0′.5; coma slightly elongated in p.a. ~ 45° as seen through deep-sky filter" [WAR01]. Mar. 27.85: "irregular and somewhat elongated coma; only a trace of cond." [DAN01]. Mar. 30.82: "somewhat elongated coma, weak trace of central cond." [EKL]. Mar. 30.88: "central cond. small and starlike" [WAR01].

◇ *Comet Levy 1990c* ⟹ 1990 May 31.32: "sharp cond." [BOR]. June 1.32: "coma suddenly condensed very near the center w/ an apparently starlike nucleus of mag ~ 11.5 at 68×; at 110×, nucleus is very small but nonstellar" [BOR]. June 5.32: at 110×, "there is a centrally located nucleus of mag ~ 11.5; although quite strong, it appears a bit softer than surrounding stars" [BOR]. June 5.35: at 167×, stellar central cond. of mag ~ 12 [MOD]. June 17.32: "observation somewhat hampered by proximity of comet to 2nd-mag star (α And)" [HAL]. June 20.29 and 25.30: in 20-cm L (88×), stellar central cond. of m_2 = 11.5 ± 0.1 [MOD]. June 22.30: in 31.7-cm L (68×), "outer two-thirds of coma rather diffuse but w/ a sharp, little cond. ~ 0′.2 at the center; at 110× and 170×, a minute, nearly-stellar nucleus is evident, which may be structured" [BOR]. June 24.14: in 40-cm *f*/5 L (164×), DC = 3, 5′ fan due W [GON04]. June 24.14: in 40-cm *f*/5 L (164×), DC = 4, 5′ broad tail near p.a. 250°; at 78×, coma wide open towards p.a. 250° [PER01]. June 25.31: in 31.7-cm L (110×), tiny, quite sharp 0′.1 cond. of mag ~ 12.5 [BOR]. June 26.29: in 31.7-cm L (110×), at center of coma is a tiny, nonstellar nucleus of mag ~ 12 [BOR]. June 27.14: in 40-cm *f*/5 L, starlike nucleus of mag ~ 10.5 [GON04]. June 27.14: in 40-cm *f*/5 L, starlike nucleus of mag ~ 12; coma open towards p.a. 250°; at 111×, 7′ tail in p.a. 250° w/ a suspected spine within [PER01]. June 27.20: 7-min exp. with 0.2-m *f*//2 Baker-Schmidt A on TP 2415 film revealed fan-shaped tail 16′ long in p.a. 270° [MIK]. June 27.78: elongated coma 5′ × 8′ toward W [CAM03]. June 28.40: also a fan-shaped tail ~ 0°.2 long between p.a. 260° and 290°; a faint structure extended toward p.a. 40° [SCO01]. June 28.41: exp. on Tech pan 2415 film w/ 10-cm Schmidt A shows faint, diffuse 13′ tail in p.a. 250°; coma dia. 2′.5 [P. Roques, Williams, AZ].

July 13.30: "a broad, faint tail suspected with 41-cm L" [HAL]. July 13.95: m_2 = 10.2 [OST]. July 14.94: m_2 = 9.5 [OST]. July 15.94: "cond. elongated" [MOE]. July 16.42: in 79-cm L, 10′ coma w/ a "nucleus" of dia. ~ 4″; tail ~ 0°.75 long [BUN]. July 19.69: "sharp central cond.; comet similar through a Swan-band filter but central cond. possibly less sharp" [SEA]. July 19.70: in 31.7-cm *f*/5 L (86×), DC = 4, tail in p.a. 240° [JON]. July 20.03: central cond. of dia. ~ 3′ [FIE]. July 20.41-Aug. 27.20: broad tail [PRY]. July 20.74: in 25-cm *f*/4 L (80×), DC = 6, 0°.5 tail [GAR01]. July 21.91: "starlike nucleus clearly visible" [MIK]. July 23.40: in 79-cm L, "nucleus is much smaller, almost stellar, than it was last week — ~ 1″.5 in dia. w/ a large, even 15′ coma; tail ~ 1° long" [BUN]. July 25.03: in 7×42 B, possible tail in p.a. ~ 236° [FIE]. July 26.21: in 37-cm *f*/4.5 L (92×), DC = 8, w/ a bright central region ~ 5′ across w/in which is a nearly-stellar concentration; an extensive 20′-dia. outer haze surrounds the central region, evenly bounded except in p.a. 235°, where it trails off into a very diffuse tail ~ 1° long [CHE]. July 26.25: "tail as wide as coma"; in 20-cm L (167×), m_2 = 11.0 ± 0.2, stellar central cond. [MOD]. July 26.30: in 31.7-cm L, parabolic coma; at 110×, there is a tiny, sharp nuclear cond. only a fraction of an arcmin in size (almost stellar), which is strongly offset sunward; tail is as wide as coma's dia., w/ sides essentially parallel [BOR]. July 27.33: central cond. very dense [DES01]. July 27.89: in 15×80 B, "tail very faint; dense central cond. of dia. ~ 1′.5; starlike nucleus" [MIK]. July 27.92: in 15.2-cm L (44×), elliptical coma; at 100×, starlike cond. of mag 9.5, eccentrically placed in coma [MOE]. July 29.02: in 7×50 B, delicate fan-shaped tail 0°.9 long in p.a. 228°-253° [MIK]. July 29.27: exp. on Tech pan 2415 film w/ 10-cm Schmidt A shows 2° dust tail in p.a. 226°; w/in tail is some fine, linear structure extending 26′ from the coma; coma dia. ~ 7′ [P. Roques, Williams, AZ]. July 29.95, Aug. 2.89, and 4.96: precise values of the tail p.a. were determined from photos [OST]. July 29.96: in 20.3-cm T, another possible tail ~ 0°.17 long at p.a. ~ 310° [DAH]. July 30.15: in 10.8-cm *f*/4 L (40×), 6′ coma, DC = 5 [HAY03]. July 30.16: in 31.7-cm L (68×), a parabolic coma containing an intense, virtually stellar nucleus of mag ~ 9 at the 'focus'; at 170×, nucleus is still very nearly stellar and of the same brightness [BOR]. July 30.21: in 30.5-cm *f*/17 L (108×), 2′ coma, DC = 7, tails ~ 0°.5 and 0°.1 long in p.a. 230° and 265° [MOD]. (Continued...)

(Cont. from previous page) July 31.20: in 20-cm L, main tail subtends ~ 10°; possible 0°.12 tail in p.a. 260°; at 167×, stellar central cond. of $m_2 = 10.9 \pm 0.1$ [MOD]. July 31.31: in 31.7-cm L (55×), a parabolic coma w/ a very faint, circular, outer halo and an intense, starlike nucleus of mag 9-10 at the 'primary focus', clearly separate from the surrounding coma (as in brilliant comets near perihelion); at 170×, nucleus continues nearly stellar, surrounded by a small, strong cond. [BOR]. July 31.45: "rather strong inner coma jet structure first seen with 41-cm L; this structure was exhibited at most subsequent observations" [HAL]. July 31.68: "large bright fan extending 5′ behind coma; two streamers extending ~ 4′ behind coma, the southern streamer being the brighter of the two" [CAM03]. July 31.97: in 15-cm L (39×), another possible tail 0°.10 long in p.a. 170°; at 79×, the central cond. (mag 8) appeared elongated toward p.a. 210° [MID01].

Aug. 1.06: in 40-cm *f*/5 L (40×), coma open towards SW, DC = 8-9, stellar nucleus of mag ~ 12; in 7-cm *f*/7 R (20×), DC = 5, 1°.3 veil spanning p.a. 230°-270°, the edges being brighter (particularly at p.a. 230°) [PER01]. Aug. 1.06: in 40-cm *f*/5 L (40×), parabolic-shaped coma open towards SW, DC = 8, stellar nucleus of mag ~ 10.5; 0°.4 tail in p.a. 225° [GON04]. Aug. 1.82: "coma has lost its cond. and is larger than on previous day; fan-shaped dust tail is almost lost in the larger coma" [CAM03]. Aug. 1.92: in 15.2-cm L (44×), central cond. of mag 10 [MOE]. Aug. 2.31: in 20-cm L (167×), stellar central cond. of $m_2 = 10.9 \pm 0.2$; in 40-cm *f*/7 L (52×), 0°.7 and 0°.12 tails in p.a. 230° and 250° [MOD]. Aug. 2.31: in 31.7-cm L (55×), a parabolic coma containing a sharp cond. at the 'primary focus' and a nucleus like a slightly-diffuse (more so than recently) 9th-mag star; at 110× and 170×, nucleus is ~ 0′.1-0′.2 in dia. [BOR]. Aug. 3.01: in 20.3-cm T, the central cond. appeared stellar at 50×; however, at 222×, a point source of $m_2 \sim 12.5$ was visible in the center of the coma [GRA04]. Aug. 3.31: in 31.7-cm L (55×), "highly elliptical or parabolic coma that condenses only slightly until very near the 'primary focus'; there it suddenly becomes very intensely condensed w/ an almost stellar (mag 9) nucleus; appearance of coma is like that of a major comet near perihelion; increasing magnification causes the nucleus to grow sharper but fainter; at 170×, nucleus is stellar (mag 11)" [BOR]. Aug. 4.08: in 15×80 B, central cond. of dia. ~ 1′.5 w/ nearly stellar nucleus [MIK]. Aug. 5.16: "central cond. very weak" [PER01]. Aug. 7.90: at 100×, elongated central cond. [MOE]. Aug. 9.27: in 20-cm L (167×), stellar central cond. of $m_2 = 10.9 \pm 0.1$ [MOD]. Aug. 9.94: in 20-cm T (222×), a point source of mag 12 was visible at center of coma [GRA04]. Aug. 9.96: in 31.6-cm L, another tail 0°.18 long in p.a. 260° [MID01].

Aug. 10.88: DC varies from 4 to 8 [BAR]. Aug. 10.93: in 31.6-cm L, another tail 0°.17 long in p.a. 290°; central cond. of mag 8.4; "asymmetric coma w/ multiple tail formations" [MID01]. Aug. 10.98: with naked eye, mag 5.0 [GRA04]. Aug. 11.21 and 12.25: starlike nucleus [PRY]. Aug. 11.94: in 9×34 B, fan > 1° long in p.a. 230°-275° [PER01]. Aug. 12.14: in 20.0-cm *f*/5 L (35×), 0°.5 tail subtends ~ 30° [MOD]. Aug. 12.89: in 5-cm *f*/12 R (100×), stellar nucleus, asymmetric coma 5′ in dia., DC = 8-9 [GON04]. Aug. 12.98: in 9×34 B, stellar nucleus; also 1° fan tail in p.a. 350°-10° [PER01]. Aug. 13.85: "delicate fan-shaped tail" [MIK]. Aug. 13.91: in 9×34 B, also 0°.8 fan centered near p.a. 35°; stellar nucleus [PER01]. Aug. 14.46: in 25-cm *f*/4 L (80×), 18′ coma, DC = 7 [GAR01]. Aug. 15.11: in 31.7-cm L (55×), "coma's shape uncertain (no definite boundaries); coma shows little cond. except very near the center, where there is a sharp, starlike nucleus of mag 9.5 (ref: AAVSO RU Peg chart) surrounded by a tiny, dense nebulous mass; nucleus remains stellar at all but 170×, which shows it to be perhaps 0′.1 in dia." [BOR]. Aug. 15.17: in 10×70 B, 20′ coma, DC = 7, tail very faint [DEA]. Aug. 15.20: 16-min exp. on Fujichrome 400D films w/ 4.8-cm *f*/2.8 A shows "dust" tails 0°.59 and 0°.46 long in p.a. 191° and 36°, and 1°.43 "gas" tail in p.a. 197°; coma dia. 9′ [MOD]. Aug. 15.31: in 20-cm L (167×), stellar central cond. of $m_2 = 10.3 \pm 0.2$ [MOD]. Aug. 15.33 and 17.19: "with 10×50 B, the coma was immersed in a broad fan, which lengthened into a tail on its SW side" [HAL]. Aug. 15.41: in 7.8-cm *f*/8 R (30×), broad, diffuse 0°.3 tail in p.a. 200°; in 31.7-cm *f*/5 L (86×), diffuse coma, DC = 7, small bright cond. [JON]. Aug. 16.13: "in 31.7-cm L (55×), a bright coma probably parabolic in outline; a sharp, bright nuclear cond. at the 'primary focus' surrounded by a small, dense cond.; outer 75 percent of coma extremely diffuse; nuclear cond. appears as a slightly soft 9th-mag star; w/ increasing magnification, the nuclear cond. is clearly less sharp than last evening and is definitely surrounded by more bright material, but there are no distinct boundaries to this mass; suggestions of large, very vague structures in the coma at lowest powers; the tail's edges seem to follow the parabolic edges of the coma and diverge slightly" [BOR]. Aug. 16.94: in B, stellar nucleus, large central cond. [PER01]. Aug. 17.05: tail fan-shaped [MIK]. Aug. 17.13: in 9×34 B, 3°.5 tail in p.a. 160°; 2° fan extending from p.a. 160°-100°; parabolic coma, stellar nucleus [PER01]. Aug. 17.15: in 10×50 B, tail is quite long but very faint; tail much more noticeable and longer than last night, although sky conditions are not quite as favorable; leading edge of tail more sharply defined than trailing edge [BOR]. Aug. 17.2: in 10×50 B, DC = 7, 5° tail; in 2.29-m L, "very stellar nucleus w/ jet-like structure coming off into an otherwise symmetrical coma" [SCO01]. Aug. 17.55: "noticed D.E.; tail appeared curved in 10×50 B; in 25-cm *f*/4 L (80×), 22′ coma, DC = 8" [GAR01]. Aug. 18.14: "w/ naked eye, comet is quite distinct, DC quite evident; in 31.7-cm L (55×), coma's shape is vaguely hyperbolic, opening to a very wide fan (axis p.a. 115°-295°); area of greatest cond. strongly offset toward p.a. 350°; tiny nucleus decidedly subdued in bright material tonight; entire inner coma much denser than previously, suggesting a spreading outburst is in progress; increasing magnification makes nucleus progressively sharper; at 110×, it is like a perfectly hard star of mag 10.5 (ref: AAVSO RU Peg chart); even at 170×, it is no more than 3″-4″ in dia.; tail is very faint and vague, but broad and directed toward p.a. 170°, its alignment differing considerably from the axis of the hyperbolic coma" [BOR]. Aug. 18.46: in 25-cm *f*/4 L (80×), 22′ coma, DC = 8 [GAR01]. Aug. 18.54: in 10×50 B, very faint, narrow 4° tail [GAR01]. Aug. 18.91: with naked eye, $m_1 \sim 4.3$ [ERG]. Aug. 18.94: in 31.6-cm L, another tail 0°.17 long in p.a. 80° [MID01]. Aug. 18.99: in 7×50 B, delicate 1°.3 ion tail in p.a. 160°; second tail (probably dust) 0°.8 long in p.a. 44° [MIK]. Aug. 19.04: in 7.5-cm *f*/7 R (21×), coma dia. 17′.2 ± 0′.2, DC = 6, very faint fan-shaped tail spanning ~ 60°, centered on p.a. 125°; coma w/ cond. shifted toward the west of center [FIE]. Aug. 19.15: in 10×50 B, DC = 6, 3° tail [SCO01]. Aug. 19.21: "with 10×50 B, same basic appearance as on Aug. 15.33 and 17.19, except the tail toward the SW is longer (~ 1°)" [HAL]. Aug. 19.46: in 10×50 B, 4°.5 tail [GAR01]. Aug. 19.55: in 25-cm *f*/4 L (80×), 25′ coma, DC = 8 [GAR01]. Aug. 19.75: "type I" tail; also 1°.2 "type III" tail in p.a. 105° [KOR01]. *(Continued...)*

(Continued from previous page) Aug. 20.05: in 7×50 B, "delicate 1°.3 ion tail in p.a. 164°; second tail (probably dust) 0°.7 in p.a. 57°; starlike nucleus clearly visible" [MIK]. Aug. 20.10: in 9×63 B, broad fan-shaped tail spanned 60°, centered at p.a. 120°, w/ a faint, broad 2° ion tail in p.a. 150°; by Aug. 24.1, the latter had become more pronounced, ~ 3° long in p.a. 110° [CHE]. Aug. 20.81: in 7×50 B, also 1°.0 "type III" tail in p.a. 96° [KOR01]. Aug. 20.88: fan tail spans p.a. 70°-160° [BAR]. Aug. 21.19: in 11×80 B, 8° "ion" tail had brightness variations along its length; a broad dust tail extended E ~ 1° [ROB03]. Aug. 21.39: in 7×50 B, 3° tail in p.a. 90° [JON]. Aug. 21.83: also 0°.8 "type III" tail in p.a. 102° [KOR01]. Aug. 21.84: "dust tail" in p.a. 120°-200° [MOE]. Aug. 21.85: also 0°.6 tail in p.a. 55° [ZHU]. Aug. 21.89: asymmetric coma [GOM]. Aug. 21.89: in 6.0-cm R, another tail 0°.24 long in p.a. 115°; fan-shaped tail spans p.a. 61°-115° [GRA04]. Aug. 21.89: in 9×34 B, 3° fan spanning p.a. 50°-90° w/ central spine apparent [PER01]. Aug. 21.89: with naked eye, m_1 = 3.6 [EKL]. Aug. 21.92: in 5.3-cm f/4.5 R (40×), DC = 1, stellar nucleus of mag 9 [GON04]. Aug. 21.97: in 15-cm f/4.25 L (26×), 10′ coma open towards ESE, DC = 5-6 [PER01]. Aug. 21.99: in 7×50 B, 1°.64 tail was narrow; also a broad, more diffuse 1°.48 tail in p.a. 89°, and a narrow, faint, 0°.93 tail in p.a. 58°; "these structures formed the most prominent components of a fan-shaped tail spanning p.a. 58°-139° [DAH]. Aug. 22.05: in 36.2-cm L, "very stellar orange nucleus" [STE01]. Aug. 22.06: another 0°.6 tail in p.a. 100° [MID01]. Aug. 22.72: also 0°.7 "type III" tail in p.a. 112° [KOR01]. Aug. 22.86: fan tail spans p.a. 90°-180° [BAR]. Aug. 22.95: in 7×50 B, 2° tail was narrow and the most apparent tail; a 1°.48 tail in p.a. 57° was more broad and more diffuse; a weak, narrow 1°.01 tail was at p.a. 46°; fan-shaped tail spanned p.a. 46°-122° [DAH]. Aug. 23.00: in 7×35 B, another tail 0°.52 long in p.a. 121°; "these two structures formed the edges of a fan-shaped tail" [GRA04]. Aug. 23.04: in 7×50 B, "1°.8 ion tail in p.a. 117°; fan of dust 0°.5-1°.0 long in p.a. 117°-45°; starlike nucleus also visible [MIK]. Aug. 23.48: in 25-cm f/4 L (80×), 16′ coma, DC = 8 [GAR01]. Aug. 23.88: in 15.2-cm L (44×), "dust tail" in p.a. 50°-110°; at 100×, central cond. of mag 8.5 [MOE]. Aug. 24.17: "with 10×50 B, the coma is still immersed in a broad fan, which however has reversed direction since the previous observation on Aug. 19.21 (clouds prevented observations during the interim)" [HAL]. Aug. 24.88: tail faintly visible w/ naked eye [GOM]. Aug. 24.94: tails in p.a. 230° and 280° [MEH]. Aug. 24.99: "in 9×34 B, 2° tail spanning p.a. 55°-75°, possibly extending further to each side; overall aspect of coma more condensed, smaller, and sharper than on previous nights" [PER01].

Aug. 25.06: also 1°.9 tail in p.a. 47° [MIK]. Aug. 25.25: "significant change in the tail from the preceding night; what was then a broad fan is now a definite tail 3° long" [HAL]. Aug. 25.42: also 0°.5 gas tail; very intense, stellar false nucleus [GAR01]. Aug. 25.89: fan-shaped tail at p.a. 55°-110° [MID01]. Aug. 25.89: in 9×34 B, 3°.5 tail spanning p.a. 40°-70°, possibly extending through p.a. 0°-355° [PER01]. Aug. 25.90: "tail was narrow and quite apparent; another tail 1°.76 long at p.a. 72° was broader and more diffuse" [DAH]. Aug. 25.90: in 15.2-cm L, 0°.5 "dust" tail in p.a. 50°-90° [MOE]. Aug. 25.90: in 7.5-cm f/7 R (21×), coma dia. 13′.6 ± 0′.6, DC = 6-7 [FIE]. Aug. 26.03: "in 7×42 B, very bright central non-starlike cond., shifted toward west of center in coma; fan-shaped 0°.5 tail in p.a. 80°, with northern edge sharp" [FIE]. Aug. 26.05: "comet clearly of smaller dia. to naked eye than before; in 31.7-cm L, the coma is either parabolic or hyperbolic in outline and well-condensed near the 'primary focus'; at 110×, the nucleus is perfectly hard and stellar, of mag ~ 11.0 (ref: AAVSO RU Peg chart); tail is very broad, its edges at p.a. 70° and 120°; suggestions of a long ray near its northern edge and a definite broad, brighter band centered on p.a. 100°; tail's outline is essentially hyperbolic" [BOR]. Aug. 26.06: in 7×35 B, 40′ coma, DC = 6; coma's outer edges sweep back in a broad 'V' to form a 2° broad dust tail in p.a. 315° that fades off rapidly away from the coma [ARC]. Aug. 26.08: asymmetrical coma [MEI01]. Aug. 26.19: fan-shaped tail spanned ~ 45° of p.a. [SCO01]. Aug. 26.46: in 10×50 B, 4° tail; also 1° dust tail; false nucleus ~ 4″ across [GAR01]. Aug. 26.50: in 25-cm f/4 L (80×), 0°.9 tail [GAR01]. Aug. 26.71: also 0°.5 tail in p.a. 45° [ZHU]. Aug. 26.87: fan-shaped tail spans p.a. 60°-157° [WES02]. Aug. 26.87: in 9×34 B, 2° tail spanning p.a. 20°-65°, possibly through p.a. 0°-330°; coma again more diffuse [PER01]. Aug. 26.88: in 15.2-cm L (44×), 0°.4 "dust tail" in p.a. 40°-90°; at 100×, diffuse central cond. of mag 7.5 [MOE]. Aug. 26.89: in 6.0-cm R, another tail 0°.52 long at p.a. 86° [GRA04]. Aug. 26.92: in 7×50 B, tail was quite narrow; another more broad and more diffuse tail was 1°.65 long at p.a. 86°; "these structures formed the most prominent parts of a fan" at p.a. 66°-86° [DAH]. Aug. 27.06: in 7×50 B, 14′ coma, DC = 3, 1° tail in p.a. 80° [SIM]. Aug. 27.06: in 31.7-cm L (55×), "coma appears most unusual — parabolic outline to edges, but inner 70 percent of coma highly elliptical or even triangular in shape; coma less condensed overall than last night, but nucleus is much sharper and brighter — new outburst in progress; at 68×, stellar nucleus is mag 10.0 (ref: AAVSO RU Peg chart); same brightness at 110×; at 110× and 170×, nucleus consists of stellar center and a minute bright mass perhaps 2″-4″ in dia. surrounding it; lower power suggests large structures in the coma, but no jets, etc., are seen with higher power near the nucleus; binoculars show the tail to be very wide, w/ edges at p.a. 55° and 90° — southern edge extends at least 50 percent further than northern edge; a brighter band near the southern edge" centered at p.a. 90° [BOR]. Aug. 28.15: "bright parabolic coma; tail broad and fan-shaped, following the edges of the coma's parabolic shape; tail evenly illuminated across its width tonight and edges are equally long and well-defined" [BOR]. Aug. 28.35: in 7.0-cm R (10×), 21′ coma, DC = 5 [JON]. Aug. 28.44: "bright dust fan in 10×50 B; sharp false nucleus in 25.4-cm L (71×, 114×); possible bright section on sunward side; hint of yellow color of false nucleus" [SEA]. Aug. 28.84: in 15.2-cm L, 0°.6 "dust" tail in p.a. 40°-90° [MOE]. Aug. 28.91: in 9×34 B, 3° tail spans p.a. 55°-95° [PER01]. Aug. 29.33: in 7.0-cm R (10×), 21′ coma, DC = 7 [JON]. Aug. 29.99: in 9×34 B, 2° tail spans p.a. 35°-80° [PER01]. Aug. 31.08: "coma contains an intense, nearly-stellar nucleus of mag 9.7 (ref: AAVSO RU Peg chart) that is virtually a separate feature from the surrounding coma" [BOR].

Sept. 6.36: central cond. nonstellar [SEA]. Sept. 11.04: in 10×70 B, 6′ coma, DC = 7, 1°.9 fan tail in p.a. 85° [DEA]. Sept. 13.03: in 10×70 B, 8′ coma, DC = 7, 1°.1 tail in p.a. 88° [DEA]. Sept. 16.02: in 15.2-cm f/10 L (76×), coma dia. ~ 2′, DC = 6; no trace of any stellar nucleus; coma's outer edges merge uniformly into a short, faint dust tail of same width that extends 15′ in p.a. 270° [ARC]. Sept. 17.04: in 10×70 B, 5′.6 coma, 1°.8 tail in p.a. 90° [DEA]. Sept. 20.99: in 10×70 B, 6′.4 coma, DC = 6, 1°.2 tail in p.a. 92° [DEA].

◇ *Comet Tsuchiya-Kiuchi 1990i* ⟹ 1990 July 17.18: "sky conditions very poor; some enhancement when viewed with a C_2 filter [HAL]. July 23.31: no nuclear cond. visible; not visible in 8×50 finder scope [BUN]. July 26.0: in 37-cm *f*/4.5 L (92×), very diffuse (DC = 2), coma dia. ~ 5′; short, fan-shaped tail ~ 10′ long spans 30° centered on p.a. 90° [CHE].

◇ *Periodic Comet Boethin (1986 I)* ⟹ 1986 Feb. 26.81: tail spans p.a. 130°-220° [KEI].

◇ *Periodic Comet Borrelly (1987 XXXIII)* ⟹ 1987 Dec. 24.90: also 0°.33 tail in p.a. 225°-240° [KEI].

◇ *Periodic Comet Brorsen-Metcalf (1919 III = 1989o)* ⟹ 1919 Sept. 12.37: brightness of comet determined as (BD +62°1275) 4.5 comet 5.5 (BD +62°1268) [VAS01]. Sept. 19.3: brightness of comet determined as (67 UMa) 4 comet 6 (4 CVn) [NAB]. 1989 July 27.10: in 20×80 B, also 0°.13 tails in p.a. 109° and 155° [KEI]. Aug. 3.08: in 20×80 B, also 0°.13 tails in p.a. 151° and 312° [KEI]. Aug. 14.09: in 20×80 B, 6′.2 coma, DC = 5, 0°.20 tail in p.a. 291° [KEI]. Aug. 16.11: in 20×80 B, also 0°.67 tail in p.a. 306° [KEI].

◇ *Periodic Comet Schwassmann-Wachmann 3 (1989d$_1$)* ⟹ 1990 Apr. 30.70: "tail suspected to at least 0°.17 at times" [SEA]. June 2.83: 5′ × 8′ elongated coma [CAM03].

◇ *Periodic Comet Wild 4 (1990a)* ⟹ 1990 Feb. 17.52: "starlike, though fuzzy" [CAM03].

(Descriptive information continued on next page...)

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Key to observers with observations published in this issue, with 2-digit numbers between Observer Code and Observer's Name indicating source [05 = Comets Section, A.L.P.O.; 07 = Comet Section, British Astronomical Assn.; 09 = Comet Section, R.A.S. of New Zealand; 11 = Dutch Comet Section; 26 = Assn. of Comet Observers (ANK), U.S.S.R.; 50 = from the notebooks of N. T. Bobrovnikoff, etc.]. Those with asterisks (*) preceding the 5-character code are new additions to the Observer Key:

CODE	S	OBSERVER, LOCATION
*ABB	07	J. Abbott, England
*ALB01	05	Steve Albers, PA, U.S.A.
AMO		Mauro Amoretti, Italy
AND01	21	Karl-Gustav Andersson, Sweden
AND03	17	Krasimir Andreev, Bulgaria
*AND04		Clara Andrade e Silva, Portugal
ARC		Brent A. Archinal, VA, U.S.A.
*BAC02	21	Tommy Backstroem, Sweden
BAR		Sandro Baroni, Italy
BAR04		Antonella Bartolini, Italy
BEN03	20	Hans Bengtsson, Sweden
BOA		Andrea Boattini, Italy
*BOD01		Zsigmond Bodok, Czechoslovakia
BOE	05	Leo Boethin, The Philippines
BOH	05	Dennis Bohn, WI, U.S.A.
BOR		John E. Bortle, NY, U.S.A.
BOT	11	S. J. J. Both, The Netherlands
BOU		Reinder J. Bouma, The Netherlands
BRA02		Jorge Bras, Portugal
*BUN		Robert Bunge, OH, U.S.A.
BUS01	11	E. P. Bus, The Netherlands
CAM03	14	Paul Camilleri, Australia
*CAM04	09	Robert C. Campbell, New Zealand
*CAR02		Eduardo Carvalho, Portugal
CAV		Marco Cavagna, Italy
CHE		G. R. Chester, VA, U.S.A.
CHE03		Kazimir T. Cernis, Lithuania, U.S.S.R.
CHU	17	Klim Churyumov, Kiev, U.S.S.R.
CLA	14	Maurice L. Clark, Australia
COL02		Mike J. Collins, England
COM	11	Georg Comello, The Netherlands
COM03		Fernando Comeron, Spain
CON	05	Darrell Conger, WV, U.S.A.
CUR01	09	David J. Curtis, New Zealand
DAH	24	Haakon Dahle, Norway
DAN01	21	Jorgen Danielsson, Sweden
DEA		V. F. de Assis Neto, Brazil
DEL	05	Kenneth J. Delano, MA, U.S.A.
DES01		Jose Guilherme de Souza Aguiar, Brazil
DIO		Massimo Dionisi, Italy
*EFI	26	Dmitrij Nikolaevich Efimov, U.S.S.R.
EKL	21	Anders Ekloef, Sweden
ERG	21	Jens Ergon, Sweden
FEI	11	Henk Feijth, The Netherlands
FIE		Marsilio Fierimonte, Italy
FRA		Evena Franciosini, Italy
GAL		Jesus Gallego Maestro, Spain
GAR01	14	Gordon Garradd, N.S.W., Australia
GEE	11	J. J. Geenen, The Netherlands
GOM		Angel Gomez, Spain
*GON04		Rui Goncalves, Portugal
GRA04	24	Bjoern Haakon Granslo, Norway
GRE		Daniel W. E. Green, U.S.A.
HAL		Alan Hale, U.S.A.
*HAN02	05	Scott Hanssen, CA, U.S.A.
HAR	05	Daniel H. Harris, AZ, U.S.A.
HAS02		Werner Hasubick, West Germany
HAS06	21	Bengt Hasseus, Sweden
HAV		Roberto Haver, Italy
*HAY03		Milton Hays, FL, U.S.A.
HER02		Carl Hergenrother, NJ, U.S.A.
ISH02	16	Akiyoshi Ishikawa, Japan
JAN02	21	Christer Jansson, Sweden
JON	09	Albert F. Jones, New Zealand
JON01	05	Merv V. Jones, Australia
JON02	05	Mark Jones, MO, U.S.A.
KAM01		Andreas Kammerer, West Germany
KAR02	21	Timo Karhola, Sweden
KEE		Richard A. Keen, CO, U.S.A.
KEE01	07	David Russell Keedy, England
KEI		Graham Keitch, England
*KHA	26	Dmitrij Valentinovich Khanzhin, U.S.S.R.
KID		Mark Kidger, Canary Islands
KLE01	05	Thomas Kleine, West Germany
KOC		Bernd Koch, West Germany
KOC01		Volkmar Koch, West Germany
KOR01	26	Valeriy L. Korneyev, Zelenograd, U.S.S.R
KOS		Attila Kosa-Kiss, Romania
KUC	17	Arunas Kuchinskas, Lithuania
*KUK01	05	Ilmo Kukkonen, Finland
LAM	05	Randy Lambert, TX, U.S.A.
*LAN01	11	M. Langbroek, The Netherlands
LOO01		Frans R. van Loo, Belgium
LUK	05	Rainer Lukas, West Germany
MAA	11	W. J. Maat, The Netherlands
MAR02	13	Jose Carvajal Martinez, Spain
*MAR06		Josep Marti, Spain
MAT01	05	Vic L. Matchett, Australia
MAT05	05	Michael Mattei, MA, U.S.A.
MCC03	05	Michael McCants, TX, U.S.A.
MCM	05	Simon C. McMillan, Australia
*MEH		Otto Mehes, Czechoslovakia
MEI01		David D. Meisel, NY, U.S.A.
MER		Jean-Claude Merlin, France
MID01	24	Oernulf Midtskogen, Norway
MIK		Herman Mikuz, Yugoslavia
MIL	05	Dennis Milon, MA, U.S.A.
MIL03	05	Martin P. Miller, CA, U.S.A.
MIN	05	R. B. Minton, AZ, U.S.A.
MIT	16	Shigeo Mitsuma, Japan
MOD		Robert J. Modic, OH, U.S.A.
MOE		Michael Moeller, West Germany
MOR		Charles S. Morris, U.S.A.
MUH	05	Wolfgang Muehle, West Germany
*NAB	50	M. E. Nabokov, Pugachev, Samarsk, U.S.S.R.
*NAG03		Sandor Nagy, Czechoslovakia
NAK01	16	Akimasa Nakamura, Japan
*NAK07		Syuichi Nakano, Japan
NOW	05	Gary T. Nowak, VT, U.S.A.
OME	05	Stephen O'Meara, MA, U.S.A.
*OST	17	Andrew Y. Ostapenko, U.S.S.R.
PAC01	05	Walter D. Pacholka, CA, U.S.A.
PAN	07	Roy W. Panther, England
PEA	14	Andrew R. Pearce, Australia
PER01		Alfredo Jose Serra Pereira, Portugal
PER02		Diego Rodriguez Perez, Spain
*PER03	05	Z. M. Pereyra, Argentina
PRY		Jim Pryal, WA, U.S.A.
RAD01	17	Veselka Radeva, Bulgaria
RIP		Jose Ripero, Spain
ROB	05	Timothy Robertson, CA, U.S.A.
ROB03		Paul C. Robinson, WV, U.S.A.
ROG	05	John Rogers, CA, U.S.A.
SCH04	11	A. H. Scholten, The Netherlands
*SCH07	21	Paul Schlyter, Sweden
SCO01		James V. Scotti, AZ, U.S.A.
SEA	14	David A. J. Seargent, Australia
*SEA01	14	John Seach, Australia
SEB	05	Steve Sebastian, TX, U.S.A.
*SEL01	50	S. M. Selivanov, Petrograd, U.S.S.R.
SHA02	07	Jonathan D. Shanklin, England
*SHA04		Gregory T. Shanos, U.S.A.
SIM	05	Karl Simmons, FL, U.S.A.
SIM01		Wanda Simmons, FL, U.S.A.
SMI	05	Horace A. Smith, CT, U.S.A.
SPR		C. E. Spratt, BC, Canada
STE01		Chris Stephan, OH, U.S.A.
SUM	05	Bruce Sumner, Australia
SWE	05	Richard A. Sweetsir, FL, U.S.A.
TAY	07	M. D. Taylor, England
THE		Serge Thebault, France
THO01		David J. Tholen, Univ. of Hawaii, U.S.A.
TOM01		Maura Tombelli, Italy
*VAS01	50	K. N. Vasil'yev, Vitebsk, U.S.S.R.
VEZ	17	Tomas Vezhauskas, Lithuania
*VIN01	07	F. Vincent, Scotland
WAR01	21	Johan Warell, Sweden
WES02		Margareta Westlund, Sweden
WIL01	05	Thomas R. Williams, TX, U.S.A.
WOL01		Graham W. Wolf, New Zealand
YOU01		Robert R. Young, PA, U.S.A.
ZAN01	11	W. T. Zanstra, The Netherlands
*ZHU		Sergey Valentinowich Zhuiko, U.S.S.R.

(Descriptive information continued from previous page)

◇ *Periodic Comet Peters-Hartley (1990d) [observations by HAL]* ⟹ 1990 June 16.22: "observation significantly hampered by proximity of comet to star of $m_v \sim 10$; the comet was only suspected, but was confirmed on the following night". July 13.20: "comet very vague and diffuse; definitely enhanced when viewed with C_2 filter".

◇ *Periodic Comet Honda-Mrkos-Pajdušáková (1990f)* ⟹ 1990 July 26.32: comet not seen in 50-cm $f/5$ L (96×), "fainter than mag 12.5?" (ref: AC) [BOR]. July 26.46: "comet very vague and diffuse; it was only suspected, and was not confirmed until July 31.45" [HAL]. July 30.45: "mediocre sky conditions; the comet was very vague and diffuse, and the observation was hampered by the comet's proximity to two ~ 10th-mag stars; this observation was not confirmed until the following morning" [HAL]. July 31.45: "this observation confirmed the previous two; comet is very vague and diffuse; it appears as little more than a fluctuation in the background sky brightness" [HAL]. Aug. 19.46: "comet significantly more condensed than in late July; it is significantly enhanced when viewed with a C_2 filter, which also tends to make the coma appear somewhat larger" [HAL]. Aug. 30.41: in 40-cm $f/7$ L (100×), 0'.5 coma, DC = 5 [MOD]. Aug. 30.48: "in 41 cm L, comet appears quite similar to a globular cluster; a tail was looked for, but was not seen" [HAL]. Sept. 18.39: "narrow tail is only suspected" [BOR].

◇ *P/Encke* ⟹ 1990 Aug. 1.44: observations attempted both with and without C_2 filter, at 83× and 183× [HAL]. Aug. 19.44: "estimate is of a suspected candidate; although the suspect appeared to move over an interval of ~ 1 hr, POSS prints showed that at least one of the positions coincided with a group of faint stars, and this was confirmed when the field was examined on Aug. 24; it is possible the comet was in fact observed, but this cannot be confirmed" [HAL]. Aug. 24.45: very diffuse [HAL]. Aug. 25.43: "comet very vague and diffuse; some enhancement when viewed with C_2 filter" [HAL]. Aug. 30.36: "only suspected" [BOR]. Sept. 16.38: m_1 estimate was using the U Gem sequence; using the ST Gem AAVSO chart, $m_1 = 9.3$ (MM: S) [BOR]. Sept. 18.37: "ST Gem and U Gem sequences give same results" [BOR]. Sept. 21.35: at 163×, 0'.03 tail in p.a. 85° [MOD]. Oct. 1.39: in 31.7-cm $f/6$ L (55×), coma 2'.3, DC = 4, "coma possibly opens slightly sunward" along axis p.a. ~ 105°-285° [BOR].

◇ *P/Schwassmann-Wachmann 1* ⟹ 1990 Aug. 15.34 and 17.25: "sky conditions poor; observation attempted through breaks in clouds" [HAL]. Aug. 19.40: "estimate is of a very faint candidate which was suspected; although nothing in the suspect's position appears on POSS prints, the comet was not seen during subsequent attempts, and consequently the suspect probably was not real" [HAL].

◇ ◇ ◇

Comet Honda 1968 VI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 09 12.98	P	6.0										PER03
1968 09 20.99	P	7.0										PER03
1968 10 11.99	P	8.5										PER03
1968 10 19.01	P	8.8										PER03
1968 10 20.01	P	9.0										PER03

Comet Honda 1968 IX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 09 04.38		9.7	AC	20.3	L		40	1.5	4			SIM
1968 09 04.38	N	11.8	AC	20.3	L		80					SIM
1968 09 22.39		7.8	AC	5.0	B		7					SIM
1968 09 22.39	N	12.4	AC	20.3	L		40	4	3	0.02	170	SIM
1968 09 23.39		7.8		20.3	L		40	4	3	0.08	270	SIM
1968 09 23.39	N	11.8		20.3	L		40			0.02	180	SIM
1968 10 12.30	P	8.1										PER03
1968 10 18.99	P	8.5										PER03
1968 10 19.99	P	8.7										PER03
1968 10 20.99	P	8.6										PER03
1968 10 27.00	P	8.7										PER03
1968 10 29.99	P	8.7										PER03
1968 11 07.01	P	9.1										PER03
1968 11 12.01	P	9.2										PER03
1968 11 19.00	P	9.4										PER03
1968 11 23.00	P	9.7										PER03
1968 11 27.00	P	10 :										PER03
1968 11 28.00	P	10 :										PER03

Comet Thomas 1969 I

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 01 11.20		11.2	AC	20.3	L		40	1				SIM
1969 01 16.22		[11.5	AC	20.3	L		40					SIM
1969 01 24.20		[11.0		20.3	L		40					SIM
1969 01 26.20		[12.0		20.3	L		40					SIM

Comet Daido-Fujikawa 1970 I

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 02 04.49		6.4:		5.0	B		8	& 4	7/	0.75	315	MCC03
1970 02 05.44		5.5	Y	5.0	B		7					MAT05

Comet Bennett 1970 II

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 01 10.43		8.7	VN	15								MCM
1970 01 10.44		8.7	S	15			30					MAT01
1970 01 11.49		8.5:	S	15			30					MAT01
1970 01 18.44		8.8	S	15			45					MCM
1970 02 07.46		5.7	S	20			40			0.5	115	JON01
1970 02 08.41		5.9	S	15			45				225	MCM
1970 02 08.41	N	9.0	S	20			40	5		0.5	115	JON01
1970 02 08.43		6.7	S	5.0	B		7					MAT01
1970 02 08.43		7.0	S	15			30	& 0.5				MAT01
1970 02 09.40		6.1	S	5.0	B		7					MCM
1970 02 09.43		6.1	S	5.0	B		7					MAT01
1970 02 10.42		6.1	S	5.0	B		7					MAT01
1970 02 10.42		6.1	S	5.0	B		7				205	MCM
1970 02 11.41		5.3	SP	5.0	B		7					MAT01
1970 02 12.42		5.3	SP	5.0	B		7				133	MAT01

Comet White-Ortiz-Bolelli 1970 VI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 05 22.33		5 :		5.0	B		7			10	105	MAT01
1970 05 28.34				5.0	B		7			10	112	MAT01
1970 05 28.34		4.8		5.0	B		7			7	122	MCM
1970 05 30.33		5.9		5.0	B		7				118	MCM
1970 05 31.34				10	R		60			3.5	108	JON01
1970 05 31.34		5.4		5.0	B		7			7	120	MCM
1970 06 01.34				5.0	B		7			7	105	MAT01
1970 06 01.34		5.6		15			45				115	MCM
1970 06 01.34		8.0	S	10	R		60			3	108	JON01
1970 06 02.33		5.6		15			45			5	117	MCM
1970 06 03.34				10	R		38			0.75	120	JON01
1970 06 04.34				10	R		38			0.4	120	JON01
1970 06 04.35				5.0	B		7			5		MAT01
1970 06 05.34				10	R		38			0.28	120	JON01
1970 06 06.34				10	R		38			0.1	120	JON01

Comet Suzuki-Sato-Seki 1970 X

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 10 21.38		6.9	S	30	L		45					MAT01
1970 10 21.38		7.4	S	20	L		40					JON01
1970 10 22.38		7.9	S	20	L		40					JON01
1970 10 23.75	O	7.1	AC	7.0	B		20	5	1			LUK
1970 10 25.11		7.2	S	15.2	L	4	26	4	7			MIL03
1970 10 27.38		8.2	S	20	L		40					JON01
1970 10 28.01		7.6	S	10.2	L							MIL

Comet Suzuki-Sato-Seki 1970 X [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 10 28.38		8.1	S	20	L		40					JON01
1970 10 30.39		8.6	S	20	L		40					JON01
1970 10 31.39		8.7:	S	20	L		40					JON01
1970 11 01.05	O	7.5	AC	5.0	B		10					SWE
1970 11 03.04	O	8.9	AC	15.2	L	8	40	& 2	3			LAM
1970 11 24.01	[	9.5		15.2	L	4		! 4				BOR

Comet Abe 1970 XV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 07 08.76		10.0	AC	20	L							JON01
1970 07 12.38		10.5	AC	20.3	L	5		3.5	5			SIM
1970 07 17.77		9.1	S	30.5	L							MAT01
1970 07 28.81		8.8	S	8.0	B		15	& 8				BOE
1970 08 02.33		8.7	S	15.2	L		88	2	4			MOR
1970 08 03.33		8.2	AC		R		8	3.8	5			PAC01
1970 08 04.33	O	8.9	S	15.2	L		44	& 2.2	4			MOR
1970 08 04.80		8.0	S	8.0	B		15	8				BOE
1970 08 06.78		8.0	S	8.0	B		15					BOE
1970 08 07.28	O	8.6	S	15.2	L		44	2.5	4/			MOR
1970 08 07.83		7.9	S	8.0	B		15	8				BOE
1970 08 09.83		7.7	S	8.0	B		15	6				BOE
1970 08 11.92	O	7.1	AC	7.0	B		20					LUK
1970 08 11.92	O	7.8	S	7.0	B		20	6	0			LUK
1970 08 12.36	O	8.1	S	15.2	L		44	2.3	4			MOR
1970 08 13.17	O	6.8	AC	4.0	B		10		0			DEL
1970 08 13.18		7.3	S	3.5	B		7					MIL
1970 08 15.27		6.7	AC	5.0	B		7					SIM
1970 08 21.24	O	7.7	S	15.2	L			2.5	5			MOR
1970 08 22.09	O	6.6	S	5.0	B		7					CON
1970 08 24.92	O	6.7	S	7.0	B		20	15	0			LUK
1970 08 26.09	O	6.7	S	5.0	B		7	7	3			CON
1970 08 26.92	O	6.6	S	7.0	B		20	&15	1	&0.08		LUK
1970 08 27.92	O	6.6	S	7.0	B		20	&15	1	&0.08		LUK
1970 08 29.25		6.6	AC	5.0	B		7					SIM
1970 08 30.22		6.2	AC	5.0	B		7					SIM
1970 08 30.33		6.4	S	5.0	B		7		4			MAT05
1970 08 30.92	O	6.5	S	7.0	B		20	&15	1	&0.08		LUK
1970 08 31.20		6.3	AC	5.0	B		7					SIM
1970 09 01.20		6.0	AC	5.0	B		7			0.17	135	SIM
1970 09 01.27				15.2	L		44	3	6	&0.04	135	MOR
1970 09 01.27	O	6.0	AC	5.2	R		8					MOR
1970 09 02.04	O	6.2	AC	3.5	B		7					SMI
1970 09 02.17	O	6.4	S	5.0	B		7	11	5	1	153	CON
1970 09 02.19		6.3	Y	5.0	B		7			1		MAT05
1970 09 02.92	O	6.5	S	7.0	B		20	12	1/	0.3	50	LUK
1970 09 03.12		6.1	Y	3.5	B		7					MIL
1970 09 04.12		6.0	AC	5.0	B		7					SIM
1970 09 05.03		6.8	S	5.0	B		7		0	1.5	40	MAT05
1970 09 05.06		6.2	Y	3.5	B		7					MIL
1970 09 05.92	O	6.6	S	7.0	B		20	20	1/	0.67	80	LUK
1970 09 06.22		6.3	AC	5.0	B		7					SIM
1970 09 06.22	O	5.6	AC	5.0	B		8					SEB
1970 09 07.92	O	6.3	S	7.0	B		20	15	2	0.33	60	LUK
1970 09 08.05		5.8	AC	5.0	B		7					SIM
1970 09 08.08	O	5.8	AC	4.0	B		10					DEL
1970 09 08.12	O	5.6	S	5.0	B		7	6	4/	0.5	95	CON
1970 09 08.90	O	6.2	S	7.0	B		20	15	1	0.33	60	LUK
1970 09 10.12	O	6.6	S	5.0	B		7	6	5			CON

Comet Abe 1970 XV [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 09 11.07	O	6.4	S	5.0	B		7	7	5			CON
1970 09 11.22	O	6.0	AC	5.2	R		8					MOR
1970 09 12.09		6.6	AC	5.0	B		7					SIM
1970 09 15.02		6.5	AC	5.0	B		7					SIM
1970 09 18.09		6.5	AC	5.0	B		7					SIM
1970 09 19.08	O	6.6	AC	5.2	R		8					MOR
1970 09 20.60		6.8	S	8.0	B		15	4		0.13	45	BOE
1970 09 21.05		7.0	S	5.0	B		7					MAT05
1970 09 21.05	O	6.3	S	5.0	B		7	8	5/	0.5	62	CON
1970 09 21.07		6.0	Y	3.5	B		7					MIL
1970 09 21.58		6.7	S	8.0	B		15	7		0.33		BOE
1970 09 21.90	O	6.6	S	7.0	B		20	20	2			LUK
1970 09 22.04		6.5	AC	5.0	B		7					SIM
1970 09 22.10	O	6.6	S	5.0	B		7			1	75	CON
1970 09 22.90	O	6.5	AC	7.0	B		20	15	2/			LUK
1970 09 23.02		6.6	AC	5.0	B		7					SIM
1970 09 23.92	O	6.4	AC	7.0	B		20	17	2	0.5	20	LUK
1970 09 24.06	O	6.6	S	5.0	B		7	7	5	0.75	75	CON
1970 09 25.07	O	6.6	S	5.0	B		7			1.33	71	CON
1970 09 26.10	O	6.8	AC	5.2	R		8					MOR
1970 09 26.90	O	6.7	S	7.0	B		20	20	2	0.67	310	LUK
1970 09 27.17		6.8	AC	5.0	B		7					SIM
1970 09 27.51		6.8	S	8.0	B		15			&1		BOE
1970 09 28.05	O	6.4	S	5.0	B		7	7	5	1.5	70	CON
1970 09 28.06	O	6.6	AC	5.2	R		8		6	0.5	63	MOR
1970 09 28.51		6.7	S	8.0	B		15			&1		BOE
1970 09 29.90	O	6.1	AC	7.0	B		20			1	330	LUK
1970 09 30.10	E	6.1	S	2.4	B		6	11	5/	&0.35	301	WIL01
1970 10 02.02	O	6.6	S	5.0	B		7	5	5	0.67	73	CON
1970 10 05.02	O	6.4	AC	4.0	B		10					DEL
1970 10 07.03	O	6.8	S	5.0	B		7	4	5	0.83	64	CON
1970 10 10.12	O	6.9	S	5.0	B		7	4	6	&0.25	55	CON
1970 10 18.07	O	7.4:	S	15.2	L		44	2.5	7/	>1		MOR
1970 10 19.98	O	7.3	AC	15.2	R		37	& 7	5/	&0.18		SMI
1970 10 20.06	E	7.5	S	5.0	B		7	10		0.18	310	WIL01
1970 10 27.43		8.6	AC	5.0	R		7					SIM
1970 10 27.97	O	7.0	S	3.5	B		7					SMI
1970 10 28.88		8.6	S	20.3	L							BOE
1971 01 16.88		9.0	S	20.3	L			8				BOE
1971 01 17.86		9.0	S	20.3	L			7				BOE
1971 01 18.83		9.1	S	20.3	L			7				BOE
1971 01 26.83		9.0	S	20.3	L			8				BOE
1971 01 30.85		9.2	S	20.3	L			10				BOE
1971 01 31.83		9.0	S	20.3	L			10				BOE
1971 02 01.85		9.0	S	20.3	L			10				BOE
1971 02 21.78		9.2	S	20.3	L			6				BOE
1971 02 22.78		9.1	S	20.3	L			8				BOE
1971 02 23.77		9.2	S	20.3	L			7				BOE
1971 02 27.73		9.2	S	20.3	L			6				BOE
1971 02 28.75		9.2	S	20.3	L			6				BOE
1971 03 01.71		9.2	S	20.3	L			6				BOE
1971 03 02.69		9.3	S	20.3	L			6				BOE
1971 03 03.70		9.3	S	20.3	L			6				BOE
1971 03 04.75		9.3	S	20.3	L			6				BOE
1971 03 05.75		9.3	S	20.3	L			8				BOE
1971 03 19.16		9.5	AC	10.0	B		14	& 1.5	0			SIM
1971 03 20.29		8.8	AC	10.0	B		14	& 1.5	0	?0.08	35	SIM
1971 03 20.62		9.2	S	20.3	L			6				BOE
1971 03 21.30		9.2	AC	10.0	B		14	& 2		?0.08	40	SIM

Comet Abe 1970 XV [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1971 03 25.60		9.4	S	20.3	L							BOE
1971 03 28.27		9.2	AC	10.0	B		14					SIM
1971 03 31.10		10.0:	AC	10.0	B		14					SIM

Comet Kohoutek 1973 VII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 04 03.86	P	14.0	NP	36.0	D	2		6	0			KLE01
1973 04 26.98	P	13.0	NP	36.0	D	2			4			KLE01
1973 05 05.91	P	13	NP	36.0	D	2		< 0.5	5/			KLE01

Comet Kohoutek 1973 XII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1974 01 13.74	P	4.6	SP	2.8	A	2		7		5	62	MUH
1974 01 22.78	P	5.8	SP	3.9	A	4		6				MUH
1974 01 25.78	P	6.6	S	3.9	A	2		6				MUH
1974 01 26.77	P	6.7	S	3.9	A	4		& 5.5		&0.15	50	MUH
1974 01 28.78	P	6.9	S	3.9	A	4		9				MUH
1974 02 02.04	O	8.5:	S	20.3	L	6		& 4.5		?0.5	40	GRE

Comet Kobayashi-Berger-Milon 1975 IX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 07 10.40	N	9.7:	S	15.2	R	15	72					HAR
1975 07 10.91	O	5.8	Y	5.0	B		7	&25	5			MIN
1975 07 12.51		6.1	VN	0.0	E		1					SUM
1975 07 22.19		5.1:	SP	3.5	B		7					JON02
1975 07 26.15		5.5:	SP	3.5	B		7		2/	0.75	100	JON02
1975 07 27.06	B	5.2	Y	3.5	B		7					SMI
1975 07 27.15		5.3:	SP	3.5	B		7		2/			JON02
1975 07 28.17		5.1:	SP	3.5	B		7		3			JON02
1975 07 28.2		4.0	SP	5.0	B		7			2.25	170	BOH
1975 07 29.17		5.0:	SP	3.5	B		7		3			JON02
1975 07 30.07	B	4.5	Y	3.5	B		7					SMI
1975 07 30.16		4.2	SP	5.0	B		7	13	5	3.5	115	BOH
1975 07 31.07	B	4.5	Y	3.5	B		7					SMI
1975 07 31.2		4.3	SP	5.0	B		7		5			BOH
1975 08 01.13		4.7	SP	3.5	B		7		8			JON02
1975 08 02.2		5.1	SP	5.0	B		7			2	95	BOH
1975 08 03.93	O	5.5		5.0	R		10					KUK01
1975 08 04.94	O	5.5		5.0	R		10					KUK01
1975 08 05.93	O	5.3		5.0	R		10					KUK01
1975 08 06.91	O	5.3		5.0	R		10					KUK01
1975 08 07.16		5.0	SP	3.5	B		7		7			JON02
1975 08 07.17		4.8	S	6.0	R		48	23	4	0.2		ROB
1975 08 07.2		5.0	SP	5.0	B		7			4.5	80	BOH
1975 08 07.93	O	5.1		5.0	R		10					KUK01
1975 08 08.12		5.0	SP	3.5	B		7		8			JON02
1975 08 08.2		5.2	SP	5.0	B		7			4	80	BOH
1975 08 09.12		5.1	SP	3.5	B		7		8			JON02
1975 08 10.07		5.0:	SP	4.0	B		10					DEL
1975 08 11.15		5.0	SP	3.5	B		7		8			JON02
1975 08 15.87	O	4.7		5.0	R		10					KUK01
1975 08 16.87	O	4.8		5.0	R		10					KUK01
1975 08 17.89	O	4.5		5.0	R		10					KUK01
1975 08 20.90	O	4.5		5.0	R		10					KUK01
1975 08 24.08		4.2	S	3.5	B		7					OME
1975 08 24.85	O	4.8		5.0	R		10					KUK01

Comet Kobayashi-Berger-Milon 1975 IX [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 08 25.88	O	4.9		5.0	R		10					KUK01
1975 08 26.86	O	4.7		5.0	R		10					KUK01
1975 08 27.15	O	4.9	SP	5.0	B		7			5.5	55	BOH
1975 09 10.40		5.4	Y	15.2	L	7	35					ALB01

Comet Suzuki-Saigusa-Mori 1975 X

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 10 26.54		6.1	S	3.0	B		6	7				HAN02
1975 10 26.55		5.2	SP	3.5	B		7	& 9				ROG

Comet Levy 1986 XVII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 01 12.27	S	11.3	AC	29.8	L	5	89	1.2	2			KEI
1987 01 30.25	S	11.2	AC	29.8	L	5	62	2.4	1/			KEI

Comet Sorrells 1987 II

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 11 26.80	S	9.4	PB	8.0	B		20	2.6				KEI
1986 11 26.80	S	10.0	PB	29.8	L	5	62	0.8	8			KEI
1986 11 28.79	S	9.4	AA	8.0	B		20	2.3				KEI
1986 11 28.79	S	10.1	PB	29.8	L	5	62	1.2	8	0.10	186	KEI
1986 12 21.86	S	9.1	AA	8.0	B		20	3.3	6			KEI
1986 12 25.81	S	9.3	AA	8.0	B		20	5.8	2			KEI
1987 01 01.77				29.8	L	5	62	2.1	6	0.17	233	KEI
1987 01 01.77	S	9.2	AA	8.0	B		20	4.2	2/			KEI
1987 01 28.80	S	9.2	AA	8.0	B		20	2.3	2			KEI
1987 01 30.78	S	9.1	AA	8.0	B		20	3.1	2			KEI
1987 02 20.82	S	9.9	AA	29.8	L	5	62	1.3	3/			KEI
1987 08 14.90		[11.0		29.8	L	5	60					KEI

Comet Nishikawa-Takamizawa-Tago 1987 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 01 28.79	S	7.9	AA	8.0	B		20	3.4	5/			KEI
1987 01 29.80	S	7.8	AA	8.0	B		20	3.7	4			KEI
1987 01 30.78	S	7.8	AA	5.0	B		10	3.9				KEI
1987 01 30.78	S	7.9	AA	8.0	B		20	3.4	4	0.25	54	KEI

Comet Wilson 1987 VII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 08 28.89	S	11.6	AC	29.8	L	5	62	0.45	8			KEI
1986 08 31.89	S	11.5	AC	29.8	L	5	62	0.35	8			KEI
1986 09 03.90	S	11.5	AC	29.8	L	5	62	0.6	8	0.03	152	KEI
1986 09 04.91	S	11.5	AC	29.8	L	5	62	0.55	8			KEI
1986 09 07.90	S	11.5	AC	29.8	L	5	68	0.75	8			KEI
1986 09 09.87	S	11.4	AC	29.8	L	5	62	1.0	8			KEI
1986 09 21.82	S	11.7	AC	29.8	L	5	68	0.4				KEI
1986 09 25.82	S	11.3	AC	29.8	L	5	68	0.5	8			KEI
1986 09 25.82	S	11.4	AC	29.8	L	5	62					KEI
1986 09 29.84	S	11.4	AC	29.8	L	5	68	0.9	8			KEI
1986 10 10.93	S	11.7	AC	29.8	L	5	68	0.9				KEI
1986 10 20.77	S	11.6	AC	29.8	L	5	68	0.5				KEI
1986 10 23.78	S	11.7	AC	29.8	L	5	62	1.1	8			KEI
1986 10 24.81	S	11.7	AC	29.8	L	5	89	1.0				KEI
1986 10 24.81	S	11.8	AC	29.8	L	5	62	0.9	7/		60	KEI

Comet Wilson 1987 VII [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 10 25.77	S	11.6	AC	29.8	L	5	62	0.8	7/		49	KEI
1986 10 30.88	S	11.8	AC	29.8	L	5	68	0.7	7			KEI
1986 11 06.78	S	11.8	AC	29.8	L	5	68	0.5				KEI
1986 11 22.79	S	11.7	AC	29.8	L	5	68	0.6	5			KEI
1986 11 26.75	S	11.4	AC	29.8	L	5	62	0.9	6/	0.07	69	KEI
1986 11 28.75	S	11.1	AC	29.8	L	5	62	1.8	6/			KEI

Comet Levy 1987 XXI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 10 21.81	S	9.3	AA	29.8	L	5	60	1.9	1			KEI

Comet Rudenko 1987 XXIII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 08 30.86	S	9.9	AA	29.8	L	5	62	1.5	4			KEI
1987 09 14.43	S	9.1	S	13	L	6	44	3	2			ISH02
1987 10 12.83	S	7.5	AA	12.0	B		20	2.5	7			MIT
1987 10 17.80	S	7.0	S	13	L	6	24	2.5	5			ISH02
1987 10 19.80	M	6.8	S	20	L	6	46	3	7			NAK01
1987 10 19.81	M	7.3	AA	12.0	B		20	2.5	7/			MIT
1987 10 19.81	S	7.1	S	13	L	6	24	2.5	4			ISH02
1987 10 27.80	M	7.6	AA	20	L	6	46	3.5	6/	?	320	NAK01
1987 10 27.81	S	7.3	AA	13	L	6	24	3	4	0.17		ISH02
1987 10 28.82	S	6.9	AA	13	L	6	24	3	4	0.17		ISH02
1987 11 05.82	M	7.6	AA	12.0	B		20	2.7	6/			MIT
1987 11 05.82	S	7.2	AA	13	L	6	24	3	4			ISH02
1987 11 09.83	S	7.3	AA	13	L	6	44	6	4			ISH02
1987 11 10.83	S	7.8	AA	13	L	6	62	5	3			ISH02
1987 11 19.82	S	8.3	S	20	L	6	46	4	3			NAK01

Comet Bradfield 1987 XXIX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 09 25.92	S	7.5	AA	6.0	R	11	56	3	5			DES01
1987 09 27.80	S	7.5	A	15.0	L	5	25	5	4	0.5		MER
1987 10 03.92	S	7.1	AA	6.0	R	11	56	5	4			DES01
1987 10 04.92	S	7.0	AA	6.0	R	11	56	12	4			DES01
1987 10 07.92	S	6.8	AA	6.0	R	11	56	15	4			DES01
1987 10 09.92	S	6.7	AA	6.0	R	11	56	17	4			DES01
1987 10 10.80	S	6.7	AA	5.0	B		10	2.2	8	0.5	102	KEI
1987 10 10.80	S	6.7	AA	8.0	B		20	2.6				KEI
1987 10 17.78	S	6.2	A	5.0	B		7	6	4			MER
1987 10 18.81	S	5.8	A	5.0	B		7	6	4			MER
1987 10 18.92	S	6.4	AA	6.0	R	11	56	20	4	0.1	340	DES01
1987 10 21.79	S	6.4	AA	5.0	B		10	2.5	8/	1.0	78	KEI
1987 10 22.94	S	6.3	AA	6.0	R	11	56	22	4	0.15	340	DES01
1987 10 24.82	S	6.3	AA	5.0	B		10	2	8/	2.0	74	KEI
1987 10 26.92	S	6.1	AA	6.0	R	11	56	23	3	0.17	345	DES01
1987 10 31.91	S	5.8	AA	6.0	R	11	56	25	3	0.2	348	DES01
1987 11 01.92	S	5.7	AA	6.0	R	11	56	24	4	0.2	350	DES01
1987 11 02.92	S	5.7	AA	6.0	R	11	56	27	4	0.2	350	DES01
1987 11 03.92	S	5.6	AA	6.0	R	11	56	25	4	0.16	350	DES01
1987 11 04.93	S	5.6	AA	6.0	R	11	56	24	4	0.15	352	DES01
1987 11 08.93	S	5.4	AA	6.0	R	11	56	25	4	0.15	355	DES01
1987 11 09.95	S	5.4	AA	6.0	R	11	56	23	2	0.1	355	DES01
1987 11 10.76	S	5.7	AA	2.5	B		3					KEI
1987 11 10.76	S	5.7	AA	5.0	B		10	3.9	8	0.8	64	KEI
1987 11 10.93	S	5.2	AA	6.0	R	11	56	23	2	0.2	355	DES01

Comet Bradfield 1987 XXIX [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 11 11.92	S	5.2	AA	6.0	R	11	56	24	3	0.25	355	DES01
1987 11 12.93	S	5.1	AA	6.0	R	11	56	22	3	0.2	357	DES01
1987 11 13.92	S	5.0	AA	6.0	R	11	56	23	3	0.18	357	DES01
1987 11 14.77	S	5.3	AA	5.0	B		10	6.3	8	1.5	55	KEI
1987 11 14.93	S	5.0	AA	6.0	R	11	56	20	4	0.15	358	DES01
1987 11 16.81	S	5.6	AA	5.0	B		10	3.1			56	KEI
1987 11 16.81	S	5.7	AA	8.0	B		20	1.9	8		56	KEI
1987 11 19.75	S	5.4	A	3.0	B		8	6		1		MER
1987 11 19.81	S	5.1	AA	2.5	B		3			1.5		KEI
1987 11 19.81	S	5.4	AA	5.0	B		10	3.6	8	1.0	49	KEI
1987 11 22.75		5.1	AA	0.0	E		1					KEI
1987 11 22.75	S	5.7	AA	5.0	B		10	3.3	8	0.67	62	KEI
1987 11 22.84	S	5.6	AA	5.0	B		10					CAR02
1987 11 25.76	S	5.4	AA	5.0	B		10					KEI
1987 11 26.74	S	5.6	AA	5.0	B		10	2.8	8	0.67	68	KEI
1987 11 27.75	S	5.7	AA	5.0	B		10	2.6	7/	1.0	58	KEI
1987 11 30.75	S	5.7	AA	5.0	B		10	3.4		0.73	70	KEI
1987 12 08.76	S	5.8	AA	5.0	B		10	2.7	7/	1.93	56	KEI
1987 12 10.74	S	5.8	AA	5.0	B		10	2.5		1.5	56	KEI
1987 12 10.81	S	5.7	A	5.0	B		7	8	5	1		MER
1987 12 15.75	S	5.7	A	5.0	B		7	14	5			MER
1987 12 19.81	S	5.9	A	5.0	B		7	12				MER
1988 01 01.95	S	6.2	AA	5.0	B		20	20	4	0.3	70	DES01
1988 01 02.95	S	6.3	AA	5.0	B		20	22	4	0.25	73	DES01
1988 01 03.94	S	6.3	AA	5.0	B		20	20	4	0.25	75	DES01
1988 01 06.77	S	6.7	A	5.0	B		7	12	3			MER
1988 01 07.77	S	6.5	AA	5.0	B		10	3.7	5	0.53	69	KEI
1988 01 11.97	S	6.5	AA	5.0	B		10	6.6	5	0.40	84	KEI
1988 01 14.76	S	6.7	AA	5.0	B		10	6.4	6	0.37	51	KEI

Comet McNaught 1987 XXXII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 12 27.86	S	7.0	AA	20	L	6	46	3.5	4			NAK01
1987 12 29.87	S	7.2	AA	13	L	6	62	3	3			ISH02
1987 12 30.87	S	6.8	AA	13	L	6	62	4	4			ISH02
1987 12 31.87	S	7.0	AA	13	L	6	62	3	4			ISH02
1988 01 06.86	S	6.5	AA	13	L	6	44	3	5			ISH02
1988 01 08.86	S	6.6	AA	13	L	6	44	3	4			ISH02
1988 01 09.86	S	6.6	AA	13	L	6	44	4	5	0.10		ISH02
1988 01 10.85	B	7.2	AA	12.0	B		20	2	7	0.25		MIT
1988 01 11.84	S	6.4	AA	20	L	6	46	4	6	0.3	345	NAK01
1988 01 13.83	S	6.5	AA	20	L	6	46	4.5	5/	?	315	NAK01
1988 01 13.86	S	6.3	AA	13	L	6	24	4	5	0.17		ISH02
1988 01 16.84	M	7.0	S	12.0	B		20	3.5	6	0.33		MIT
1988 01 16.86	S	6.5	AA	13	L	6	24	3	5	0.17		ISH02
1988 01 17.85	M	7.0	S	12.0	B		20	3.5	6	0.25		MIT
1988 01 17.86	S	6.5	AA	13	L	6	24	4	5	0.13	30	ISH02
1988 01 18.85	S	6.7	AA	13	L	6	24	4	5	0.08		ISH02
1988 01 23.85	M	7.0	S	12.0	B		20	3	6	0.25		MIT
1988 01 23.85	S	6.9	AA	13	L	6	24	4	5	0.17		ISH02
1988 01 24.85	S	6.7	AA	13	L	6	24	5	5	0.25		ISH02
1988 01 25.85	S	6.8	AA	13	L	6	24	4	5	0.13		ISH02
1988 01 27.83	S	6.5	AA	20	L	6	46	5	5	0.3	330	NAK01
1988 01 27.84	M	7.3:	AA	12.0	B		20	3	5/			MIT
1988 01 27.85	S	6.8	AA	13	L	6	24	4	5	0.13		ISH02
1988 01 28.84	S	6.7	AA	13	L	6	24	5	5	0.17		ISH02
1988 01 29.84	M	7.2	AA	12.0	B		20	4	5	0.25		MIT
1988 01 29.84	S	6.7	AA	13	L	6	24	4	5	0.25		ISH02

Comet McNaught 1987 XXXII [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 02 02.85	S	7.3	AA	13	L	6	24	3	4			ISH02
1988 02 06.83	S	7.5	AA	13	L	6	24	4	4			ISH02
1988 02 08.85	S	7.5	AC	20	L	6	46	4	6	?	320	NAK01
1988 02 09.39	S	7.7	AA	13	L	6	24	3	3			ISH02
1988 02 10.39	S	8.0	AA	13	L	6	24	4	3			ISH02
1988 02 10.82	M	7.9	AA	12.0	B		20	& 3	5			MIT
1988 02 10.84	S	7.8	AA	13	L	6	24	6	3			ISH02
1988 02 13.83	S	7.5	AC	20	L	6	46	4.5	4	?	320	NAK01
1988 02 15.40	S	8.3	AA	13	L	6	62	3	2			ISH02
1988 02 17.81	M	8.3	AA	12.0	B		20	4.5	4	0.17		MIT
1988 02 18.79	M	8.3	AA	12.0	B		20	4	4	0.17		MIT
1988 02 18.81	S	8.1	AC	20	L	6	46	5	4	?	320	NAK01
1988 02 19.40	S	8.7	AA	13	L	6	62	3	2			ISH02
1988 02 19.84	S	8.4	AA	13	L	6	24	4	3			ISH02
1988 02 21.84	S	8.4	AA	13	L	6	24	5	3	0.08		ISH02
1988 02 24.78	M	8.5	AA	12.0	B		20	4.5	4			MIT
1988 02 28.83	S	8.8	AA	13	L	6	44	3	2			ISH02
1988 03 07.43	S	9.2	AC	13	L	6	62	3	2			ISH02
1988 03 12.82	S	9.4	AC	20	L	6	58	3.5	3			NAK01
1988 03 12.82	S	9.5	AC	13	L	6	44	2	2			ISH02
1988 03 15.80	S	10.3:	S	12.0	B		20	2				MIT
1988 03 23.47	S	9.8	AC	13	L	6	44	2	3			ISH02
1988 03 24.43	S	9.8	AC	13	L	6	44	2.5	2			ISH02
1988 03 26.79	S	10.5	AC	20	L	6	58	2.8	3			NAK01
1988 03 27.77	S	10.7	AC	20	L	6	58	2.6	2			NAK01
1988 04 06.45	S	10.2	AC	13	L	6	64	2	2			ISH02
1988 04 10.46	S	10.5	AC	20	L	6	58	4.5	2			NAK01
1988 04 15.75	S	10.4	AC	20	L	6	58	4	3			NAK01
1988 04 16.45	S	10.7	AC	13	L	6	44	2	2			ISH02

Comet Ichimura 1988 I

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 11 24.53	S	9.1	AA	12.0	B		20	5.5	2			MIT
1987 11 24.58	S	8.6	AC	20	L	6	46	8	2			NAK01
1987 11 25.56	S	8.2	AC	20	L	6	46	10	2/			NAK01

Comet Furuyama 1988 IV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 11 26.92	S	10.3	AC	29.8	L	5	60	1.7	3			KEI
1987 11 28.02	S	10.5	AC	29.8	L	5	60	1.8	3/			KEI
1987 12 13.44	S	10.4	AC	20	L	6	65	3.5	3			NAK01
1987 12 14.58	S	10.3	AC	20	L	6	65	3.3	4			NAK01
1987 12 16.53	S	10.0	AC	20	L	6	58	5	4			NAK01
1987 12 16.54	S	10.3	AC	13	L	6	62	2.5	2			ISH02
1987 12 17.51	S	10.5	AC	13	L	6	62	2	2			ISH02
1987 12 19.48	S	10.2	AC	20	L	6	58	4	4			NAK01
1987 12 20.48	S	10.3	AC	13	L	6	62	2	2			ISH02
1987 12 21.48	S	10.0	AC	13	L	6	62	2.5	2			ISH02
1987 12 21.52	S	10.8	AC	16	L	6	31	3	3			MIT
1987 12 21.58	S	10.2	AC	20	L	6	65	4.5	3			NAK01
1987 12 22.46	S	10.3	AC	13	L	6	62	2	2			ISH02
1987 12 23.46	S	10.5	AC	13	L	6	62	2	2			ISH02
1987 12 23.51	S	10.3	AC	20	L	6	65	3.5	4			NAK01
1987 12 26.52	S	10.4	AC	20	L	6	58	3.5	2			NAK01
1988 01 09.46	S	10.6	AC	20	L	6	65	3.5	2/			NAK01
1988 01 10.42	S	10.9	AC	20	L	6	65	2.2	3			NAK01
1988 01 10.43	S	10.7	AC	13	L	6	62	2	2			ISH02

Comet Furuyama 1988 IV [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 01 13.46	S	10.4	AC	20	L	6	106	3	2			NAK01
1988 01 17.41	S	10.1	AC	20	L	6	65	4.5	4			NAK01
1988 01 17.41	S	10.3	AC	13	L	6	44	2	2			ISH02
1988 01 18.41	S	10.5	AC	13	L	6	62	2	2			ISH02
1988 01 23.45	S	10.8	AC	16	L	6	31	2	2			MIT
1988 01 24.42	S	10.4	AC	20	L	6	65	3	4			NAK01
1988 02 07.42	S	10.3	AC	20	L	6	58	3.5	4			NAK01

Comet Liller 1988 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 04 09.84	S	5.5	S	4.0	B		7	4	7	0.5	360	BUS01
1988 04 11.84	S	5.6:	S	4.0	B		7					BUS01
1988 04 12.84	S	5.5	S	4.0	B		7		8	1.5		BUS01
1988 04 13.85	B	5.7	S	4.0	B		7					BUS01
1988 04 13.85	S	5.6	S	4.0	B		7		6/	1	350	BUS01
1988 04 23.88	S	5.6	S	4.0	B		7			>3		BUS01
1988 05 06.90	B	6.1	S	6.7	R		14					BUS01
1988 05 06.90	S	5.9	S	6.7	R		14	8	5	2		BUS01

Comet Yanaka 1988 XX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 05.14	S	10.9:	A	20.0	T	10	50	& 3	0/			COM
1989 01 11.23	S	12.9	VB	30	R	18	95	0.8	4			SHA02
1989 01 13.15	S	11.4	A	20.0	T	10	50	& 4	0/			COM
1989 01 13.22	S	13.1	VB	30	R	18	95	1.0	4			SHA02
1989 01 18.23	S	11.3	A	20.0	T	10	50	& 4	1			COM
1989 01 18.26	S	13.3	VB	30	R	18	235	0.6	3			SHA02

Comet Yanaka 1988 XXIV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 11.26	! S	11.2	VB	30	R	18	95	1.4	4			SHA02
1989 01 13.21	S	9.7:	A	20.0	T	10	50	& 3	1			COM
1989 01 13.27	! S	11.4	VB	30	R	18	95	1.3	3			SHA02

Comet Okazaki-Levy-Rudenko 1989r

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 27.95	S	11.1	VB	20	R	14	40	2.0	2			SHA02
1989 08 28.90	S	10.8	VB	20	R	14	40	1.6	2			SHA02
1989 08 31.80	S	9.4	AA	8.0	B		20	5	3			DIO
1989 09 02.89	S	10.0	VB	20	R	14	95	1.6	2			SHA02
1989 09 03.09	* M	9.9	AA	20.0	L	5	35	& 3	4			MOD
1989 09 03.87	S	9.2	AA	8.0	B		20		3			DIO
1989 09 04.07	* M	9.9	AA	20.0	L	5	35	& 3	4			MOD
1989 09 04.80	S	9.0	AA	8.0	B		20	6	4	0.06	10	DIO
1989 09 19.79	S	8.6	AA	20.0	T	10	80	9	4			DIO
1989 09 19.84	S	9.2	VB	20	R	14	40	5.2	3			SHA02
1989 09 20.78	S	8.5	AA	20.0	T	10	80	9	4			DIO
1989 09 22.72	S	8.3	S	13	R	15	26	5	2			EFI
1989 09 22.82	S	8.7	S	8.0	B		20	5.1	4			KOC01
1989 09 24.84	S	9.2	VB	20	R	14	40	2.9	4			SHA02
1989 09 24.85	S	8.9	VB	8.0	B		20	2.7	5			SHA02
1989 09 25.74	S	8.4	S	13	R	15	26	4	2			EFI
1989 09 26.74	S	8.4	S	13	R	15	26	4	2			EFI
1989 09 27.74	S	8.4	S	13	R	15	26	4	2			EFI
1989 09 28.74	S	8.3	S	13	R	15	26	4	2			EFI

Comet Okazaki-Levy-Rudenko 1989r [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 29.79	S	7.8	AA	8.0	B		20	3	5	0.08	65	DIO
1989 10 04.81	S	8.3	VB	8.0	B		20	1.3	6			SHA02
1989 10 06.75	S	7.5	AA	8.0	B		20	2	6			DIO
1989 10 20.76	S	6.6	S	8.0	B		15	10	6			SCH04
1989 10 22.27	B	6.6	SC	5.0	B	2	10		2			RAD01
1989 10 23.75	B	6.8	AA	8.0	B		20					KOC
1989 10 24.80	S	7.0	S	8.0	B		10	1.3	6			SHA02
1989 10 25.76	S	6.5:	S	8.0	B		15	6	8			SCH04
1989 10 27.75	S	6.3	S	8.0	B		15	10	5/			SCH04
1989 10 31.76	S	6.3	S	8.0	B		10	1.8	7			SHA02
1989 11 11.21	S	6.2	S	8.0	B		15	8	8			SCH04
1989 11 12.19	S	5.9	S	8.0	B		15	7	8			SCH04
1989 11 14.65	M	4.3	AA	5.0	B		20	& 5	6	&0.3	45	WOL01
1989 11 15.65	M	5.4	AA	5.0	B		20	& 5	6	&0.3	30	WOL01
1989 11 16.65	M	5.6	AA	5.0	B		20	& 5	6	&0.3	30	WOL01
1989 11 17.22	B	6.2	S	8.0	B		15	6	8			SCH04
1989 11 17.22	S	6.0	S	8.0	B		15	6	8			SCH04
1989 11 17.23	B	6.3	S	8.0	B		11					BOT
1989 11 17.23	S	6.0	S	8.0	B		11					BOT
1989 11 20.23	S	5.7	S	8.0	B		15	9	8			SCH04
1989 11 21.21	B	6.2	S	4.0	B		8	9	8			SCH04
1989 11 21.21	S	6.0	S	4.0	B		8	9	8			SCH04
1989 11 21.65	M	5.6	AA	6.2	R	11	38	3.2	6	&0.5	10	WOL01
1989 11 22.65	M	5.8	AA	6.2	R	11	38	3.2	6	&0.5	10	WOL01
1989 11 23.22	S	5.7	S	8.0	B		15	10	8	0.2	320	SCH04
1989 11 23.23	B	5.9	S	8.0	B		11					BOT
1989 11 23.23	S	5.8	S	8.0	B		11			0.3	300	BOT
1989 11 23.64	M	5.8	AA	6.2	R	11	38	3.2	6	&0.5	10	WOL01
1989 11 24.74	S	5.0	MM	8.0	B		20	15	6	0.10	250	CAM03
1989 11 24.75	S	5.0	MM	20	L	7	56	10	6	0.16	255	CAM03
1989 11 25.21	S	5.4	S	8.0	B		15	9	7	0.5	300	SCH04
1989 11 25.21	S	5.7	S	5.0	B		10	& 3	7	0.5	325	COM
1989 11 25.23	S	6.0	S	8.0	B		11			0.2	300	BOT
1989 11 25.24	S	6.2	SC	5.0	B		7	1.3	8			SHA02
1989 11 25.28	S	5.7	AA	5.0	B		20	15	6	0.4	0	DES01
1989 11 26.24	S	5.7	SC	5.0	B		7	2.7	8			SHA02
1989 11 26.27	S	5.7	AA	5.0	B		20	18	6	0.5	355	DES01
1989 11 26.72	S	4.9	V	20	L	7	35	&22.5	7	1.5	290	CAM03
1989 11 26.74	S	4.9	V	8.0	B		20	20	7/	1.0	285	CAM03
1989 11 27.28	S	5.8	AA	5.0	B		20	10	6	0.5	355	DES01
1989 11 27.30	S	5.9	AA	6.0	R	11	56	8	4	0.3		DES01
1989 11 27.69	S	4.9	V	8.0	B		20	20	7/	1.5	285	CAM03
1989 11 27.70	S	5.0	V	5.0	B		12	15	6/	1	280	CAM03
1989 11 27.74	S	4.9	V	20	L	7	35	25	6/	2	295	CAM03
1989 11 28.73	S	5.0	V	5.0	B		12	15	6/	0.5	285	CAM03
1989 11 28.73	S	5.0	V	8.0	B		20	20	6/	1	280	CAM03
1989 11 28.73	S	5.0	V	20	L	7	35	25	6/	2	290	CAM03
1989 11 30.63	M	6.2	AA	5.0	B		20		5			WOL01
1989 12 02.27	S	6.2	AA	5.0	B		20	8	6	0.2	350	DES01
1989 12 02.72	S	5.5	V	20	L	7	35	15	8	0.5	285	CAM03
1989 12 02.73	S	5.5	V	5.0	B		12	20	8	0.16	280	CAM03
1989 12 02.73	S	5.5	V	8.0	B		20	20	8	0.16	280	CAM03
1989 12 03.27	S	6.2	AA	5.0	B		20	4	7	0.15	350	DES01
1989 12 03.69	S	5.6	V	8.0	B		20	20	8	0.25	290	CAM03
1989 12 05.41	M	6.5	AA	5.0	B		20		5			WOL01
1989 12 05.73	S	5.7	V	20	L	7	35	&17.5	8	0.25	280	CAM03
1989 12 05.74	S	5.7	V	5.0	B		12	20	6/			CAM03
1989 12 05.74	S	5.7	V	8.0	B		20	20	8	0.16	280	CAM03
1989 12 06.49	M	6.5	AA	5.0	B		20	& 3	5			WOL01

Comet Okazaki-Levy-Rudenko 1989r [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 06.73	S	5.6	V	8.0	B		20	20	7	0.16	290	CAM03
1989 12 07.28	S	6.7	AA	5.0	B		20	5	7			DES01
1989 12 07.71	S	5.8	V	20	L	7	56	15	7/	1.6	275	CAM03
1989 12 07.74	S	5.8	V	8.0	B		20	20	7/	0.25	270	CAM03
1989 12 07.75	S	5.8	V	5.0	B		12	20	7/			CAM03
1989 12 09.50	M	6.8	AA	5.0	B		7		4	&0.3	340	WOL01
1989 12 09.56	S	6.5	V	8.0	B		20	15	4			CAM03
1989 12 09.77	S	6.5	V	20	L	7	35	15	8	0.25	260	CAM03
1989 12 09.78	S	6.5	V	8.0	B		20	20	8			CAM03
1989 12 11.38	M	7.0	AA	6.2	R	11	38	2.1	3	0.2	300	WOL01
1989 12 12.40	M	7.0	AA	6.2	R	11	38	2.0	3	0.17	280	WOL01
1989 12 14.48	S	6.8	MM	8.0	B		20	15	8			CAM03
1989 12 14.48	S	6.8	V	20	L	7	35	10	8			CAM03
1989 12 15.50	S	6.9	MM	20	L	7	35	15	8	0.25	260	CAM03
1989 12 15.50	S	7.0	MM	8.0	B		20	20	8			CAM03
1989 12 16.23	S	7.3	AA	5.0	B		20	4	7			DES01
1989 12 16.42	M	7.5	AA	5.0	B		7	& 3	3	&0.25	250	WOL01
1989 12 16.48	S	7.0	MM	20	L	7	56	12	8	0.16	260	CAM03
1989 12 16.51	S	6.9	MM	8.0	B		20	15	8			CAM03
1989 12 17.48	S	7.4	MM	20	L	7	35	8	8	0.08	280	CAM03
1989 12 17.49	S	7.4	MM	8.0	B		20	10	8			CAM03
1989 12 17.55	S	7.4	MM	5.0	B		12	15	7			CAM03
1989 12 18.43	M	8.0	AA	5.0	B		7					WOL01
1989 12 19.43	M	8.2	AA	5.0	B		7					WOL01
1989 12 20.50	S	8 :	MM	20	L	7	56	8	8	0.6	300	CAM03
1989 12 20.51	S	8.3	MM	8.0	B		20	10	9			CAM03
1989 12 20.56	S	8 :	MM	5.0	B		12	15	8			CAM03
1989 12 21.43	M	8.5	AA	5.0	B		7		3			WOL01
1989 12 21.53	S	8.2	MM	20	L	7	56	8	9	0.5	290	CAM03
1989 12 21.54	S	8.3	MM	8.0	B		20	15	8			CAM03
1989 12 21.57	S	8.0	MM	5.0	B		12	10	8			CAM03
1989 12 22.48	S	8.3	MM	8.0	B		20	10	8			CAM03
1989 12 22.49	S	8.4	MM	20	L	7	35	8	8	0.7	290	CAM03
1989 12 22.55	S	8.3	MM	5.0	B		12	10	8			CAM03
1989 12 23.43	M	8.8	AA	5.0	B		7		3			WOL01
1989 12 23.55	S	8.3	MM	20	L	7	35	6	9	0.4	290	CAM03
1989 12 23.56	S	8.3	MM	8.0	B		20	8	8			CAM03
1989 12 23.57	S	8.3	MM	5.0	B		12	6	8			CAM03
1989 12 24.52	S	8.3	MM	8.0	B		20	10	9			CAM03
1989 12 24.53	S	8.3	MM	5.0	B		12	8	7			CAM03
1989 12 24.54	S	8.4	MM	20	L	7	35	4	9	0.2	290	CAM03
1989 12 28.73	S	8.5	MM	8.0	B		20	5	6			CAM03
1989 12 30.62	S	8.9	MM	20	L	7	56	8	7			CAM03
1989 12 30.64	S	9.0	MM	8.0	B		20	6	6			CAM03

Comet Helin-Roman-Alu 1989v

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 31.82	S[	12.8	VB	30	R	18	95					SHA02
1989 11 17.82	S	10.1	A	20.0	T	10	77	& 4	3			COM
1989 11 19.80	S	10.1	A	28.5	T	10	109	& 5	1/			COM
1989 11 25.86	S	13.2	VB	30	R	18	235	0.4	3			SHA02
1989 11 25.90	S	10.3:	A	20.0	T	10	80		1			COM
1989 11 2[illegible]90	S	10.6	A	28.5	T	10	109		1			COM
1990 02 01.52	S	10.5	AC	31.8	L	4	63	5	1			KEE
1990 02 03.16	S	12.1	A	28.0	T	10	113	& 4	0/			COM
1990 02 17.02	S	12.9:	A	28.0	T	10	112	& 3	0			COM
1990 02 21.94	S	12.9:	A	28.0	T	10	112	& 3	0			COM

Comet Aarseth-Brewington 1989a1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 19.73	S	9.1	A	20.0	T	10	77	& 3	3/			COM
1989 11 22.73	S	8.3	A	20.0	T	10	77	3	5			COM
1989 11 22.76	S	8.6	AA	8.0	B		20	1.8	5			SHA02
1989 11 23.77	S	8.6	AA	8.0	B		20	1.3	5			SHA02
1989 11 25.23	S	7.8	A	11.0	L	7	32	2	7			SCH04
1989 11 25.74	S	8.2	AA	8.0	B		20	1.3	6			SHA02
1989 11 26.74	S	7.6	AA	8.0	B		20	1.8	6			SHA02
1989 11 27.74	S	7.6	AA	8.0	B		20	1.8	5			SHA02
1989 11 28.73	S	8.0:	A	11.0	L	7	32	1	6			SCH04
1989 11 29.72	S	7.6	A	11.0	L	7	32	3	6			SCH04
1989 11 30.22	S	7.4	A	12.0	R	4	20	3	7			LOO01
1989 12 01.24	S	7.1	A	8.0	B		15	5	7			SCH04
1989 12 02.22	S	7.1	A	8.0	B		15	6	7			SCH04
1989 12 03.19	S	6.9	A	12.0	R	4	20	3.2	7			LOO01
1989 12 03.72	S	7.0	A	8.0	B		15	5	7			SCH04
1989 12 04.24	S	6.9	S	8.0	B		15	8	6	0.2	0	SCH04
1989 12 20.20	B	4.5	S	15.4	L	10		8	9	1.8	325	KOS
1990 01 13.51	S	5.5	MM	8.0	B		20	2	8	&1	180	CAM03
1990 01 14.54	S	6.0	V	8.0	B		20	3	8	&0.5	230	CAM03
1990 01 15.51	S	6.0	V	8.0	B		20	3	8	1.0	180	CAM03
1990 01 15.51	S	6.2	V	20	L	7	35	2	8	0.2	185	CAM03
1990 01 16.47	S	6.7	V	20	L	7	35	2	8	2	200	CAM03
1990 01 16.48	S	6.7	V	8.0	B		20	3	8	2	225	CAM03
1990 01 16.53	S	6.6	AA	8.0	B		20	4	6	1	180	PEA
1990 01 17.53	S	6.7	AA	8.0	B		20	3	6/	0.8	182	PEA
1990 01 18.47	S	7.3	V	20	L	7	35	2	8	1.2	150	CAM03
1990 01 18.47	S	7.4	V	8.0	B		20	3	8	1.5	150	CAM03
1990 01 20.48	S	7.8	V	8.0	B		20	3	8	0.75	230	CAM03
1990 01 21.47	S	8.0	V	8.0	B		20	2	8	1.0	230	CAM03
1990 01 22.47	S	7.9	AA	12.0	B		20			1	180	PEA
1990 01 22.48	S	8.0	V	8.0	B		20	3	8	1.0	215	CAM03
1990 01 22.48	S	8.0	V	20	L	7	35	1	8	1.2	225	CAM03
1990 01 23.45	S	8.0	AA	12.0	B		20		6	1	180	PEA
1990 01 23.47	S	8.3	MM	20	L	7	35	2	8	1.6	235	CAM03
1990 01 23.47	S	8.5	MM	8.0	B		20	3	8	2	240	CAM03
1990 01 24.46	S	8.0	AA	12.0	B		20		7	0.8	180	PEA
1990 01 25.45	S	8.3	AA	12.0	B		20	1.5	7	0.7	180	PEA
1990 01 26.46	S	8.3	AA	12.0	B		20		7	0.7	195	PEA
1990 01 26.47	S	9.1	MM	20	L	7	35	3	8	0.8	225	CAM03
1990 01 26.48	S	8.9	MM	8.0	B		20	3	8	1	225	CAM03
1990 01 27.46	S	8.4	AA	12.0	B		20		7	0.7	192	PEA
1990 01 28.47	S	9.5	MM	20	L	7	35	3	7	0.8	225	CAM03
1990 01 28.48	S	9.0	MM	8.0	B		20	4	7	1.0	225	CAM03
1990 01 31.45	S	9.1	AA	32	L	5	78	1.5	5	0.5	190	PEA

Comet Austin 1989c1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 07.66	S	11.1	MM	20	L	7	56	& 3.5	5			CAM03
1989 12 09.76	S	11.0	V	20	L	7	56	3	4			CAM03
1989 12 17.51	S	10.6	MM	20	L	7	56	2	7			CAM03
1989 12 17.54	S	10.6	MM	8.0	B		20	4	5			CAM03
1989 12 20.55	S	10.1	MM	20	L	7	56	3	8			CAM03
1989 12 20.56	S	10.1	MM	8.0	B		20	4	7			CAM03
1989 12 21.56	S	10 :	MM	8.0	B		20	6	5			CAM03
1989 12 21.56	S	10 :	MM	20	L	7	56	4	7			CAM03
1989 12 22.53	S	9.6	MM	8.0	B		20	8	7			CAM03
1989 12 22.54	S	9.6	MM	20	L	7	56	5	7			CAM03
1989 12 23.56	S	9.4	MM	5.0	B		12	6	7			CAM03

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 23.56	S	9.4	MM	20	L	7	56	7	8			CAM03
1989 12 23.57	S	9.4	MM	8.0	B		20	8	7			CAM03
1989 12 24.51	S	8.5	MM	20	L	7	35	5	9			CAM03
1989 12 24.52	S	8.5	MM	5.0	B		12	6	7			CAM03
1989 12 24.52	S	8.5	MM	8.0	B		20	10	7			CAM03
1989 12 27.49	S	9.6	MM	20	L	7	35	6	7			CAM03
1989 12 27.68	S	9.6	MM	8.0	B		20	8	6			CAM03
1989 12 27.68	S	9.6	MM	20	L	7	56	6	8			CAM03
1989 12 30.60	S	9.1	MM	20	L	7	56	10	8			CAM03
1990 01 14.54	S	8.3	MM	8.0	B		20	8	7			CAM03
1990 01 15.51	S	8.2	MM	8.0	B		20	10	8			CAM03
1990 01 15.52	S	8.5	MM	20	L	7	35	6	8	0.06	280	CAM03
1990 01 16.48	S	8.1	MM	20	L	7	56	10	8	0.06	280	CAM03
1990 01 16.49	S	8.0	MM	8.0	B		20	10	8			CAM03
1990 01 16.56	S	9.3	AA	20	L	4	45	4	5			PEA
1990 01 16.57	S	9.2	AA	8.0	B		20	5.5	4			PEA
1990 01 17.56	S	9.2	AA	8.0	B		20	5	5			PEA
1990 01 17.56	S	9.3	AA	20	L	4	45	4	6			PEA
1990 01 18.48	S	8.0	V	8.0	B		20	15	8			CAM03
1990 01 18.48	S	8.0	V	20	L	7	35	12	8	0.08	280	CAM03
1990 01 20.52	S	7.8	V	20	L	7	35	14	8	0.06	290	CAM03
1990 01 20.53	S	7.8	V	8.0	B		20	18	8			CAM03
1990 01 21.49	S	7.7	V	8.0	B		20	20	8			CAM03
1990 01 21.51	S	7.7	V	20	L	7	35	12	8	0.06	290	CAM03
1990 01 22.50	S	8.7	AA	12.0	B		20	5.5	6			PEA
1990 01 22.51	S	7.5	V	20	L	7	35	12	8	0.06	290	CAM03
1990 01 22.51	S	7.6	V	8.0	B		20	20	8			CAM03
1990 01 23.47	S	7.4	MM	20	L	7	35	20	8	0.33	280	CAM03
1990 01 23.48	S	8.7	AA	12.0	B		20	5	6			PEA
1990 01 23.49	S	7.2	MM	8.0	B		20	25	8	0.16	280	CAM03
1990 01 24.48	S	7.3	MM	20	L	7	35	20	8	0.25	290	CAM03
1990 01 24.49	S	7.1	MM	8.0	B		20	25	8			CAM03
1990 01 24.50	S	8.6	AA	12.0	B		20		6/			PEA
1990 01 25.46	S	8.5	AA	12.0	B		20	5.5	5/			PEA
1990 01 25.47	S	7.0	MM	8.0	B		20	15	8			CAM03
1990 01 26.48	S	7.1	MM	8.0	B		20	25	8			CAM03
1990 01 26.48	S	8.6	AA	12.0	B		20	5	6	0.1	95	PEA
1990 01 26.50	S	7.1	MM	20	L	7	35	20	8	0.33	290	CAM03
1990 01 27.47	S	8.5	AA	12.0	B		20	6	6	0.1	90	PEA
1990 01 30.46	S	8.3	AA	12.0	B		20	7	6	0.2	98	PEA
1990 01 31.06	S	9.0:	AA	31.8	L	4	63	4	1			KEE
1990 01 31.47	S	8.1	AA	6.3	B		9	9	5			PEA
1990 01 31.48	S	8.2	AA	12.0	B		20	7	5	0.2	90	PEA
1990 02 01.07	! S	8.4	AA	31.8	L	4	63	4	1			KEE
1990 02 15.55	S	8.0	AA	25	L	6	70	6	7	0.75	140	CLA
1990 02 18.53	S	7.4	AA	8.0	B		20	4	5			PEA
1990 02 18.55	M	7.9	AA	25	L	6	70	6	7	0.83		CLA
1990 02 19.42	S	7.2	A	5.0	B		10	5	5	0.07		GAR01
1990 02 19.52	S	7.4	AA	8.0	B		20	4	5/			PEA
1990 02 21.01	M	7.5:	AA	20.0	L	5	35	2.5	4			MOD
1990 02 22.42	S	6.9	A	5.0	B		10	5	6			GAR01
1990 02 22.50	M	7.5	AA	25	L	6	70	7	6	0.75		CLA
1990 02 22.53	S	7.3	AA	8.0	B		20	5.5	5			PEA
1990 02 23.08	S	7.5:	S	15.2	L	3	23					KEE
1990 02 24.52	S	6.9	AA	8.0	B		20	5	6			PEA
1990 02 25.42				25	L	7	76	5	6	0.5		GAR01
1990 02 25.42	S	6.9	A	5.0	B		10	5	6			GAR01
1990 02 25.50	M	7.4	AA	25	L	6	70	7	6	0.88	140	CLA
1990 02 25.52	S	6.9	AA	8.0	B		20	4	6			PEA

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 02 26.42	S	6.8	A	5.0	B		10					GAR01
1990 03 03.49	M	5.8	AA	25	L	6	70	6	6	0.5		CLA
1990 03 04.49	M	5.7	AA	25	L	6	70	6	6	0.42		CLA
1990 03 05.50	S	6.5	AA	8.0	B		20	4	6			PEA
1990 03 05.7	S	6.0:	S	8.0	B		20					HAS02
1990 03 07.49	M	5.5	AA	25	L	6	70	5	7	0.33		CLA
1990 03 07.50	S	6.6	AA	8.0	B		20	3.5	6			PEA
1990 03 11.50	S	6.5	AA	8.0	B		20	3	6			PEA
1990 03 12.50	S	6.6	AA	8.0	B		20	3	6			PEA
1990 03 13.49	S	6.4	AA	8.0	B		20	3	6/			PEA
1990 03 14.49	S	6.3	AA	8.0	B		20	2.5	7			PEA
1990 03 15.31	S	5.9	A	5.0	B		10					GAR01
1990 03 16.31	M	5.8	A	5.0	B		10	2	7			GAR01
1990 03 17.31	M	5.8	A	5.0	B		10					GAR01
1990 03 18.49	S	5.9	AA	8.0	B		20	2.5	6/			PEA
1990 03 19.49	S	5.9	AA	8.0	B		20	2.5	7			PEA
1990 03 20.49	S	5.8	AA	8.0	B		20	2	7			PEA
1990 03 23.48	S	5.8	AA	8.0	B		20					PEA
1990 03 24.02	S	6.0	AC	15.2	L	5	30	1.0	6			HER02
1990 03 25.03	M	6.0	AA	20.0	L	5	35	& 2	6			MOD
1990 03 26.80	S	5.1	SC	8.0	B		20	10	4			DAN01
1990 03 26.81	S	5.0:	S	10.8	L	4	22	& 2	4			BUS01
1990 03 27.81	S	4.8	SC	24.5	L	6	45	& 3.5	3			DAN01
1990 03 28.02	S	5.0	AC	15.2	L	5	30	3.0	7	0.08	98	HER02
1990 03 31.75	B	5.5:	AA	15.0	C	15	74		7			CHE03
1990 04 01.79	S	5.7	AC	8.0	B		20		4			HAS02
1990 04 03.17	S	4.8	AA	8.0	B		11	5	6			SPR
1990 04 03.87	S	5.0:	SC	8.0	B		11					KEE01
1990 04 04.17	B	5.1	S	6.4	B		8		7			GEE
1990 04 04.17	S	4.6	AA	8.0	B		11	6.5	6	0.25	135	SPR
1990 04 04.81	S	5.5	SC	8.0	B		20	5	2	&1.25	65	DAN01
1990 04 04.82	S	4.2	D	10.8	L	4	22	& 1	8	&0.1	50	BUS01
1990 04 04.82	S	5.0	SC	4.0	B		8	3	3			BEN03
1990 04 04.82	S	5.5:	S	8.0	B		15	& 5	4			SCH04
1990 04 04.83	S	4.4	AA	8.0	B		20	3.6	4			SHA02
1990 04 04.87	S	5.0	SC	8.0	B		11			?		KEE01
1990 04 05.78	B	4.3	AA	6.0	B	4	20	& 1.0	7			CHE03
1990 04 05.81	S	4.7	SC	8.0	B		20	& 7	8			DAN01
1990 04 05.82	S	4.1	D	10.8	L	4	22	& 1	8	&0.2	50	BUS01
1990 04 05.82	S	4.1	S	8.0	B		15	& 2	9			FEI
1990 04 06.82	S	4.0:	D	10.8	L	4	22					BUS01
1990 04 07.78	S	4.4	AA	8.0	B		15	2	8/	0.5	30	HAV
1990 04 07.81	S	5.3	SC	8.0	B	6	20	& 1.5	5	0.1	40	SCH07
1990 04 07.83	S	4.5	SC	6.3	B		9	5		0.3	40	AND01
1990 04 07.85	S	5.7	AA	8.0	B		20	1.8	8	0.5	50	SHA02
1990 04 07.87	S	4.8	SC	8.0	B		11			&0.4		KEE01
1990 04 08.17	S	4.5	AA	14.0	S	4	28	2.0	7			SPR
1990 04 08.78	S	4.7	AA	8.0	B		15	2	8	0.5	25	HAV
1990 04 08.79	B	4.6	AA	6.0	B	4	20	& 2.5	7	0.05		CHE03
1990 04 08.82	S	3.8	D	10.8	L	4	22	& 2	8	&0.3		BUS01
1990 04 08.82	S	4.0	SC	5.0	B		7					WAR01
1990 04 08.82	S	4.4	S	8.0	B		15	& 2	9			FEI
1990 04 08.83	S	4.5:	S	8.0	B		15	2	7			SCH04
1990 04 08.84	S	5.6	AA	8.0	B		20	1.8	8	0.7	40	SHA02
1990 04 08.87	S	4.8	SC	8.0	B		11					KEE01
1990 04 09.78	B	4.7	AA	6.0	B	4	20	& 2.0	7	0.05		CHE03
1990 04 09.82	S	3.8	D	10.8	L	4	22	2	8	&0.5	20	BUS01
1990 04 09.83	S	4.9:	S	8.0	B		15	2	7			SCH04
1990 04 10.79	B	4.8	AA	6.0	B	4	20		6			CHE03

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 04 10.79	S	4.0	AA	8.0	B		20		8			FRA
1990 04 12.81	S	3.5:	S	5.0	B		10					CAV
1990 04 12.85	S	3.3:	SC	8.0	B		20	8	4	&2.25	30	DAN01
1990 04 13.80	S	3.9	AA	8.0	B		20		8			FRA
1990 04 13.85	S	5.2	SC	8.0	B		20	1.8	8			SHA02
1990 04 14.14	S	4.5	SC	8.0	B		11			1.0		KEE01
1990 04 16.85	S	5.0:	SC	8.0	B		20	1.8	8			SHA02
1990 04 16.86	S	3.5	SC	8.0	B		20	7		1.0	360	AND01
1990 04 16.91	S	3.8	SC	8.0	B		20	5	5	2	350	EKL
1990 04 17.09	S	4.7	SC	8.0	B	6	20	& 1.5	7	1	0	SCH07
1990 04 17.13	S	4.0	AA	20	L	5	37		7			FRA
1990 04 18.13	S	5.0	AA	5.0	B		10		8		50	ABB
1990 04 18.14	S	5.1	AA	8.0	B		20	1.3	8	0.7	355	SHA02
1990 04 18.40	B	4.8	SC	5.0	B		10		9			MOD
1990 04 18.40	B	5.4	SC	20.0	L	5	35	0.6	8	&0.07	0	MOD
1990 04 19.09	S	5.2	S	5.0	B		10	2	7			COM
1990 04 19.10	S	4.4	SC	8.0	B		11			1.0		KEE01
1990 04 19.38	S	4.0	AA	20.0	T	10	88	0.69	6			SHA04
1990 04 19.39	S	5.0	AC	15.2	L	5	119	0.8	3	0.02	328	HER02
1990 04 19.40				20.0	L	5	35	0.6	8	0.08	350	MOD
1990 04 19.40	B	4.9	SC	5.0	B		10		9			MOD
1990 04 19.88	S	4.1	SC	5.0	B		7		6			BAC02
1990 04 20.02	E	5.1	A	20	R	15	60		7			ZHU
1990 04 21.45	B	5.2	SP	6.3	B		9					KEE
1990 04 21.45	I	4.7	SP	0.9	E		1					KEE
1990 04 22.13	B	4.9	SC	4.2	B		7					FIE
1990 04 22.37	B	4.7	AC	6.0	B		10					HER02
1990 04 22.37	B	4.7	AC	15.2	L	5	119	1.0	2	0.07	323	HER02
1990 04 22.40				20.0	L	5	35	& 3	8	&0.5	330	MOD
1990 04 22.40	B	4.9	SC	5.0	B		10	& 3	8	&0.5	330	MOD
1990 04 23.39				20.0	L	5	35	& 2.5	8	&1	325	MOD
1990 04 23.39	B	5.0	SC	5.0	B		10	& 3	8	2.8	325	MOD
1990 04 24.04	S	4.2	SC	6.3	B		9	6		1.0	340	AND01
1990 04 24.05	S	4.7	SC	5.0	B		7					WAR01
1990 04 24.35	S	4.0	AA	20.0	T	10	88	1.6	7	2.5	303	SHA04
1990 04 24.39				20.0	L	5	35	& 2	8	&0.75	325	MOD
1990 04 24.39	B	5.0	SC	5.0	B		10	& 3	8	&1.5	325	MOD
1990 04 24.97	S	4.5	SC	6.3	B		9	6		1.5	310	AND01
1990 04 25.01	S	5.5	SC	8.0	B	6	20	& 3.5	5	0.5	320	SCH07
1990 04 25.04	S	5.0	SC	5.0	B		7					WAR01
1990 04 25.09	S	4.7	AA	8.0	B		15	4.5	7	2.0	317	HAV
1990 04 25.10	S	4.3	AA	0.0	E		1					HAV
1990 04 25.10	S	4.7	S	8.0	B		20	7	2			CAV
1990 04 25.38				20.0	L	5	35	& 2	8	&0.25	324	MOD
1990 04 25.38	B	5.3	SC	5.0	B		10	& 3	8	&1	324	MOD
1990 04 26.01	B	5 :	A	11	L	7	32		7			ZHU
1990 04 26.05	S	5.1	SC	5.0	B		7					WAR01
1990 04 26.08	S	4.8	S	5.0	B		10	2	7			COM
1990 04 26.09	S	4.3	S	8.0	B		15	7	7	0.7	310	SCH04
1990 04 26.38				20.0	L	5	35	& 2	8	&0.75	318	MOD
1990 04 26.38	B	5.3	SC	5.0	B		10	& 3	8	&1	318	MOD
1990 04 27.08	S	4.5	SC	8.0	B		11			1.0	310	KEE01
1990 04 27.10	S	4.4	AA	0.0	E		1					HAV
1990 04 27.10	S	4.8	AA	8.0	B		15	6.0	7	2.7	311	HAV
1990 04 27.38				20.0	L		35	& 2	8	0.15	318	MOD
1990 04 27.38	B	5.3	SC	5.0	B		10	& 3	8			MOD
1990 04 27.45	B	5.2	AA	4.0	B		8			1	320	KEE
1990 04 28.09	B	4.8	S	5.0	B		10	8	7	0.7	300	ZAN01
1990 04 28.10	S	4.5	S	8.0	B		20					CAV

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 04 28.13	S	5.2	AA	5.0	B		10		7			ABB
1990 04 28.36	B	5.2	AC	6.0	B		10					HER02
1990 04 28.36	B	5.5	AC	15.2	L	5	119	2.1	7			HER02
1990 04 28.90	S	4.8	SC	8.0	B		20	4	3			EKL
1990 04 28.94	S	4.7	SC	6.3	B		9	7		1.0	310	AND01
1990 04 28.97	S	5.3	SC	8.0	B	6	20	3	4	0.3	300	SCH07
1990 04 29.05	S	5.1	AA	8.0	B		20	3.6	7	0.5	310	SHA02
1990 04 29.08	B	3.6	SC	6	I		12		6			RAD01
1990 04 29.09	S	4.4	AA	0.0	E		1					HAV
1990 04 29.09	S	4.7	AA	8.0	B		20		6	&2	285	DIO
1990 04 29.09	S	4.8	AA	8.0	B		15	5.5	6	2.9	306	HAV
1990 04 29.10	S	5.0	AA	5.0	B		10		7		45	ABB
1990 04 29.11	S	4.6	AA	8.0	B		20		6			FRA
1990 04 29.40	B	5.3	SC	5.0	B		10	& 2	7			MOD
1990 04 29.71	S	4.5	AC	8.0	B		20					TOM01
1990 04 29.98	S	5.0	SC	8.0	B		20	7		1.5	300	AND01
1990 04 30.00	B	5.2	AA	6.0	B	4	20	& 5	5	>0.5		CHE03
1990 04 30.00	B	6.0	A	11	L	7	32	3	6			ZHU
1990 04 30.01	S	5.5	SC	5.0	B		7	5	5	0.2	300	WAR01
1990 04 30.04	S	4.8	SC	8.0	B		20	5		0.2	330	KAR02
1990 04 30.07				10.0	B		14	4.0	6	2.13	305	HAS02
1990 04 30.07				20.3	T	10	51	6.6	5	>1.0	305	HAS02
1990 04 30.07	I	5.0	AC	0.8	E		1					HAS02
1990 04 30.07	S	5.2	A	3.5	B		7	& 5	6	&0.5		COM
1990 04 30.09	B	5.2	AA	6.3	B		9		8	1.3	292	KAM01
1990 04 30.09	S	4.9	SC	4.2	B		7					FIE
1990 04 30.09	S	5.2	SC	8.0	B		20	& 5.7	5			FIE
1990 04 30.46	S	4.9	AA	8.0	B		11	4.9	7	1.25	315	PRY
1990 04 30.46	S	5.0	AA	8.0	B		11	5	7	1.3	300	SPR
1990 04 30.92	B	6.1	A	11	L	7	32	3	6			ZHU
1990 04 30.99	S	5.5	SC	5.0	B		7	4	4			WAR01
1990 05 01.00	S	5.1	SC	6.3	B		9	8		0.5	290	AND01
1990 05 01.02	S	5.9	SC	8.0	B		20	5	5	&0.55	310	DAN01
1990 05 01.07	S	4.5	S	4.0	B		8	12	7			SCH04
1990 05 01.08	S	4.4	AA	0.0	E		1	12				HAV
1990 05 01.08	S	4.8	AA	8.0	B		15	7.0	6	4.1	302	HAV
1990 05 01.08	S	5.2	SC	8.0	B		20	& 5.7	5			FIE
1990 05 01.09	S	5.0	AA	8.0	B		20	3.6	7	0.3	305	SHA02
1990 05 01.10	B	5.3	S	5.0	B		7	8	4	0.4	303	COL02
1990 05 01.82	S	5.0	SM	8.0	B		20	5	4			CAM03
1990 05 01.99	B	5.1	AA	6.0	B	4	20	& 6	5	>0.5		CHE03
1990 05 01.99	S	5.0	SC	6.3	B		9	8		0.5	290	AND01
1990 05 02.00	B	6.0	A	20	R	15	60	4	7			ZHU
1990 05 02.07	S	4.2	S	4.0	B		8	15	6	1.3	275	SCH04
1990 05 02.07	S	5.0	AC	10.0	B		14	4.1	5	1.27	300	HAS02
1990 05 02.07	S	5.0	S	5.0	B		10	8	7	0.5	297	ZAN01
1990 05 02.08				10.8	L	4	22			&0.5		BUS01
1990 05 02.08	I	4.5:	S	0.8	E							BUS01
1990 05 02.08	S	4.1	S	10.8	L	4	17	&10	8	&1.5		BUS01
1990 05 02.08	S	4.2	S	4.0	B		7	& 9	8			BUS01
1990 05 02.08	S	4.4	S	1.8	B		3	& 8	8			BUS01
1990 05 02.08	S	5.0	A	5.0	B		10	5	6			COM
1990 05 02.09	B	5.3	S	5.0	B		7	8	4	0.5	287	COL02
1990 05 02.09	S	5.2	SC	8.0	B		20	13.9	4/			FIE
1990 05 02.10	S	5.0	AA	8.0	B		20		5	>2	280	DIO
1990 05 02.81	M	4.1	A	5.0	B		10					GAR01
1990 05 02.92	B	5.3	AA	6.0	B	4	20	& 6	5	0.4		CHE03
1990 05 02.99	S	5.0	S	5.0	B		10	8	7			ZAN01
1990 05 03.01	S	5.5	SC	5.0	B		7	2	5	0.2	300	WAR01

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 03.06	S	4.9	S	5.0	B		10	& 6	6			COM
1990 05 03.06	S	5.0	S	5.0	B		10	8	7	0.5	295	ZAN01
1990 05 03.07	B	5.7	SC	6	I		12		6			RAD01
1990 05 03.07	B	5.8	SC	5.0	B		10		1			AND03
1990 05 03.08	B	5.8	AA	6.3	B		9		8	0.9	294	KAM01
1990 05 03.09	S	5.2	SC	8.0	B		20	5.3	4			FIE
1990 05 03.31	B	5.5	AA	20.0	L	6	37	6.25	5	1.50	10	NOW
1990 05 03.35	B	5.4	HR	5.0	B		10	9.5	5	2.3	300	BOR
1990 05 04.00	E	6.3	A	20	R	15	60	5	6			ZHU
1990 05 04.00	S	5.6	SC	5.0	B		7					WAR01
1990 05 04.02	S	4.8	SC	6.3	B		9	8		0.5	290	AND01
1990 05 04.04	S	4.9	S	5.0	B		10	8	7			ZAN01
1990 05 04.07	S	4.6	S	4.0	B		8	8	7	0.7	280	SCH04
1990 05 04.08	B	4.7	S	10.8	L	4	22					BUS01
1990 05 04.08	B	5.6	AA	6.3	B		9		8	0.65	295	KAM01
1990 05 04.08	S	4.3	S	10.8	L	4	22	& 8	7/			BUS01
1990 05 04.09	B	5.2	S	5.0	B		7	15	4	0.7	285	COL02
1990 05 04.44	B	5.1	AA	4.0	B		8	8	5	2.3	290	KEE
1990 05 04.44	I	4.9	AA	0.9	E		1					KEE
1990 05 04.46	S	5.3	AA	8.0	B		11	6	5	1.3	335	SPR
1990 05 04.80				20	L	5	71	6	5	0.5	290	GAR01
1990 05 04.80	M	4.2	A	5.0	B		10					GAR01
1990 05 04.81	S	5.1	AA	8.0	B		15	& 4	5			SEA
1990 05 04.92	B	5.2	AA	6.0	B	4	20	& 6	4	0.2		CHE03
1990 05 04.98	S	5.6	SC	5.0	B		7	6		0.3	300	BEN03
1990 05 04.99	S	4.9	SC	8.0	B		20	9		0.5	290	AND01
1990 05 05.05	S	4.8	S	5.0	B		10	8	7			ZAN01
1990 05 05.07	B	5.5	SC	5.0	B		10		2			AND03
1990 05 05.07	S	4.5	S	4.0	B		8	8	8			SCH04
1990 05 05.07	S	4.6	S	8.0	B		15	10	7/	0.5	300	SCH04
1990 05 05.09	B	5.4	S	5.0	B		7	15	4			COL02
1990 05 05.10	S	5.0	AC	3.0	B		8		4			HAS02
1990 05 05.45	S	5.2	AA	8.0	B		11	6	6	1	330	SPR
1990 05 05.81	M	4.2	A	5.0	B		10					GAR01
1990 05 05.94	B	5.3	AA	6.0	B	4	20		4			CHE03
1990 05 05.94	S	5.2	SC	5.0	B		7					EKL
1990 05 06.07	M	5.2	SC	5.0	B		10		3			AND03
1990 05 06.10	S	5.4	AC	10.0	B		14		4	1.0		HAS02
1990 05 06.44	I	4.8	AA	0.9	E		1					KEE
1990 05 06.44	S	5.2	AA	8.0	B		11	6	6	1	325	SPR
1990 05 07.07	M	5.3	SC	5.0	B		10		5			AND03
1990 05 07.10	S	4.9	AA	8.0	B		20		6			FRA
1990 05 07.35	B	5.1	AC	15.2	L	5	30	5.5	4	0.14		HER02
1990 05 07.45	B	5.1	AA	4.0	B		8			1.5	285	KEE
1990 05 07.80				20	L	5	71	8	5	1.0		GAR01
1990 05 07.80	M	4.6:	A	5.0	B		10					GAR01
1990 05 08.39	S	5.5	AA	5.0	B		10	& 4	3			MOD
1990 05 08.39	S	6.0	AA	20.0	L	5	35	& 2.5	5			MOD
1990 05 08.44	S	5.4	AA	8.0	B		11	6	5			SPR
1990 05 08.75	S	6.1	SC	8.0	B		11	5	1			JON
1990 05 08.84	S	5.1	AA	5.0	B							CLA
1990 05 08.85	M	5.2	AA	25	L	6	70	9	5	0.58	58	CLA
1990 05 08.99	B	5.1	AA	5.0	B	4	7		4			CHE03
1990 05 08.99	B	6.3:	A	20	M	10	32	4	6			ZHU
1990 05 09.75	S	6.0	SC	8.0	B		11					JON
1990 05 09.80	S	5.0	AA	8.0	B		15					SEA
1990 05 10.07	M	6.7	SC	5.0	B		10		4			AND03
1990 05 10.44	S	5.4	AA	8.0	B		11	6	4			SPR
1990 05 11.79	M	4.7	A	5.0	B		10					GAR01

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 12.29	S	4.5	AA	20.0	T	10	88	2.4	4			SHA04
1990 05 12.34	B	5.7	HR	5.0	B		10	11	5			BOR
1990 05 12.79	M	4.8	A	5.0	B		10					GAR01
1990 05 12.96	S	5.4	SC	8.0	B		20	11		0.5	280	AND01
1990 05 13.76	M	4.8	A	5.0	B		10					GAR01
1990 05 13.78				20	L	5	71	6	5	0.5		GAR01
1990 05 13.92	E	6.6	A	20	R	20	60	7	5			ZHU
1990 05 14.35	B	4.8	AC	6.0	B		10		2			HER02
1990 05 14.37				20.0	L	5	35	& 4	6			MOD
1990 05 14.37	S	5.5	AA	5.0	B		10	& 7	5			MOD
1990 05 15.01	S	5.6:	S	8.0	B		20	15	3	2.2	279	LAN01
1990 05 15.04	S	4.9	S	4.0	B		8	20	3	0.2	260	SCH04
1990 05 15.29	S	4.8	AA	20.0	T	10	88	2.4	3			SHA04
1990 05 15.33	B	5.1	AC	15.2	L	5	30	7.7	3			HER02
1990 05 15.44	I	5.1	AA	0.9	E		1					KEE
1990 05 15.44	M	5.3	AA	4.0	B		8	17	3			KEE
1990 05 16.02	S	5.1	AA	8.0	B		20		5			DIO
1990 05 16.10	B	5.8	S	5.0	B		7	12	3			COL02
1990 05 16.75				4.5	R	6	13	6	3			JON
1990 05 16.75	S	5.5	SC	5.0	R		7					JON
1990 05 16.84	S	5.0	AA	3.0	R		6					CLA
1990 05 16.85	M	5.1	AA	25	L	6	70	9	5	0.7		CLA
1990 05 17.00	S	4.8	S	5.0	B		10		1			ZAN01
1990 05 17.05	S	4.9	S	4.0	B		8	20	4	0.2	270	SCH04
1990 05 17.06	M	6.0	SC	5.0	B		10		3			AND03
1990 05 17.07	B	5.6	S	5.0	B		7	9	4			COL02
1990 05 17.07	S	5.0	AA	5.0	B		10	4	4			ABB
1990 05 17.08	S	5.3	AA	8.0	B		15	14	5	0.7	300	PAN
1990 05 17.76				4.5	R	6	13	10	5			JON
1990 05 17.76	S	5.3	SC	5.0	R		7					JON
1990 05 17.94	S	5.5	SC	8.0	B		20	15				AND01
1990 05 17.97	S	6.1	SC	5.0	B		7					WAR01
1990 05 18.04	S	4.9	AA	0.0	E		1	11	4			LOO01
1990 05 18.13	B	6.3	SC	5.0	B		10		4			AND03
1990 05 18.28	S	5.1	HR	0.0	E		1					BOR
1990 05 18.28	S	5.3	HR	5.0	B		10	15	4			BOR
1990 05 18.44	S	5.1	AA	8.0	B		11	9	5			SPR
1990 05 18.49	B	6.3	SC	5.0	B		10		4			RAD01
1990 05 18.69	M	5.0	A	5.0	B		10					GAR01
1990 05 18.76	S	5.1	AA	2.5	B		2					SEA
1990 05 18.95	S	6.1	SC	5.0	B		7	10				BEN03
1990 05 19.02	S	5.1	AA	8.0	B		20	10	5	0.5	270	DIO
1990 05 19.05	S	5.3	AA	0.0	E		1	13	4			LOO01
1990 05 19.06	M	6.0	SC	15.5	L	5	36	14	5			MAR02
1990 05 19.08				10.0	B		14	10.4	3			HAS02
1990 05 19.08	S	5.8	AC	3.0	B		8					HAS02
1990 05 19.14	B	6.2	SC	5.0	B		10		3			AND03
1990 05 19.25				20.0	L	5	35	& 7	6	&0.3	250	MOD
1990 05 19.25	S	5.6	SC	5.0	B		10	&12	4	&0.5	250	MOD
1990 05 19.44	K	4.9	AA	4.0	B		8	19	2			KEE
1990 05 19.71	M	5.0	A	5.0	B		10					GAR01
1990 05 19.76	S	5.0	AA	0.0	E		1					CLA
1990 05 19.76	S	5.0	AA	3.0	R		6					CLA
1990 05 19.77	M	5.1	AA	12.5	R	5	32	16	6			CLA
1990 05 19.78	M	5.1	AA	25	L	6	70	12	6	0.83	98	CLA
1990 05 19.79	S	5.2	V	8.0	B		20	20	5	1	200	CAM03
1990 05 19.93	B	7.0:	A	8	R	10	27	8	5			ZHU
1990 05 19.95	B	5.6	AA	5.0	B	4	7	&13	3	0.2		CHE03
1990 05 19.96	S	5.7	SC	14.0	S		56	10				WAR01

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 19.99	S	6.0	SC	8.0	B		11					KEE01
1990 05 20.03	S	4.4	AA	0.0	E		1	24				HAV
1990 05 20.03	S	4.8	AA	5.0	B		10	22	4	2.0	270	HAV
1990 05 20.03	S	6.1	SC	8.0	B		20	& 4.9	1			FIE
1990 05 20.04	S	5.7	AA	6.3	B		9	21	3/			KAM01
1990 05 20.10	S	5.3:	AA	8.0	B		20	10	3			DIO
1990 05 20.23	S	5.5	AA	20.0	T	10	88	2.4	3			SHA04
1990 05 20.68	M	5.1	A	5.0	B		10					GAR01
1990 05 20.75	S	4.9	AA	0.0	E		1					CLA
1990 05 20.75	S	4.9	AA	3.0	R		6					CLA
1990 05 20.76	M	5.0	AA	12.5	R	5	32	20	6			CLA
1990 05 20.76	S	5.5	SC	5.0	R		7					JON
1990 05 20.77	M	5.0	AA	25	L	6	70	14	6	0.75		CLA
1990 05 21.03	S	5.0	S	4.0	B		8	20	5	0.3	270	SCH04
1990 05 21.04	S	5.7	AC	10.0	B		14	16.2	3			HAS02
1990 05 21.44	B	6.4	SC	5.0	B		10		4			AND03
1990 05 21.72				5.0	R		7	12	5/			JON
1990 05 21.72	S	5.1	SC	4.9	B		3					JON
1990 05 21.81	S	4.9	AA	0.0	E		1					CLA
1990 05 21.81	S	4.9	AA	3.0	R		6					CLA
1990 05 21.82	M	5.0	AA	12.5	R	5	32	20	5			CLA
1990 05 21.82	M	5.0	AA	25	L	6	70	15	5	0.67		CLA
1990 05 22.01	S	5.2	AA	5.0	B		10	17	3			ZAN01
1990 05 22.02	S	5.1	AA	8.0	B		20	20	2	0.5	260	DIO
1990 05 22.02	S	5.4	AA	8.0	B		15	18	4	1.0	325	PAN
1990 05 22.03	S	5.2	S	5.0	B		10	& 5		1.5		COM
1990 05 22.04	S	5.2	S	4.0	B		8	15	3			SCH04
1990 05 22.07	B	6.8	S	10.3	R	7	40	12	3			COL02
1990 05 22.45	B	6.4	SC	5.0	B		10		3			AND03
1990 05 23.01	S	5.3	AA	5.0	B		10	13	3			ZAN01
1990 05 23.02	B	6.2	SC	5.0	B		10		4			AND03
1990 05 23.02	S	5.7	AA	8.0	B		10	11	4			SHA02
1990 05 23.03	S	6.4	SC	8.0	B		20	11.0	0			FIE
1990 05 23.05	S	5.4:	S	4.0	B		8	&25	3			SCH04
1990 05 23.06	S	5.0	S	0.0	E		1	&10	3	2.5		COM
1990 05 23.07	B	5.5	AA	5.0	B		7	16	4			COL02
1990 05 23.28				40	L	7	119	& 5	6	&0.2	255	MOD
1990 05 23.28	I	5.3	SC	0.7	E		1	& 5	0			MOD
1990 05 23.28	M	5.4	SC	5.0	B		10	12	3			MOD
1990 05 23.43	K	5.0	SP	4.0	B		8	17	2	0.25	250	KEE
1990 05 23.63	S	5.2	AA	0.0	E		1					SEA
1990 05 23.85	S	4.8	AA	0.0	E		1					CLA
1990 05 23.85	S	4.8	AA	3.0	R		6					CLA
1990 05 23.86	M	4.9	AA	25	L	6	70	18	5	0.8		CLA
1990 05 23.94	S	6.3	SC	8.0	B		20	&27.5	1			DAN01
1990 05 23.97	S	5.5	AC	10.0	B		14		3			HAS02
1990 05 24.01	S	5.3	AA	5.0	B		10	17	2			ZAN01
1990 05 24.02	S	5.5	AA	8.0	B		15	19	4	0.7	300	PAN
1990 05 24.06	B	5.6	S	5.0	B		7	14	8			COL02
1990 05 24.23	B	5.4	SC	5.0	B		10	8.5	4			MOD
1990 05 24.33				20.0	L	5	35	8.5	5	&0.25	240	MOD
1990 05 24.33	B	5.3	SC	0.7	E		1	& 7	1			MOD
1990 05 24.33	M	5.4	SC	5.0	B		10	11.5	4			MOD
1990 05 24.46	B	6.5	SC	5.0	B		10		4			RAD01
1990 05 24.68		5 :	V	0.7	E		21	30	5			CAM03
1990 05 24.68	S	5.2	V	20	L	7	35	20	5			CAM03
1990 05 24.68	S	5.2	V	20	L	7	56	15	6			CAM03
1990 05 24.69	S	5.2	V	8.0	B		20	40	6			CAM03
1990 05 24.75				5.0	R		7	15	6			JON

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 24.75	S	5.1	SC	2.3	B		3					JON
1990 05 24.94	S	4.9	S	4.0	B		7	&30	5	>1.5		BUS01
1990 05 24.98	S	5.3	AA	5.0	B		10	17	2			ZAN01
1990 05 25.02	B	5.5	S	5.0	B		7	11	6			COL02
1990 05 25.02	B	6.3	SC	5.0	B		10		4			AND03
1990 05 25.03	S	5.4	S	4.0	B		8	20	5			SCH04
1990 05 25.03	S	6.0	AA	8.0	B		10	12	4			SHA02
1990 05 25.05	S	5.3	S	4.0	B		7	24	5/			BUS01
1990 05 25.35	S	4.6	AC	15.2	L	5	30		1/			HER02
1990 05 25.38	S	6.1	AA	8.0	B		11	6.6	3			PRY
1990 05 25.43	K	5.0	AA	4.0	B		8	20	2			KEE
1990 05 25.65	M	4.5	A	0.0	E		1					GAR01
1990 05 25.69	S	5.2	V	5.0	B		12	40	5			CAM03
1990 05 25.70		5.0	V	0.7	E		1	60	4			CAM03
1990 05 25.70	S	5.2	V	8.0	B		20	30	4			CAM03
1990 05 25.70	S	5.2	V	20	L	7	35	25	3			CAM03
1990 05 25.72	S	5.0	SC	2.3	B		3					JON
1990 05 25.96	S	5.4	AA	5.0	B		10	17	2			ZAN01
1990 05 25.97	S	6.2	SC	8.0	B		20	& 7.4	1			FIE
1990 05 25.98	B	5.3	AA	5.0	B	4	7	&16	3			CHE03
1990 05 26.00	S	5.2	S	4.0	B		8	22	3			SCH04
1990 05 26.05	B	5.4	S	5.0	B		7	15	5			COL02
1990 05 26.05	S	5.8	AA	6.3	B		9	18	2			KAM01
1990 05 26.06	S	5.6	AA	8.0	B		15	24	3	1.0	295	PAN
1990 05 26.22	B	5.8	SC	5.0	B	4	7	23	3			SIM
1990 05 26.27	S	5.2	HR	5.0	B		10	20	4	4.0	316	BOR
1990 05 26.31	M	5.4	SC	5.0	B		10			3.33	320	HAL
1990 05 26.41	K	5.1	AA	4.0	B		8	22	2			KEE
1990 05 26.42	E	5.4	SP	15.2	L	3	16					KEE
1990 05 26.42	S	4.8	AA	0.9	E		1					KEE
1990 05 26.45	S	6.3	AA	8.0	B		11	6.3	3			PRY
1990 05 26.73	S	5.5	SC	2.3	B		3					JON
1990 05 26.98	S	5.7	VB	8.0	B		10	12	3			SHA02
1990 05 27.00	S	5.3	S	5.0	B		10	17	2			ZAN01
1990 05 27.01	S	5.7	S	5.0	B		7	25	3			LAN01
1990 05 27.05	B	5.5	S	5.0	B		7	15	4			COL02
1990 05 27.05	S	5.6	AA	8.0	B		15	36	4	1.7	315	PAN
1990 05 27.05	S	5.9	AA	6.3	B		9	19	2/			KAM01
1990 05 27.15	B	5.5	AC	10.6	L	4	20	8.25	3			NOW
1990 05 27.24	S	5.8	SC	2.3	B		3					JON
1990 05 27.27	S	5.8	SC	5.0	B		10	&10	2			MOD
1990 05 27.29				0.0	E		1	60	1/	&2	312	BOR
1990 05 27.29	S	5.5	HR	5.0	B		10	22	4	1.7	312	BOR
1990 05 27.53	S	5.5	V	5.0	B		12	20	4			CAM03
1990 05 27.74				5.0	R		7	14	2			JON
1990 05 27.80	S	6.0	V	5.0	R		8	30	5			CAM03
1990 05 27.80	S	6.0	V	20	L	7	35	15	7			CAM03
1990 05 27.81	S	5.5	V	8.0	B		20	25	5			CAM03
1990 05 28.02	S	5.1	AA	0.0	E		1	18				HAV
1990 05 28.02	S	5.3	AA	5.0	B		10	20	3/			HAV
1990 05 28.02	S	6.1	AC	10.0	B		14	15.0	2			HAS02
1990 05 28.04	S	5.4	A	5.0	B		10	&20	2/	&4	210	COM
1990 05 28.05	S	6.3	S	6.3	B		9	13.5	2			KAM01
1990 05 28.21	S	6.5	AA	20.0	T	10	88	1.5	3			SHA04
1990 05 28.31	S	5.6	AC	15.2	L	5	30		0/			HER02
1990 05 28.54	S	6.2	V	20	L	7	35	15	7			CAM03
1990 05 28.73	S	5.4	SC	2.3	B		3					JON
1990 05 28.73	S	5.4	SC	5.0	R		7	13	2			JON
1990 05 28.93	B	5.5:	AA	5.0	B	4	7	&25	3			CHE03

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 28.98	S	5.2	S	5.0	B		10	26	2			MAA
1990 05 28.98	S	5.7	S	4.0	B		8	20	3			SCH04
1990 05 28.98	S	5.7	S	5.0	B		10	17	2			ZAN01
1990 05 28.99	B	6.5	AC	5.0	B		7	12	3			MOE
1990 05 29.05	S	6.3	AA	6.3	B		9	16.5	3			KAM01
1990 05 29.54	S	6.5	V	20	L	7	35	15	6			CAM03
1990 05 29.74				5.0	R		7	14	2	0.6	145	JON
1990 05 29.74	S	5.4	SC	5.0	B		3					JON
1990 05 30.03	S	5.5	A	5.0	B		10	&18	2	&3	210	COM
1990 05 30.05	S	5.0	AA	0.0	E		1	24				HAV
1990 05 30.05	S	5.3	AA	5.0	B		10	22	3	1.5	323	HAV
1990 05 30.05	S	6.3	S	6.3	B		9	15	2/			KAM01
1990 05 30.35				20.0	L	5	35	3.5	4	0.1	295	MOD
1990 05 30.35	S	6.1	SC	5.0	B		10	10	2			MOD
1990 05 30.38	K	5.1	AA	4.0	B		8	16	2	0.6	320	KEE
1990 05 30.39	I	4.8	AA	0.9	E		1					KEE
1990 05 30.73	S	6.0	SC	5.0	B		3					JON
1990 05 31.02	S	6.2	AC	10.0	B		14	10.5	3	1.50	325	HAS02
1990 05 31.02	S	6.3	AC	3.0	B		8					HAS02
1990 05 31.21	S	7.2	AA	20.0	T	10	88	1.4	2			SHA04
1990 05 31.31				20.0	L	5	35	7	5	1.1	320	MOD
1990 05 31.31				31.7	L	6	55	11	5	0.75	335	BOR
1990 05 31.31	M	6.1	SC	5.0	B		10	11	3	0.9	320	MOD
1990 05 31.31	S	5.8	HR	5.0	B		10	21	4	1.4	335	BOR
1990 05 31.71	S	5.7	SC	5.0	B		3					JON
1990 06 01.00	S	6.1	S	6.3	B		9	13.5	2			KAM01
1990 06 01.04	! S	6.9	VB	8.0	B		20	8	2			SHA02
1990 06 01.05	S	5.5	A	5.0	B		10	&10	2	&1	208	COM
1990 06 01.21	B	6.5	AC	10.0	B	4	20	11.25	3			NOW
1990 06 01.30				20.0	L	5	35	7	5	1.3	325	MOD
1990 06 01.30				31.7	L	6	55	6.5	3/	1.25	325	BOR
1990 06 01.30	M	6.1	SC	5.0	B		10	11	3	1.2	325	MOD
1990 06 01.30	S	5.8	HR	5.0	B		10	21	4	3.0	325	BOR
1990 06 01.40	I	5.1	AA	0.9	E		1					KEE
1990 06 01.40	K	5.3	AA	4.0	B		8	21	2	0.8	315	KEE
1990 06 01.40	M	6.1	SC	5.0	B		10			0.83	325	HAL
1990 06 01.88	S	6.1	AA	8.0	B		20	10	5	2.2	324	PEA
1990 06 02.03	S	6.2	AA	3.0	B		8					HAS02
1990 06 02.04	S	5.6	A	5.0	B		10	&10	2	2.5	210	COM
1990 06 02.08	O	6.5	AA	33.5	L	4	100	5				RIP
1990 06 02.76	M	5.1	A	5.0	B		10			4		GAR01
1990 06 02.83	S	5.2	AA	3.0	R		6					CLA
1990 06 02.84	M	5.5	AA	25	L	6	70	10	6	2.3	327	CLA
1990 06 02.84	S	6.5	V	8.0	B		20	10	3	4	260	CAM03
1990 06 03.09	K	7.0	SC	6.0	B		20	50	2			MAR02
1990 06 03.48	B	7.2	SC	5.0	B		10		1			AND03
1990 06 03.85	S	5.2	AA	3.0	R		6					CLA
1990 06 03.86	M	5.4	AA	25	L	6	44	10	6	2.4	330	CLA
1990 06 04.32	M	5.7	A	7.0	B		10	28		2.0	331	DEA
1990 06 04.47	B	7.8	SC	5.0	B		10		1			AND03
1990 06 04.69	M	6.2	A	5.0	B		10			2.5		GAR01
1990 06 04.69	S	6.2	SC	5.0	R		7	14	0/			JON
1990 06 04.76	P	7 :		6.7	A	4		10	6	5.5	330	CAM03
1990 06 04.76	S	6.1	AA	5.0	B		10	7	4	3.3	335	SEA
1990 06 04.77		6 :		0.7	E		1	5	5	3.5	330	CAM03
1990 06 04.77	S	6.7	S	20	L	7	35	10	7	2.4	330	CAM03
1990 06 04.83	S	6.7	S	8.0	B		20	12	6	4	330	CAM03
1990 06 04.86	S	5.3	AA	3.0	R		6					CLA
1990 06 04.87	M	5.6	AA	25	L	6	70	9	6	2.9	330	CLA

Comet Austin 1989c1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 06 05.01	S	6.3	AA	8.0	B		15	18	3	1.7	335	PAN
1990 06 05.27	M	6.6	SC	20.0	L	5	35	& 4	4			MOD
1990 06 05.31	S	5.7	HR	5.0	B		10	24	3	2.5	326	BOR
1990 06 05.34	M	6.1	SC	5.0	B		10	8	1	1.4	325	MOD
1990 06 05.47	B	8.1	SC	5.0	B		10		1			AND03
1990 06 05.82	S	6.7	S	8.0	B		20	10	6	4	320	CAM03
1990 06 06.83		6.5:		8.0	B		20	8	6	2	320	CAM03
1990 06 10.35	M	8.2	SC	5.0	B		10		2			AND03
1990 06 11.93	M	6.6	A	7.0	B		10	20		1.0	335	DEA
1990 06 12.14	S	6.8	SC	5.0	B		10	10	1			MOD
1990 06 12.35	S	9.9	GA	31.7	L	5	86	13	1			JON
1990 06 12.40	K	6.1	AA	4.0	B		8	20	1	1.3	345	KEE
1990 06 12.92	M	7.6	S	7.0	B		10	14		0.33	325	DEA
1990 06 13.35	S	7.1	AA	8.0	B		15					SEA
1990 06 13.35	S	8.7	GA	7.8	R	8	30	13	0			JON
1990 06 13.37	S	9.7	GA	31.7	L	5	86		1	0.3	340	JON
1990 06 14.36	S	10.0	GA	31.7	L	5	86	2.5	2	0.5	350	JON
1990 06 14.40	S	7.5	SC	8.0	B		20	8	4	2	355	CAM03
1990 06 14.41	S	7.5	SC	20.3	L	7	35	6	5	1.3	350	CAM03
1990 06 14.58	S	8.9	AA	8.0	B		20	7.5	2			PEA
1990 06 15.36	S	10.0	GA	31.7	L	5	86	2.5	1	0.3	353	JON
1990 06 15.51	S	9.1	AA	8.0	B		20	6	2			PEA
1990 06 15.97	O	9.0	AA	33.5	L	4	100	1				RIP
1990 06 16.18	S	7.5	SC	5.0	B		10	7	0			MOD
1990 06 16.28	S	7.9	S	5.0	B		10		1			HAL
1990 06 16.40	S	9.9	GA	31.7	L	5	86	2.5	1/	0.3	0	JON
1990 06 16.92	S	8.4	AA	8.0	B		15	6.0	1/			HAV
1990 06 17.46	S	8.5	SM	8.0	B		20	6	4	1	315	CAM03
1990 06 17.47	S	8.5	SM	20.3	L	7	56	4	3	1	350	CAM03
1990 06 17.91	S	10.0	SC	14.0	S	4	28	4				WAR01
1990 06 17.99	S	9.2	AA	15	L	4	26	& 8	4			PER01
1990 06 18.42	S	9.4	SM	20.3	L	7	56	8	2	0.08	345	CAM03
1990 06 18.94	M	7.6	S	7.0	B		10					DEA
1990 06 19.28	S	8.6	NP	5.0	B		10					HAL
1990 06 19.40				25	L	4	114	3	1	1		GAR01
1990 06 19.49	S	9.6	SM	20.3	L	7	35	10	1	0.08		CAM03
1990 06 19.93	M	7.8	S	7.0	B		10					DEA
1990 06 22.44	S	9.6	AC	15.2	L	5	47	8	2			SEA
1990 06 22.44	S	10.8	GA	31.7	L	5	86	1.25	1			JON
1990 06 23.27	S	9.4	AC	41	L	4	83		0/			HAL
1990 06 23.33	S	10.4	GA	31.7	L	5	86	2	1			JON
1990 06 24.38	S	9.7	AC	15.2	L	5	47	8				SEA
1990 06 24.45	S	10.4	GA	31.7	L	5	86	2	1			JON
1990 06 24.54	S	10.0	AA	20	L	4	45	3.5	0/			PEA
1990 06 24.94	M	8.4	S	7.0	B		10					DEA
1990 06 25.55	S	10.3	AA	20	L	4	45	4	0			PEA
1990 06 26.56	S	10.5	AA	20	L	4	45	4	0			PEA
1990 07 11.43	S	12.5	LM	20	L	7	56	1	0			CAM03
1990 07 13.22	I[12	:		41	L	4	83					HAL
1990 07 24.23	I[12.0			41	L	4	83					HAL

Comet Skorichenko-George 1989e1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 22.77	S[12.9		VB	30	R	18	235					SHA02
1989 12 24.72	S	10.3	A	28.0	T	10	125		3			COM
1989 12 28.82	S	9.5:	AA	8.0	B		20	4	2			DIO
1989 12 29.82	S	9.6:	AA	8.0	B		20	3	3			DIO
1990 01 13.76	S	9.1	AA	8.0	B		15	4.5	3			HAV

Comet Skorichenko-George 1989e1 [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 13.77	S	9.1	AA	8.0	B		20		3			DIO
1990 01 17.80	! S	11.0	VB	20	R	14	40	1.8	3			SHA02
1990 01 20.75	S	9.5	AA	8.0	B		15	4.0	2/			HAV
1990 01 24.75	S	10.0	A	20.0	T	10	80	& 2	3			COM
1990 01 28.76	S	9.9	A	20.0	T	10	80	2	3			COM
1990 01 31.77	S	10.7	VB	20	R	14	40	2.7	2			SHA02
1990 02 01.09	S	9.8	AA	15.2	L	3	23	3	2			KEE
1990 02 09.80	S	10.0	A	28.0	T	10	112	& 2	2			COM
1990 02 12.79	S	9.9	AA	20	R	14	40	3.4	2			SHA02
1990 02 18.05	M	10.0	AA	20.0	L	5	35	1.5	3			MOD
1990 02 20.77	S	8.5	S	10.0	B		14	3.8	4			HAS02
1990 02 20.77	S	8.6	AA	8.0	B		15	6.5	3			HAV
1990 02 21.04	M	9.7	AA	20.0	L	5	35	2.5	3			MOD
1990 02 22.80	S	9.5:	A	11.0	L	7	32	& 5	0			SCH04
1990 02 22.82	S	10.1	A	20.0	T	10	80	& 2	2/			COM
1990 02 26.67	B	9.0	S	8.0	B		10					CHU
1990 03 17.82	S	10.0	A	20.0	T	10	80	& 2	2			COM
1990 03 19.79	S	8.4	AA	8.0	B		15	6.5	3			HAV
1990 03 21.06	M	9.5	AA	20.0	L	5	35	2.0	5			MOD
1990 03 21.79	S	8.4	AA	8.0	B		15	6.0	2/			HAV
1990 03 22.80	S	8.3	AA	15.0	L	6	36		3			DIO
1990 03 24.88	S	9.6	AA	20	R	14	40	3.5	2			SHA02
1990 03 25.84	S	9.6	AA	20	R	14	40	3.9	2			SHA02
1990 03 26.79	S	8.2	AA	8.0	B		20	6	4			DIO
1990 04 13.82	S	9.0	AA	20.0	T	10	80	0.5	2			DIO
1990 04 19.08	M	9.6	AA	20.0	L	5	35	1.5	2			MOD
1990 04 29.85	S	10.0:	S	20.3	T	10	51					HAS02

Comet Cernis-Kiuchi-Nakamura 1990b

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 14.79	B	9.1	S	12.0	R	5	35	& 2	3			CHE03
1990 03 18.81	S	8.3	A	20.0	T	10	80	2.5	4			COM
1990 03 18.81	S	8.7	AC	20.3	T	10	51	1.8	4			HAS02
1990 03 18.84	S	8.8	A	11.0	L	7	32	3	2			SCH04
1990 03 20.11	B	8.4	AA	15.2	L	3	23	2	3			KEE
1990 03 21.07	M	8.7	AA	20.0	L	5	35	2.5				MOD
1990 03 21.80	S	8.1	AA	8.0	B		15	4.5	4/	0.17	25	HAV
1990 03 21.81	S	8.4	AC	20.0	T	10	80	1.5	4	0.13	45	DIO
1990 03 22.83	S	8.0	AA	15.0	L	6	36	2.5	5			DIO
1990 03 22.95	S	8.0:	AA	20	R	14	40	2.0	5			SHA02
1990 03 23.80	S	8.2	AC	10.0	B		14	4.5	4			HAS02
1990 03 24.81	S	8.1	AC	10.0	B		14	2.9	4			HAS02
1990 03 24.86	S	7.8	AA	8.0	B		20					SHA02
1990 03 24.86	S	7.9	AA	8.0	B		10	2.7	5			SHA02
1990 03 25.07	M	8.9	AA	20.0	L	5	35	3	4			MOD
1990 03 25.17	S	7.6	AA	12.0	R	4	20	3	5			LOO01
1990 03 25.85	S	7.9	AA	8.0	B		20	2.7	4			SHA02
1990 03 26.06	M	8.9	AA	20.0	L	5	35	2	4			MOD
1990 03 26.81	S	8.1	AC	8.0	B		20	2.5	4	0.1	20	DIO
1990 03 26.86	S	8.6	A	20.0	T	10	80	& 2.5	3			COM
1990 03 27.05	M	9.3	AA	20.0	L	5	35	2	3			MOD
1990 03 27.83	B	8.8	S	15.0	C	15	74	& 3	3			CHE03
1990 03 28.82	B	9.2	AA	15.0	C	15	74	& 3	3			CHE03
1990 03 31.87	B	9.2	AA	14.0	R	9	38		3			CHE03
1990 04 11.79	B	9.3	AA	12.0	R	5	35		3			CHE03
1990 04 13.78	B	9.1	AA	14.0	R	9	38	& 5	3	0.05		CHE03
1990 04 13.88	S	9.5	AA	20.0	T	10	80	1	7			DIO
1990 04 19.11	S	10.0	AA	20.0	L	5	35	2	0			MOD

Comet Cernis-Kiuchi-Nakamura 1990b [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 04 29.85		[10.5		20.3	T	10	51					HAS02
1990 05 19.94		[10.5		12.0	R	5	35					CHE03

Comet Levy 1990c

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 23.08	S	10.3	AC	25.4	J	6	88	1.5	4/			BOU
1990 05 23.08	! S	11.6	VB	30	R	18	235	0.6	2			SHA02
1990 05 23.80	S	10.4	AA	25.4	L	4	71	3	5			SEA
1990 05 23.87	S	10.3	AA	25	L	6	70	3	6			CLA
1990 05 27.07	S	10.2	AC	25.4	J	6	58	2.0	3			BOU
1990 05 27.44	S	9.7	AC	20	L	6	55	2.6	4			BOR
1990 05 27.45	M	9.8	AC	20	L	6	55					HAL
1990 05 27.83	S	10.6	LM	20	L	7	56	4	3			CAM03
1990 05 28.04	S	10.1	AC	25.4	J	6	58	2.1	4			BOU
1990 05 28.04	S	10.3	AC	20.3	T	10	51	1.8	4			HAS02
1990 05 29.05	M	10.0	AC	25.4	J	6	58	2.5	4			BOU
1990 05 29.83	S	10.5	LM	20	L	7	56	4	5			CAM03
1990 05 30.06	S	10.1	AC	20.3	T	10	51	1.4	4			HAS02
1990 05 31.04	S	9.8	AC	10.0	L	10	38	2.6	4			BOU
1990 05 31.32	S	9.7	AC	31.7	L	6	68	2.8	5			BOR
1990 05 31.35	M	9.5	GA	20.0	L	5	35	3	3			MOD
1990 06 01.06	S	11.0:	VB	30	R	18	95	1.0	3			SHA02
1990 06 01.07	M	9.7	AC	25.4	J	6	58	2.5	3/			BOU
1990 06 01.08	S	9.8	AC	8.0	B		15					BOU
1990 06 01.32	S	9.8	AC	31.7	L	6	68	2.5	5			BOR
1990 06 01.35	M	9.5	GA	20.0	L	5	35	2.5	4			MOD
1990 06 01.35	M	9.7	GA	40	L	7	52	2.5	4			MOD
1990 06 01.42	M	9.6	AC	41	L	4	83					HAL
1990 06 02.06	S	9.6	AC	25.4	J	6	58	2.5	4			BOU
1990 06 02.83	S	10.1	LM	20	L	7	56	4	6			CAM03
1990 06 02.88	S	10.0	AA	25	L	6	70	4	6			CLA
1990 06 03.89	S	9.9	AA	25	L	6	70	4	6			CLA
1990 06 04.83	S	10.0	LM	20	L	7	56	2	8			CAM03
1990 06 04.90	S	9.8	AA	25	L	6	70	4	6			CLA
1990 06 05.04	S	10.3	AA	25	L		42	1.5	1			PAN
1990 06 05.32	S	9.7	AC	31.7	L	6	68	2.5	5			BOR
1990 06 05.35	M	9.7	GA	20.0	L	5	35	2.5	7			MOD
1990 06 11.33	S	9.9	GA	20.0	L	5	35	1.5	5			MOD
1990 06 16.00	O	8.0	AA	33.5	L	4	100	0.5				RIP
1990 06 16.23	M	9.5	GA	20.0	L	5	35	1.5	6			MOD
1990 06 16.23	M	9.7	GA	40	L	7	52	1.0	6			MOD
1990 06 17.17	S	8.3	A	5.0	B		10					KID
1990 06 17.32	M	8.8	AC	41	L	4	83					HAL
1990 06 18.10	S	8.7	AA	15	L	4	26	4	5			PER01
1990 06 20.01	S	8.9	S	10.3	R	7	40	4	3			COL02
1990 06 20.29	M	8.7	AA	5.0	B		10	4	5			MOD
1990 06 20.29	M	9.0	GA	20.0	L	5	35	2.5	7			MOD
1990 06 20.29	M	9.3	GA	40	L	7	52	2	7	0.07	250	MOD
1990 06 20.32	B	8.7	S	7.0	B		10	6.0				DEA
1990 06 20.45	M	8.6	AC	5.0	B		10					HAL
1990 06 20.73	S	9.5	GA	31.7	L	5	86	1	2			JON
1990 06 21.35	B	8.9	S	20	T	10	100	1.75	5			PRY
1990 06 22.04	S	8.8	S	10.3	R	7	40	5	4			COL02
1990 06 22.30				31.7	L	6	68	2.7	5/	0.3	285	BOR
1990 06 22.30	S	8.7	AC	8.0	B		20	5.1	4			BOR
1990 06 22.33	B	8.9	S	25	L	8	70	2	6	0.05	250	ROB03
1990 06 22.35	B	8.9	S	20	T	10	63	1.97	5			PRY
1990 06 22.98	S	8.0	A	12.0	R	4	20	4	5	0.13	270	LOO01

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 06 23.01	S	8.8	S	10.3	R	7	40	6	4			COL02
1990 06 23.33	B	8.7	S	12.7	R	5	41	& 4	7	0.42	250	ARC
1990 06 23.34	M	8.5	AA	5.0	B		10	3	5			MOD
1990 06 23.34	M	8.8	GA	20.0	L	5	35	2	7			MOD
1990 06 23.89	S	9.0	AA	20	L	4	45	2.7	4/			PEA
1990 06 23.99	S	9.2	AA	30	R	18	95	2.1	4			SHA02
1990 06 24.00	S	8.0	A	12.0	R	4	20	4	5			LOO01
1990 06 24.01	S	8.8	S	10.3	R	7	40	4	3			COL02
1990 06 24.05	S	9.0	AA	8.0	B		15	4.0	2			PAN
1990 06 24.06	S	8.4	AA	40	L	5	66	4	4/			BOA
1990 06 24.14	S	8.5	AA	5.0	B		7		4/			PER01
1990 06 24.14	S	8.6	AA	7.0	R	7	20	& 5	5			PER01
1990 06 24.14	S	9.0	AA	7.0	R	7	20					GON04
1990 06 24.14	S	9.0	AA	40	L	5	78	2	5/			PER01
1990 06 24.14	S	9.5	AA	40	L	5	78	2	3/			GON04
1990 06 24.17	M	8.0	A	15	L	4	50	5	4	0.17	260	PER02
1990 06 24.89	S	8.9	AA	20	L	4	45	2.5	5			PEA
1990 06 24.98	M	8.5	AA	8.0	B		15	6.5	6			MIK
1990 06 25.30	M	8.5	AA	5.0	B		10	4	4			MOD
1990 06 25.30	M	8.8	GA	20.0	L	5	35	2.5	7			MOD
1990 06 25.31				31.7	L	6	68	3.1	5/			BOR
1990 06 25.31	B	8.6	S	7.0	B		10					DEA
1990 06 25.31	S	8.6	AC	8.0	B		20	5.1	5			BOR
1990 06 25.89	S	8.8	AA	20	L	4	45	2.7	5			PEA
1990 06 26.01	S	8.6	AC	10.0	B		14	1.8	5			HAS02
1990 06 26.29				31.7	L	6	68	2.7	6	?	285	BOR
1990 06 26.29	M	8.3	AA	5.0	B		10	6	5			MOD
1990 06 26.29	M	8.7	GA	20.0	L	5	35	3	7	0.06	270	MOD
1990 06 26.29	S	8.4	AC	8.0	B		20	5.1	5			BOR
1990 06 26.34	B	8.6	S	8.0	B		11	5	5			ROB03
1990 06 26.45	M	8.5	AC	5.0	B		10					HAL
1990 06 26.88	S	8.8	AA	20	L	4	45	2.5	5			PEA
1990 06 26.99	M	8.3	AA	8.0	B		15	6	7			MIK
1990 06 27.14	S	9.6	AA	40	L	5	78					GON04
1990 06 27.14	S	9.6	AA	40	L	5	78	1.5	3/			PER01
1990 06 27.29	S	8.8	AA	6.0	R	11	116	2	7			DES01
1990 06 27.78	S	8.3	LM	8.0	B		20	5	5	0.13		CAM03
1990 06 27.88	S	8.7	AA	20	L	4	45	2.8	5/			PEA
1990 06 28.02	S	8.8	S	10.3	R	7	40	4	4			COL02
1990 06 28.29	S	8.7	AA	6.0	R	11	116	2	7			DES01
1990 06 28.41	M	8.8	AC	40.6	L	5		5	7	&0.6	260	SCO01
1990 06 28.88	S	8.7	AA	20	L	4	45	3	5/			PEA
1990 06 29.01	S	8.7	S	10.3	R	7	40	8	4			COL02
1990 06 29.29	S	8.6	AA	6.0	R	11	116	2	7			DES01
1990 06 29.93	S	8.2	SC	24.5	L	6	145	1.5	5			DAN01
1990 06 30.00	S	8.1	A	12.0	R	4	20	3.5	4			LOO01
1990 06 30.00	S	8.1	AA	40	L	5	66	4.5	4/	0.4	268	BOA
1990 06 30.28	S	8.6	AA	6.0	R	11	116	3	7			DES01
1990 06 30.76	S	9.0	GA	7.8	R	8	30	1.5				JON
1990 06 30.76	S	9.2	GA	31.7	L	5	86	1	4			JON
1990 06 30.89	S	8.7	AA	20	L	4	45		6			PEA
1990 07 01.28	S	8.5	AA	6.0	R	11	116	3	6			DES01
1990 07 01.31	B	8.5	S	7.0	B		10	5.4	6			DEA
1990 07 01.40	M	8.3	AC	5.0	B		10					HAL
1990 07 01.97	S	8.7	AA	8.0	B		20	2.7	4			SHA02
1990 07 02.01	S	8.6	S	10.3	R	7	40	4	3			COL02
1990 07 02.28	S	8.5	AA	6.0	R	11	116	3	6			DES01
1990 07 02.30				40	L	7	102	1.5	6			MOD
1990 07 02.30	M	8.3	AA	5.0	B		10	3	4			MOD

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 02.88	S	8.6	AA	8.0	B		20	3.2	5			PEA
1990 07 03.01	S	8.6	S	10.3	R	7	40	4	4			COL02
1990 07 03.29	S	8.4	AA	6.0	R	11	56	4	6			DES01
1990 07 03.30	S	8.5	AC	8.0	B		20	5.1	4			BOR
1990 07 03.31	S	8.2	AA	5.0	B		20	7	6			DES01
1990 07 03.79	S	8.3	AA	15.2	L	5	47		6			SEA
1990 07 03.93	S	8.2	SC	24.5	L	6	145	2	7			DAN01
1990 07 03.95	S	8.8	AC	15.2	L	5	44	2.0	3			MOE
1990 07 03.97	S	8.7	AC	15.2	L	5	100	2.3	3			MOE
1990 07 04.04	S	8.7	S	10.3	R	7	40	3	3			COL02
1990 07 05.32	B	8.0	S	7.0	B		10	7.2	6			DEA
1990 07 05.77	S	8.9	GA	31.7	L	5	86	1	5			JON
1990 07 06.03	S	8.5	S	10.3	R	7	40	5	4			COL02
1990 07 07.32	M	8.4	GA	20.0	L	5	35	2.5	5	0.06	270	MOD
1990 07 07.32	S	8.0	AA	5.0	B		10	7	3			MOD
1990 07 08.18	B	8.4	A	10	R	4	24	5	3			KOR01
1990 07 10.96	S	8 :	SC	10.2	R	15	94	4	3			ERG
1990 07 10.96	S	8.2	A	10.0	R		14	3.5	5			LOO01
1990 07 11.19	B	8.6	A	10	R	4	24	6	3			KOR01
1990 07 11.88	S	8.1	AA	8.0	B		15	4.5	6			MIK
1990 07 11.90	B	8.9	A	11	L	7	32	4	4			OST
1990 07 13.30	M	8.0	AC	5.0	B		10					HAL
1990 07 13.89	S	8.1	AA	8.0	B		15	& 5	6			MIK
1990 07 13.91	S	7.4	A	12.0	R	4	20	4	4/			LOO01
1990 07 13.94	S	8.2	AC	15.2	L	5	44	& 3	3			MOE
1990 07 13.95	B	8.6	A	11	L	7	32	6	3			OST
1990 07 13.96	B	8.3	S	10.3	R	7	40	6	4			COL02
1990 07 13.98	S	7.9	SC	24.5	L	6	45	5/	5			DAN01
1990 07 13.98	S	8.0	SC	10.2	R	15	38	5	5			ERG
1990 07 14.28	B	7.6	SC	20	T	10	63	2.82	6	0.05	210	PRY
1990 07 14.34	S	8.3	S	22.9	R	12	96	& 2.5	6			GRE
1990 07 14.94	B	8.5	A	11	L	7	32	7	3			OST
1990 07 14.97	B	7.7	SC	6.0	B		20	& 0.5	2/			MAR02
1990 07 14.98	B	7.5	SC	8.0	B		11	5	4			MAR06
1990 07 14.99	B	8.4	S	10.3	R	7	40	8	4			COL02
1990 07 14.99	S	8.1	SC	10.2	R	15	94	3/	6			ERG
1990 07 14.99	S	8.1	SC	24.5	L	6	145	4	6			DAN01
1990 07 15.14	B	8.4	A	20	R	15	60	6	4			KOR01
1990 07 15.28	S	7.6	SC	20	T	10	63	3.49	5	0.03	210	PRY
1990 07 15.94	S	7.6	AA	10.0	B		14	5.0	4			HAS02
1990 07 15.94	S	7.9	AC	15.2	L	5	44	4	3			MOE
1990 07 16.24	S	7.9	SC	5.0	B		10	6	2			MOD
1990 07 16.25	M	8.3	AA	20.0	L	5	35	3	5			MOD
1990 07 16.42	S	7.7	AA	12.7	R		25					BUN
1990 07 17.01	B	7.3	SC	8.0	B		11		4			MAR06
1990 07 17.06	S	7.1	SC	7.5	R	7	21	5.9	5			FIE
1990 07 17.18	B	8.3	A	10	R	4	24	6	4			KOR01
1990 07 17.89	B	8.3	A	11	L	7	32	6	4			OST
1990 07 17.93	S	6.3	A	5.0	B		10	6	6	0.2	325	LOO01
1990 07 17.97	S	7.5	AA	8.0	B		20	4.3	5			SHA02
1990 07 18.29	S	7.7	AA	6.0	R	11	56	5	5	0.1	160	DES01
1990 07 18.3	B	7.7	S	8.0	B		11	7	5	0.15	250	ROB03
1990 07 18.73	S	7.7	SC	7.8	R	8	30	2	2			JON
1990 07 18.89	M	7.5	AA	8.0	B		15	& 7	6			MIK
1990 07 18.90	S	7.3	AA	10.0	B		14	4.3				HAS02
1990 07 18.92	S	7.7	AC	33	L	5	50	14	4			BAR04
1990 07 18.96	S	8.2	HD	31.6	L	5	130	2	5			MID01
1990 07 18.97	S	6.5	AC	20	T	10	77					TOM01
1990 07 18.97	S	7.3	AA	8.0	B		20	4.3	4			SHA02

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 19.00	B	6.8	S	5.0	B		7	10	6			COL02
1990 07 19.07	S	6.5	A	5.0	B		10	6	5			LOO01
1990 07 19.29				41	L	4	83			>0.33	240	HAL
1990 07 19.29	M	7.3	AC	5.0	B		10					HAL
1990 07 19.33	B	7.3	S	20	T	10	63	4.4	6	0.05	200	PRY
1990 07 19.64				15.2	L	5	47			0.2	233	SEA
1990 07 19.69	S	6.7	AA	8.0	B		15	6	6			SEA
1990 07 19.70	S	7.6	SC	4.5	R	6	13	3				JON
1990 07 19.88	S	7.2	AA	8.0	B		20	7	6			PEA
1990 07 19.89	B	8.0	A	11	L	7	32	8	5	0.2		OST
1990 07 19.93	S	6.4	A	5.0	B		10	8	6			LOO01
1990 07 19.93	S	7.3	AA	10.0	B		14	& 8.1	4			HAS02
1990 07 19.97	S	7.3	AA	8.0	B		20	4.3	5			SHA02
1990 07 20.03	B	6.7	S	10.3	R	7	40	11	5			COL02
1990 07 20.03	S	7.0	SC	7.5	R	7	21	6.2	5			FIE
1990 07 20.06	S	6.7	A	3.0	B		8					LOO01
1990 07 20.41	B	7.4	S	20	T	10	63	4.2	5	0.03	200	PRY
1990 07 20.67	S	7.5	SC	10.0	B		25	8	0			CAM04
1990 07 20.73	M	6.2	A	5.0	B		10					GAR01
1990 07 20.89	B	7.9	A	5.0	B		7	8	4			OST
1990 07 20.89	E	7.8	A	20	R	15	60	8	4	0.1		OST
1990 07 20.95	M	7.3	AA	8.0	B		15	& 9	5/			MIK
1990 07 20.95	S	6.5	AC	8.0	B		11					TOM01
1990 07 20.98	S	7.1	AA	10.0	B		14	4.6	3	0.14		HAS02
1990 07 21.01	O	7.0	AA	25	T	10	75	20		0.2	135	RIP
1990 07 21.01	S	7.1	AA	8.0	B		20	4.3	4			SHA02
1990 07 21.09	B	7.4	SC	6.0	B		20	0.5	6	&0.5	90	MAR02
1990 07 21.18	B	7.9	A	5.0	B		7	7	4			KOR01
1990 07 21.22	E	7.8	A	20	R	15	60	8	4			KOR01
1990 07 21.44	B	7.2	SC	20	T	10	63	4.2	6	0.05	200	PRY
1990 07 21.65	M	6.2	A	5.0	B		10					GAR01
1990 07 21.78	S	7.3	SC	20	L	7	56	6	8	0.08	90	CAM03
1990 07 21.90	S	6.6	AA	8.0	B		20	12	8	0.5	280	BAR
1990 07 21.90	S	6.6	AA	8.0	B		20	12	8	0.5	280	CAV
1990 07 21.91	M	7.2	AA	8.0	B		15	& 9	6			MIK
1990 07 21.92	B	7.6	A	5.0	B		7	9	4			OST
1990 07 21.92	S	7.4	AC	15.2	L	5	44	6	4	0.2	240	MOE
1990 07 21.93	B	7.5	AC	5.0	B		7	5	4			MOE
1990 07 21.96	S	6.8	AA	8.0	B		20		3			HAS02
1990 07 21.97	B	7.1	SC	8.0	B		11		4			MAR06
1990 07 22.05	B	7.1	AC	35	T	6	113	13	6			AMO
1990 07 22.16				20.0	L	5	35	5	6	0.4	250	MOD
1990 07 22.16	M	7.0	SC	5.0	B		10	8	4			MOD
1990 07 22.20	B	7.7	A	8.0	B	4	11	9	4			KOR01
1990 07 22.24	B	7.7	A	10	R	4	24	9	4			KOR01
1990 07 22.89	S	6.2	AC	8.0	B		20		5			BAR04
1990 07 22.91	S	6.4	AC	20	T	10	77					TOM01
1990 07 22.91	S	7.1	AC	15.2	L	5	44	6.5	4	0.3	240	MOE
1990 07 23.03	M	7.0	AA	8.0	B		15	& 9	6			MIK
1990 07 23.03	S	7.2	SC	7.5	R	7	21	8.5	5/			FIE
1990 07 23.04	S	6.8	AA	5.0	B		7	&10	7			MIK
1990 07 23.40	S	8.0	AA	12.7	R		25					BUN
1990 07 23.70	S	7.4	SC	4.5	R	6	13	3				JON
1990 07 23.87	S	6.4	AC	8.0	B		20		6			BAR04
1990 07 23.97	S	6.6	SC	5.0	B		7	6	4			SHA02
1990 07 23.97	S	7.0	SC	10	L		16		7			VIN01
1990 07 23.98	B	6.9	AC	5.0	B		7	6	5			MOE
1990 07 24.26	M	6.8	SC	5.0	B		10	9	4			MOD
1990 07 24.27				20.0	L	5	35	4	6	0.13	250	MOD

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 24.79				25	L	4	80	8	6	0.67		GAR01
1990 07 24.79	M	5.9	A	5.0	B		10					GAR01
1990 07 24.80	S	7.3	SC	20	L	7	56	8	8	0.25	110	CAM03
1990 07 24.87	S	7.2	SP	12	L	9	40	5	6			MEH
1990 07 24.90	S	6.5	AA	8.0	B		20	9	7	0.5	228	PEA
1990 07 24.94	S	6.3	AA	5.0	B		7	10	5	0.7	230	SHA02
1990 07 24.99	S	6.1	A	5.0	R		10	12	6	0.55	230	LOO01
1990 07 25.03	S	6.9	SC	7.5	R	7	21	8.4	5/			FIE
1990 07 25.07	S	6.6	SC	4.2	B		7	8.7			236	FIE
1990 07 25.16	B	6.5	A	7.0	B		10	11.2	6	0.4	227	DEA
1990 07 25.30	M	6.8	NP	5.0	B		10	20				SCO01
1990 07 25.32	S	6.6	HR	5.0	B		10	13	5			BOR
1990 07 25.34				40	L	7	52			0.6	245	MOD
1990 07 25.34	M	6.8	SC	5.0	B		10	9	4	0.3	245	MOD
1990 07 25.34	M	7.5	SC	20.0	L	5	35	4.5	6	0.6	245	MOD
1990 07 25.90	B	6.5	AA	8.0	B		20	8	7	0.5	239	PEA
1990 07 25.93	S	6.8	AC	15.2	L	5	44	6.5	4	0.5	230	MOE
1990 07 25.94	S	6.2	AA	5.0	B		7	9	5			SHA02
1990 07 25.95	S	7.0	SC	8.0	B		20	7				AND01
1990 07 25.98	S	6.9	SC	8.0	B		12	10				BEN03
1990 07 26.04	E	7.3	S	6	R	15	45		3			COM03
1990 07 26.07	B	7.0	A	5.0	R		10					LOO01
1990 07 26.07	S	6.3	A	5.0	R		10	6	6			LOO01
1990 07 26.21	B	6.5	S	6.3	B		9					CHE
1990 07 26.25				20.0	L	5	35	4	6	0.13	245	MOD
1990 07 26.25	M	6.8	SC	5.0	B		10	7	4			MOD
1990 07 26.30				31.7	L	6	68	6.5	7	0.2	240	BOR
1990 07 26.30	S	6.5	AA	6.0	R	11	56	10	5	0.2	170	DES01
1990 07 26.30	S	6.6	HR	5.0	B		10	13	5/	0.35	240	BOR
1990 07 26.32	S	6.3	AA	5.0	B		20	15	5	0.3	170	DES01
1990 07 26.41	M	6.7	SC	5.0	B		10			0.5	236	HAL
1990 07 26.75	S	7.2	SC	10.0	B		25	10	0			CAM04
1990 07 26.92	B	6.7	AC	5.0	B		7	7	5			MOE
1990 07 26.92	B	7.2	A	8.0	B	4	11	11	4			KOR01
1990 07 26.92	S	6.1	A	5.0	R		10	10	5			LOO01
1990 07 26.93	S	6.7	AC	15.2	L	5	44	7.5	4	0.7	240	MOE
1990 07 26.94	S	6.9	SC	8.0	B		20	7				AND01
1990 07 26.97	S	7.8	S	20.3	T	10	80	2.8	7			DAH
1990 07 27.01	E	7.1	S	6	R	15	45		3			COM03
1990 07 27.30	B	6.6	AA	8.0	B		11	10	7	1.5	220	ROB03
1990 07 27.31	M	6.3	NP	5.0	B		10					SCO01
1990 07 27.33	S	6.5	AA	6.0	R	11	56	12	5	0.2	172	DES01
1990 07 27.37				20.0	L	5	35	5	6	0.3	225	MOD
1990 07 27.37	M	6.7	SC	5.0	B		10	9	4			MOD
1990 07 27.69	S	7.0	SC	4.5	R	6	13	4	3			JON
1990 07 27.85	B	6.3	AA	8.0	B		20	8	7	0.75	231	PEA
1990 07 27.89	M	6.5	AA	8.0	B		15	&10	5	0.7	235	MIK
1990 07 27.89	S	6.6	AC	8.0	B		20		5			BAR04
1990 07 27.90	S	6.5	AA	5.0	B		7	&11	7			MIK
1990 07 27.91	S	6.6	AC	15.2	L	5	44	7.5	5	0.6	240	MOE
1990 07 27.92	B	6.7	AC	5.0	R		10	7	5			MOE
1990 07 27.92	S	6.8	AC	15.2	L	5	100	6.5	4			MOE
1990 07 27.92	S	7.0	SC	15.0	L	8	13	5	6			WAR01
1990 07 27.95	B	6.9	A	5.0	B		7	12	4			OST
1990 07 27.97	S	7.6	S	20.3	T	10	80	3.1	7			DAH
1990 07 28.01	S	6.8	SC	8.0	B		12	12				BEN03
1990 07 28.05	S	5.9	AA	4.0	R	15	8	& 8	3/			PER01
1990 07 28.19	S	6.5	HR	5.0	B		10	10	6	0.75	235	BOR
1990 07 28.21	B	6.8	AA	5.0	B	4	7	6	3			SIM

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 28.26	B	6.6	AA	25	L	8	70	&10	7	1.2	220	ROB03
1990 07 28.26	M	6.4	AA	4.0	B		8	15	3	1.2	230	KEE
1990 07 28.28				20.0	L	5	35	5	6	0.7	230	MOD
1990 07 28.28	M	6.5	SC	5.0	B		10	11	4	1.0	230	MOD
1990 07 28.38	M	6.2	NP	5.0	B		10					SCO01
1990 07 28.64	M	5.9	A	5.0	B		10			1.5		GAR01
1990 07 28.70				25	L	4	80	9	7	1.5		GAR01
1990 07 28.81	B	6.8	A	5.0	B		7	10	4			OST
1990 07 28.88	B	6.9	A	8.0	B	4	11	12	4			KOR01
1990 07 28.93	I	6.4	AA	0.8	E		1					HAS02
1990 07 28.93	S	6.2	S	5.0	B		10					CAV
1990 07 28.93	S	6.4	AA	3.0	B		8					HAS02
1990 07 28.93	S	6.5	AA	10.0	B		14	8.4	3	0.53	235	HAS02
1990 07 28.95	S	5.6	AA	5.0	B		7	11	4	1.1	230	SHA02
1990 07 28.96	B	6.6	SC	8.0	B		11	10	4			MAR06
1990 07 28.96	B	6.9	A	5.0	B	4	7	12	4			KOR01
1990 07 28.98	S	6.0	AA	8.0	B		20	8	3			BAR
1990 07 29.00		6.3	AA	0.0	E		1					MIK
1990 07 29.01	M	6.9	AA	4.0	B		8	8	2			TAY
1990 07 29.02	M	6.4	AA	8.0	B		15	&10	6	0.7		MIK
1990 07 29.03	M	6.3	AA	5.0	B		7	&13	7	0.9		MIK
1990 07 29.04	S	6.0	AA	4.0	R	15	8	&11	5			PER01
1990 07 29.17	B	6.5	AA	25	L	8	70	&10	7	1.1	220	ROB03
1990 07 29.21	S	6.6	AA	20.0	T	10	88	2.3	6	&1.0	310	SHA04
1990 07 29.29	M	6.5	SC	5.0	B		10	9	4	0.5	230	MOD
1990 07 29.31	B	6.4	SC	8.0	B		11	6.0	6	0.05	200	PRY
1990 07 29.31	M	6.1	NP	5.0	B		10	20				SCO01
1990 07 29.31	S	6.3	AA	5.0	B		20	15	6	0.4	175	DES01
1990 07 29.86	S	6.7	SP	12	L	9	40	9	6			MEH
1990 07 29.89	B	6.3	AA	8.0	B		20	7	7	0.6	225	PEA
1990 07 29.89	S	6.7	AC	15.2	L	5	44	& 6.5	4			MOE
1990 07 29.93	S	6.3	AA	7.0	B		16	12	3			TAY
1990 07 29.94	B	6.8	A	8.0	B	4	11	12	4	0.4	195	KOR01
1990 07 29.94	S	6.6	SC	5.0	B		7	12				WAR01
1990 07 29.94	S	6.6	SC	15.0	L	8	67	8	6			WAR01
1990 07 29.95	B	6.7	A	5.0	B		7	11	4	0.4	135	OST
1990 07 29.95	S	6.7	SC	8.0	B		20	8				AND01
1990 07 29.96				20.3	T	10	80	3.5	7	&0.17	235	DAH
1990 07 29.96	S	6.9	SC	8.0	B		12	9				BEN03
1990 07 29.97				15.0	L	7	79	5	7	0.07	210	MID01
1990 07 29.97	N	11 :	AC	20.3	T	10	80	7	5			GRA04
1990 07 29.97	S	6.3	SC	3.5	B		7					GRA04
1990 07 29.97	S	6.7	HP	2.4	R		6	6.5	5			MID01
1990 07 29.98	B	6.6	SC	8.0	B		11	10	4			MAR06
1990 07 29.99	S	6.1	SC	5.0	B		7	8.5	7			DAH
1990 07 30.02	E	6.8	S	6	R	15	45		3			COM03
1990 07 30.11	S	6.1	AA	4.0	R	15	8	&11	3			PER01
1990 07 30.14	B	6.7	AA	5.0	B	4	7		2			SIM
1990 07 30.14	B	7.0	AA	5.0	B	4	7					SIM01
1990 07 30.14	B	7.1	AA	5.0	B	4	10					HAY03
1990 07 30.16				8.0	B		20	7.5	5	0.25	225	BOR
1990 07 30.16				31.7	L	6	68	4.5	6	0.25	225	BOR
1990 07 30.16	S	6.4	HR	5.0	B		10	10	5	?	225	BOR
1990 07 30.29				20.0	L	5	35	5	6	0.7	230	MOD
1990 07 30.29	M	6.5	SC	5.0	B		10	10	4	1.0	230	MOD
1990 07 30.30	B	6.3	AA	8.0	B		11	13	7	1.5	230	ROB03
1990 07 30.32	S	6.2	AA	5.0	B		20	15	6	0.45	175	DES01
1990 07 30.69	S	6.8	SC	4.5	R	6	13	4	2	?		JON
1990 07 30.89	B	6.2	AA	8.0	B		20	7	6/	0.75	233	PEA

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 30.89	S	7 :	SC	8.0	B		20	5	5			EKL
1990 07 30.90	S	6.7	AC	15.2	L	5	44	& 6	3			MOE
1990 07 30.91	S	6.8	SC	8.0	B		20	9		0.3	320	AND01
1990 07 30.94	S	5.8	AA	5.0	B		7	9	5	0.8	230	SHA02
1990 07 30.95	B	6.3	S	5.0	B		7	9	5			COL02
1990 07 30.96	B	6.6	A	8.0	B	4	11	12	4	0.5	190	KOR01
1990 07 30.96	B	6.9	A	5.0	B		7	5		0.33	255	THE
1990 07 30.97	E	6.8	S	6	R	15	45		3			COM03
1990 07 30.98	B	6.5	A	5.0	B	4	7	12	4	0.4	190	KOR01
1990 07 31.19	M	6.5	SC	5.0	B		10	8	5	1.0	230	MOD
1990 07 31.20				20.0	L	5	35	6	7	0.7	230	MOD
1990 07 31.31				31.7	L	6	55	7.5	6			BOR
1990 07 31.31	B	6.2	HR	5.0	B		10					BOR
1990 07 31.31	S	6.2	HR	5.0	B		10	11	5	1.1	240	BOR
1990 07 31.33	S	6.2	AA	5.0	B		20	16	6	0.3	170	DES01
1990 07 31.45				5.0	B		10			1.17	235	HAL
1990 07 31.45	B	6.1	SC	1.0	E		1					HAL
1990 07 31.68		5.8	SC	0.0	E		1					CAM03
1990 07 31.68	S	6.0	SC	20	L	7	35	10	8	0.77	90	CAM03
1990 07 31.91	S	6.5	AC	15.2	L	5	44	7.5	4	0.4	240	MOE
1990 07 31.92	S	6.5	SC	5.0	B		7	6	6			DAH
1990 07 31.93	B	6.6	AC	5.0	B		7	6	5			MOE
1990 07 31.93	S	6.5	SC	8.0	B		12	12				BEN03
1990 07 31.94	S	6.5	AA	5.0	B		7					HAS06
1990 07 31.95	S	6.5	SC	8.0	B		20	15	5			DAN01
1990 07 31.96	S	6.5	SC	12.7	T	10	40	10	6			DAN01
1990 07 31.97				15.0	L	7	39	8	6	0.11	210	MID01
1990 07 31.97				15.0	L	7	79	5	5			MID01
1990 07 31.97				20.3	T	10	80	7	5/			GRA04
1990 07 31.97	S	5.6	AA	5.0	B		7	12	5			SHA02
1990 07 31.97	S	6.6	HP	2.4	R		6	10	4			MID01
1990 07 31.98	S	6.0	SC	3.5	B		7	12				GRA04
1990 08 01.00	S	5.8	AA	5.0	B		7	13	6/			PER01
1990 08 01.00	S	6.1	AA	5.0	B		7	13	3			GON04
1990 08 01.03	E	6.6	S	6	R	15	45		3			COM03
1990 08 01.14	B	5.9	AA	5.0	B		7					PER01
1990 08 01.14	I	5.9	AA	0.0	E		1					PER01
1990 08 01.14	M	5.8	AA	5.0	B		7					PER01
1990 08 01.14	S	5.5	AA	5.0	B		7	&11	6	2.5	240	PER01
1990 08 01.24				20.0	L	5	35	4	7	0.10	230	MOD
1990 08 01.24	M	6.5	SC	5.0	B		10	9	5			MOD
1990 08 01.34	M	5.9	AA	4.0	B		8					KEE
1990 08 01.35	B	6.3	AA	5.0	B	4	7	6	5			SIM
1990 08 01.68	S	6.8	SC	4.5	R	6	13		2			JON
1990 08 01.82	S	5.8	SC	20	L	7	56	12	6	1.38	110	CAM03
1990 08 01.83	S	5.2	SC	8.0	B		20	15	5	0.17	95	CAM03
1990 08 01.87	S	6.6	SC	8.0	B		20	12	6			DAN01
1990 08 01.91	B	6.4	AC	5.0	B		7	7	4			MOE
1990 08 01.91	S	6.4	AC	15.2	L	5	44	8	4	0.8	240	MOE
1990 08 01.94	S	6.4	SC	5.0	B		7	14				WAR01
1990 08 01.97	E	6.7	S	6	R	15	45		3			COM03
1990 08 01.98	P	6.5	SC	3.0	R	4		7		0.19	220	ERG
1990 08 02.00	S	6.5	SC	10.2	R	15	38	10	5			ERG
1990 08 02.01	B	6.0	S	5.0	B		7	12	5			COL02
1990 08 02.25	B	6.6	AA	5.0	B		12					GRE
1990 08 02.26	M	5.8	AA	5.0	B		12					GRE
1990 08 02.26	S	5.7	AA	5.0	B		12	&13	6/			GRE
1990 08 02.30	I	5.9	SC	0.7	E		1		9			MOD
1990 08 02.30	M	6.4	SC	5.0	B		10	8	5	0.8	230	MOD

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 02.31				20.0	L	5	35	5	7	1.0	230	MOD
1990 08 02.31				31.7	L	6	55	5.9	6	&1.0	241	BOR
1990 08 02.31	B	6.2	HR	5.0	B		10					BOR
1990 08 02.31	S	6.1	HR	5.0	B		10	11	5	2.0	241	BOR
1990 08 02.88	S	5.8	AC	8.0	B		20		6			BAR04
1990 08 02.90	B	6.4	A	8.0	B	4	11	13	4	0.3	185	KOR01
1990 08 02.91	B	6.2	AC	5.0	B		7	6.5	4			MOE
1990 08 02.91	S	6.2	AC	15.2	L	5	44	7.5	5	0.8	240	MOE
1990 08 02.92	S	6.7	AA	5.0	B		7					HAS06
1990 08 02.93	S	6.4	SC	8.0	B		20	10	5			AND01
1990 08 02.94	S	5.8	SC	14.0	S	4	28	10	6	0.6	230	WAR01
1990 08 02.96	B	6.1	A	5.0	B		7	13	4	0.2	140	OST
1990 08 02.96	M	6.2	AA	8.0	B		15	& 9	5/	1.2	227	MIK
1990 08 02.96	S	6.3	SC	10.2	R	15	38	14	4	0.5	225	ERG
1990 08 02.96	S	6.3	SC	10.2	R	15	38	14	4	0.5	225	ERG
1990 08 02.97				20.3	T	10	80	5	6			DAH
1990 08 02.97	M	6.0	AA	5.0	B		7	&11	7	1.4	225	MIK
1990 08 02.98	E	6.7	S	6	R	15	45		3			COM03
1990 08 02.98	P	6.3	SC	4.0	R	4		13		0.51	219	ERG
1990 08 02.98	S	5.3	SC	5.0	B		7	10	5			DAH
1990 08 02.99	S	5.8	SC	3.5	B		7	13				GRA04
1990 08 03.01	N	10.7	AC	20.3	T	10	50	9	5/			GRA04
1990 08 03.17	B	6.2	AA	5.0	B		8					BRA02
1990 08 03.17	S	5.7	AA	3.4	B		9	&15	5			PER01
1990 08 03.29	B	6.4	AA	5.0	B		12					GRE
1990 08 03.29	S	5.6	AA	5.0	B		12	&12	6			GRE
1990 08 03.31				31.7	L	6	55		6/	1.5	230	BOR
1990 08 03.31	S	5.7	HR	0.0	E		1	30				BOR
1990 08 03.31	S	6.0	HR	5.0	B		10	12	5	1.5	230	BOR
1990 08 03.35	M	5.7	NP	5.0	B		10			>1		SCO01
1990 08 03.37	M	6.4	SC	5.0	B		10	7	5	0.3	225	MOD
1990 08 03.38				20.0	L	5	35	5	7	0.2	225	MOD
1990 08 03.46				5.0	B		10			0.5	230	HAL
1990 08 03.46	B	5.5	SC	1.0	E		1					HAL
1990 08 03.83	B	6.0	AA	8.0	B		20		6			PEA
1990 08 03.87	B	6.3:	AA	10.0	B		14	6.2	4			HAS02
1990 08 03.88	B	6.2	A	5.0	B		7	11	4	0.3	140	OST
1990 08 03.88	S	5.6	AC	20	T	10	77					TOM01
1990 08 03.89	S	6.4	SC	8.0	B		20	10	5			AND01
1990 08 03.90	S	6.2	SC	8.0	B	4	20	10	5			AND01
1990 08 03.91	B	6.3	A	5.0	B	4	7	13	3	0.3	185	KOR01
1990 08 03.93	S	6.2	SC	5.0	B		7	10				BEN03
1990 08 03.93	S	6.3	AC	15.2	L	5	44	7	5	0.5	240	MOE
1990 08 03.97	S	6.4	SC	8.0	B		12	10				AND01
1990 08 03.99	S	5.8	SC	5.0	B		7	15				WAR01
1990 08 04.01	S	6.4	SC	10.2	R	15	38	15	4	0.33	215	ERG
1990 08 04.07	M	6.0	AA	5.0	B		7	&12	6/	0.7		MIK
1990 08 04.08				8.0	B		15	&10	6	1.0	227	MIK
1990 08 04.08		6.0	AA	0.0	E		1					MIK
1990 08 04.08	B	6.0	S	5.0	B		7	20	4			COL02
1990 08 04.08	I	6.0	AA	0.8	E		1					HAS02
1990 08 04.08	S	6.0	AA	8.0	B		20	6.4	3	0.23	220	HAS02
1990 08 04.27	B	6.1	AA	5.0	B		12					GRE
1990 08 04.28	S	5.5	AA	5.0	B		12	&14	6/			GRE
1990 08 04.32	B	5.9	AA	3.5	B		7	&15	6			GRE
1990 08 04.32	S	5.4	AA	3.5	B		7					GRE
1990 08 04.90	S	5.6	AC	20	T	10	77					TOM01
1990 08 04.92	S	6.2	SC	8.0	B		20	15	4	0.5	310	DAN01
1990 08 04.94	B	6.1	A	5.0	B	4	7	13	3	0.3	190	KOR01

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 04.96	B	6.2:	A	8.0	B		12	13	4	0.3	142	OST
1990 08 05.04				20.3	T	10	80	7	5/			GRA04
1990 08 05.04	S	5.8	SC	3.5	B		7	11				GRA04
1990 08 05.08	B	6.0	AA	3.0	B		8					HAS02
1990 08 05.16	S	5.8	AA	3.4	B		9	&12	5			PER01
1990 08 05.18	B	6.3	AA	5.0	B		8					BRA02
1990 08 05.18	B	6.5	SC	6.0	B		20	25	7	0.5	0	MAR02
1990 08 05.25	S	5.6	AA	5.0	B		12	& 9	5/			GRE
1990 08 05.83	B	6.3	A	20	R	15	60	10	4			KOR01
1990 08 05.89	S	6.0	SC	8.0	B		20	18	4			DAN01
1990 08 05.89	S	6.2	SC	8.0	B		20	10	5			AND01
1990 08 05.90	S	6.1	SC	12.7	T		127	4	8	0.5	185	DAN01
1990 08 05.94	S	5.4	SC	20.3	T	10	80	6	6			DAH
1990 08 05.94	S	6.2	SC	8.0	B	6	20	8	3			SCH07
1990 08 05.96	S	6.1:	SC	10.2	R	15	94	11	4	0.25	220	ERG
1990 08 05.97	S	6.2	SC	8.0	B		12	10				BEN03
1990 08 06.01	S	6.0	SC	8.0	B		12	6	7			WES02
1990 08 06.01	S	6.0	SP	8.0	B		12					WES02
1990 08 06.58	S	4.9	AA	0.0	E		1					SEA
1990 08 06.89	S	5.8	SC	6.0	B	4	12	11	5			AND01
1990 08 06.90	S	5.7	SC	25.4	L	6	35	12	6	0.2	190	DAN01
1990 08 06.91	S	5.7	SC	25.4	L	6	145	6	7	0.5	190	DAN01
1990 08 06.93	S	6.1	SC	8.0	B		12	9				BEN03
1990 08 07.05	S	5.4	SC	3.5	B		7	14	4			GRA04
1990 08 07.16	S	5.6	AA	3.4	B		9	&15	7	1.6	230	PER01
1990 08 07.86	B	6.2	A	8.0	B	4	11	12	4			KOR01
1990 08 07.89	S	6.1	AC	15.2	L	5	44	& 6	5	0.4	230	MOE
1990 08 07.90	S	5.5	SC	8.0	B		20	14	6			DAN01
1990 08 07.90	S	5.6	SC	25.4	L	6	35	11	6	0.1	200	DAN01
1990 08 07.90	S	6.2	AC	15.2	L	5	100	& 5	5			MOE
1990 08 07.91	S	5.6	SC	25.4	L	6	145	6	7	0.5	200	DAN01
1990 08 07.91	S	5.8	SC	8.0	B	4	20	11	5			AND01
1990 08 07.91	S	5.9	SC	8.0	B		12	10				BEN03
1990 08 08.14	S	5.4	AA	3.4	B		9	&15	6	1.2	215	PER01
1990 08 08.36	M	5.6:	NP	5.0	B		10		5	&2		SCO01
1990 08 08.37	M	5.5	SC	5.0	B		10	10	5			MOD
1990 08 08.38				20.0	L	5	35	6	7	0.3	210	MOD
1990 08 08.75	B	5.8	AA	8.0	B		20		6/			PEA
1990 08 08.87	S	4.8	AC	20	T	10	77					TOM01
1990 08 08.94	S	4.8:	SC	5.0	B		7	&15	6			DAH
1990 08 08.94	S	5.8	SC	8.0	B		12	11				BEN03
1990 08 09.04		5.5:	S	0.0	E		1					JAN02
1990 08 09.04	S	5.5:	S	2.1	B		8	&10				JAN02
1990 08 09.14	S	5.5	AA	3.4	B		9	& 9	6/			PER01
1990 08 09.25	M	5.4	SC	5.0	B		10	8	5			MOD
1990 08 09.26	M	5.5	SC	5.0	B		10					HAL
1990 08 09.27				20.0	L	5	35	3	7	0.12	220	MOD
1990 08 09.37	M	5.7:	NP	5.0	B		10		5			SCO01
1990 08 09.82	S	5.4	SC	5.0	B		10	11	5			BOA
1990 08 09.87	S	5.6	S	8.0	B		20	14	6			DAN01
1990 08 09.87	S	5.7	S	12.7	T	10	40	9	6	0.75	225	DAN01
1990 08 09.88	S	5.7	S	12.7	T	10	127	5	7	0.5	225	DAN01
1990 08 09.89	S	5.5	SC	8.0	B	4	20	11	6			AND01
1990 08 09.89	S	5.7	SC	9.0	M	11	80	5	5			WES02
1990 08 09.89	S	5.7	SP	8.0	B		12					WES02
1990 08 09.90	S	5.1	AA	8.0	B		20	10	3			BAR
1990 08 09.94	N	10.6	AC	20.3	T	10	80	9	5/			GRA04
1990 08 09.94	S	4.9	SC	5.0	B		7	14	6			DAH
1990 08 09.94	S	5.2	SC	3.5	B		7	13				GRA04

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 09.95	S	5.9	SC	5.0	B		7	10				WAR01
1990 08 09.96				31.6	L	5	62	11	7	0.22	190	MID01
1990 08 09.96	S	4.7	HD	5.0	R		8	15	6			MID01
1990 08 09.97	S	5.5	SC	10.2	R	15	94	11	4	0.25	210	ERG
1990 08 10.83	M	5.1	AA	5.0	B		7	&10	7			MIK
1990 08 10.84	S	5.0	SC	0.0	E		1	12	6/			BOA
1990 08 10.84	S	5.2	SC	6.0	B		20	15	6			BOA
1990 08 10.85	S	5.3	S	8.0	B		20	14	4			DAN01
1990 08 10.88	S	5.0	AA	8.0	B		20	10				BAR
1990 08 10.92	B	4.8:	AA	3.4	B		9					PER01
1990 08 10.92	M	4.7	AA	3.4	B		9					PER01
1990 08 10.92	S	4.1	AA	3.4	B		9	&18	6/	2.0	200	PER01
1990 08 10.92	S	4.7	HP	0.7	E		1					MID01
1990 08 10.92	S	4.7	HP	5.0	R		8	12	7			MID01
1990 08 10.92	S	5.1	SC	3.5	B		7	15				GRA04
1990 08 10.93				31.6	L	5	62	10	8	0.25	175	MID01
1990 08 10.93	B	4.8	SC	0.7	E		1	&16	5			DAH
1990 08 10.93	I	4.6:	AA	0.0	E		1					PER01
1990 08 10.94	B	6.1	A	10	R	4	19	15	4	0.2	200	KOR01
1990 08 10.94	S	4.6	SC	5.0	B		7	20	6			DAH
1990 08 10.96	S	5.4	SC	8.0	B	4	20	11	5	0.1	200	AND01
1990 08 10.96	S	5.5	SC	8.0	B		12	13		0.4	200	BEN03
1990 08 10.98	N	10.4	AC	20.3	T	10	80	9	6			GRA04
1990 08 10.98	S	5.7	SC	9	M	11	56	8	6			WES02
1990 08 11.02	S	5.7	SP	8.0	B		12					WES02
1990 08 11.12	B	5.0	S	5.0	B		7	18	4			COL02
1990 08 11.21	B	5.3	SC	8.0	B		11	7.36	5	0.08	200	PRY
1990 08 11.50	M	4.3	A	5.0	B		10	14	7	3.0		GAR01
1990 08 11.82	S	5.0	SC	6.0	B		20	16	6/			BOA
1990 08 11.84	S	5.2	SP	10	R	10	40	10	3	0.2	200	NAG03
1990 08 11.86	M	4.8	AA	5.0	B		7	&15	6			MIK
1990 08 11.87	S	5.2	SP	10	R	10	40	15	3	0.4	205	BOD01
1990 08 11.88	S	4.5	AC	8.0	B		11					TOM01
1990 08 11.89	B	4.9	A	5.0	B		7	21	4	1	165	OST
1990 08 11.90	S	4.9	AA	8.0	B		20	12	6			BAR
1990 08 11.92	S	5.1	SC	8.0	B		20	12		0.7	210	KAR02
1990 08 11.94	B	4.8	AA	3.4	B		9					PER01
1990 08 11.94	I	4.4	AA	0.0	E		1					PER01
1990 08 11.94	M	4.4	AA	3.4	B		9					PER01
1990 08 11.94	S	4.2	AA	3.4	B		9	&13	5	1.5	215	PER01
1990 08 11.95	B	6.0	A	10	R	4	19	17	4	0.3	205	KOR01
1990 08 11.97	S	5.3	SC	8.0	B	4	20	12	6	0.5	200	AND01
1990 08 12.08	B	5.2	AA	5.0	B		8					BRA02
1990 08 12.14	M	4.9	SC	5.0	B		10	&15	5			MOD
1990 08 12.22	B	4.8	AA	5.0	B	4	7	10	3			SIM
1990 08 12.22	B	5.2:	AA	5.0	B		12					GRE
1990 08 12.22	S	4.8:	AA	5.0	B		12	&15	6			GRE
1990 08 12.25	B	5.2	SC	8.0	B		11	7.4	6	0.08	200	PRY
1990 08 12.44	S	5.5	SC	10.0	B		25	12	8			CAM04
1990 08 12.56				8.0	B		15		7	2	200	SEA
1990 08 12.56	S	4.4	AA	0.0	E		1					SEA
1990 08 12.76	B	5.2	AA	8.0	B		20	11.5	7	1.4	197	PEA
1990 08 12.77	S	5.1	AA	0.0	E		1					PEA
1990 08 12.86	B	6.0	A	5.0	B	4	7	15	5	0.2	190	KOR01
1990 08 12.86	S	4.5	SC	0.0	E		1	18	7			BOA
1990 08 12.86	S	4.7	SC	5.0	B		10	18	6/			BOA
1990 08 12.87	S	5.2	SP	12	L	9	40	15	4	0.5	200	MEH
1990 08 12.89	S	4.7	AA	5.0	B		7					GON04
1990 08 12.90	S	4.4	AC	8.0	B		11					TOM01

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 12.90	S	4.9	SP	10	R	10	40	20	3	0.5	200	BOD01
1990 08 12.91	S	5.8	AC	15.2	L	5	44	8.5	4	0.8	200	MOE
1990 08 12.93	S	4.8	SP	10	R	10	40	15	3	0.3	170	NAG03
1990 08 12.96	B	5.2	AA	5.0	B		8					BRA02
1990 08 12.97	B	5.0	B	5.0	B		7	15	7	0.5	180	COL02
1990 08 12.98	B	4.6	AA	3.4	B		9					PER01
1990 08 12.98	I	4.8	AA	0.0	E		1	&20				PER01
1990 08 12.98	M	4.3	AA	3.4	B		9					PER01
1990 08 12.98	S	4.2	AA	3.4	B		9	&13	7	1.5	180	PER01
1990 08 13.12		4.7	SP	0.0	E		1					SIM01
1990 08 13.12		4.8	SP	0.0	E		1					SIM
1990 08 13.12	B	4.9	SP	5.0	B	4	10	15				HAY03
1990 08 13.21	S	4.9	AA	5.0	B		12	&14	6			GRE
1990 08 13.83	S	4.3	SC	0.0	E		1	20	6/			BOA
1990 08 13.83	S	4.5	SC	5.0	B		10	21	6			BOA
1990 08 13.85	M	4.7	AA	5.0	B		7	&17	6	2.0	207	MIK
1990 08 13.88	S	4.2	AC	20	T	10	77					TOM01
1990 08 13.88	S	6.0	AC	15.2	L	5	44	7	3	0.4	200	MOE
1990 08 13.90	B	4.5	AA	14.5	L	5	48	13	6	0.13		KUC
1990 08 13.90	S	4.7	SP	5.0	B		7	20	4	0.7		BOD01
1990 08 13.91	B	4.4	AA	3.4	B		9					PER01
1990 08 13.91	I	4.6:	AA	0.0	E		1					PER01
1990 08 13.91	M	4.2	AA	3.4	B		9					PER01
1990 08 13.91	S	4.1	AA	3.4	B		9	&14	6/	1.2	200	PER01
1990 08 13.91	S	5.5	SC	5.0	B		7	16		&0.5	210	WAR01
1990 08 13.93	S	4.8	SP	15	L	8	60	15	3			MEH
1990 08 13.95	S	4.3	SC	5.0	B		7	18	6			DAH
1990 08 13.97	B	4.9	S	5.0	B		7	23	8			COL02
1990 08 13.99	B	5.0	AA	5.0	B		8					BRA02
1990 08 14.09				7.0	B		10	20	6	1.06	193	DEA
1990 08 14.09		4.5	A	0.0	E		1					DEA
1990 08 14.17	B	5.0	SP	5.0	B	4	7					YOU01
1990 08 14.25	M	4.8	SC	5.0	B		10	10	5	0.3	200	MOD
1990 08 14.30	B	5.1	SC	8.0	B		11	7.4	6	0.12	190	PRY
1990 08 14.46	M	4.3	A	5.0	B		10			4.0		GAR01
1990 08 14.53	S	4.2	AA	0.0	E		1					SEA
1990 08 14.89	B	5.1	SC	8.0	B		11	18	6			MAR06
1990 08 14.90	B	4.4	AA	14.5	L	5	48	14	5/			KUC
1990 08 14.90	S	4.5	SC	5.0	B		7	10	4			DAN01
1990 08 14.90	S	4.6	SC	8.0	B		20	8	4			DAN01
1990 08 14.91	S	4.5	SP	5.0	B		10	20	3			MEH
1990 08 14.92	B	4.6	AA	5.0	B		7					GON04
1990 08 14.92	S	4.3	SC	5.0	B		10	22	6			BOA
1990 08 14.92	S	4.6	AA	5.0	B		7					GON04
1990 08 14.93	E	5.9	S	6	R	15	73		3			COM03
1990 08 14.93	S	4.2	SC	0.7	E		1		5			DAH
1990 08 14.93	S	4.4	SC	5.0	B		7	21	6/	&0.7	202	DAH
1990 08 14.95	B	4.6:	AA	3.4	B		9					PER01
1990 08 14.95	I	4.5	AA	0.0	E		1					PER01
1990 08 14.95	M	4.1	AA	3.4	B		9					PER01
1990 08 14.95	S	4.1	AA	3.4	B		9	&16	6/			PER01
1990 08 14.96	S	4.4:	SC	25.0	L	7	109	16	4	0.3	225	ERG
1990 08 15.09	B	3.7	Y	0.0	E		1					MEI01
1990 08 15.09	B	4.3	Y	5.0	B		7					MEI01
1990 08 15.10	B	4.6	S	6.3	B		9	&30		1	180	CHE
1990 08 15.10	S	4.6	S	6.3	B		9	&30		1	180	CHE
1990 08 15.11				31.7	L	6	55	9	7			BOR
1990 08 15.11	B	4.9	HR	5.0	B		10	12	6	?	200	BOR
1990 08 15.11	S	4.8	HR	0.0	E		1	45	3			BOR

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 15.15	B	4.2	AA	0.0	E		1	&40	8			ROB03
1990 08 15.15	B	4.3	AA	8.0	B		11	20	7	2	190	ROB03
1990 08 15.17		4.3	A	0.0	E		1					DEA
1990 08 15.20	B	5.0	AA	3.5	B		7					GRE
1990 08 15.20	S	4.5	AA	3.5	B		7	&16	7			GRE
1990 08 15.21	B	4.9	AA	5.0	B		12					GRE
1990 08 15.21	S	4.5	AA	5.0	B		12	&16	6			GRE
1990 08 15.23	I	4.4	AA	0.0	E		1					GRE
1990 08 15.23	S	4.4	AA	20.0	T	10	88	7.7	9	&5	292	SHA04
1990 08 15.30	M	4.4	SC	0.7	E		1	&20	5			MOD
1990 08 15.30	M	4.6	SC	5.0	B		10	10	5	0.7	190	MOD
1990 08 15.31				20.0	L	5	35	8	7	0.8	190	MOD
1990 08 15.33	B	4.4	SC	1.0	E		1					HAL
1990 08 15.41	S	5.0	SC	5.0	B		7	10	3			JON
1990 08 15.46		4.0	Y	0.0	E		1					THO01
1990 08 15.51	S	4.1	AA	0.0	E		1					SEA
1990 08 15.85	S	4.2	AC	8.0	B		11	1	6			TOM01
1990 08 15.90	I	4.5	AA	0.0	E		1					PER01
1990 08 15.90	S	4.2	AA	3.4	B		9	&16	5			PER01
1990 08 15.90	S	5.3:	SC	5.0	B		7	20	6	>1.0	200	WAR01
1990 08 15.91	S	5.3	SC	5.0	B		7	20		1.0	200	WAR01
1990 08 15.92	S	4.4	SP	5.0	B		7	20	4	1	175	BOD01
1990 08 15.93	B	4.3	S	0.0	E		1	20				COL02
1990 08 15.93	B	4.3	S	5.0	B		7	20	6	0.2	165	COL02
1990 08 15.98	B	4.7	AC	35	T	6	113	7	6	0.45	180	AMO
1990 08 16.01	B	5.0	AA	5.0	B		8					BRA02
1990 08 16.02	S	4.2	SP	5.0	B		7	20	4	1	175	NAG03
1990 08 16.07	B	5.0	SC	15.5	L	5	36	15	8	0.75	195	MAR02
1990 08 16.13				31.7	L	6	55	8.5	7		170	BOR
1990 08 16.13	B	4.7	HR	5.0	B		10	17	6	1.3	170	BOR
1990 08 16.13	S	4.6	HR	0.0	E		1	45	5			BOR
1990 08 16.15	B	4.2	AA	0.0	E		1					GRE
1990 08 16.15	B	4.2	AA	3.5	B		7	&22	6			GRE
1990 08 16.75	B	4.2	AA	0.0	E		1					PEA
1990 08 16.75	B	4.4	AA	8.0	B		20	20	7/	1.0	163	PEA
1990 08 16.84	S	4.1	SC	5.0	B		10	23	6			BOA
1990 08 16.86	S	5.5	AC	15.2	L	5	44	11	5	1.3	180	MOE
1990 08 16.88	I	5.4	AC	0.0	E		1					MOE
1990 08 16.92	S	4.6	AA	5.0	B		7					GON04
1990 08 16.93	S	4.1	SC	5.0	B		7	24	6			DAH
1990 08 16.94	B	4.3:	AA	3.4	B		9					PER01
1990 08 16.94	M	4.3:	AA	3.4	B		9					PER01
1990 08 16.94	S	3.9	AA	3.4	B		9	&13	4	0.8	175	PER01
1990 08 16.94	S	4.0	SC	0.7	E		1	&22	5			DAH
1990 08 16.95	B	5.0	AA	5.0	B		8					BRA02
1990 08 16.95	S	4.2	SP	10	R	10	40	20	4	1	170	BOD01
1990 08 16.95	S	4.3	SC	4.2	B		7	10.4	6			FIE
1990 08 16.96	B	4.3	S	0.0	E		1	15				COL02
1990 08 16.97	I	4.2	AA	0.0	E		1					AND04
1990 08 16.97	I	4.2	AA	0.0	E		1	&32				PER01
1990 08 16.98	S	3.8	SC	3.5	B		7	25	4/			GRA04
1990 08 16.99	S	3.9	SC	0.7	E		1					GRA04
1990 08 17.03	B	4.9	SC	15.5	L	5	36	15	8	1	200	MAR02
1990 08 17.05	M	4.0	AA	5.0	B		7	&15	6	3.0	164	MIK
1990 08 17.14	B	4.0	AA	0.0	E		1					GRE
1990 08 17.14	B	4.3	AA	3.5	B		7	&20	6/			GRE
1990 08 17.15	B	4.5	HR	5.0	B		10	16	6	3.6	160	BOR
1990 08 17.15	S	4.5	HR	0.0	E		1	54	5			BOR
1990 08 17.17	M	4.0	SC	0.0	E		1					SCO01

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 17.19	B	4.2	SC	1.0	E		1					HAL
1990 08 17.46		3.9	Y	0.0	E		1					THO01
1990 08 17.46	M	4.2	A	0.0	E		1					GAR01
1990 08 17.55				5.0	B		10		8	4		GAR01
1990 08 17.55	M	4.0	A	0.0	E		1					GAR01
1990 08 17.73	B	4.4	A	5.0	B	4	7	20	6	1.8	200	KOR01
1990 08 17.75	B	4.4	A	5.0	B	4	10	25	5	3	150	ZHU
1990 08 17.86	S	5.6	AC	15.2	L	5	44	10	4	1.2	180	MOE
1990 08 17.88	S	4.7	SC	8.0	B		12	18				BEN03
1990 08 17.89	S	3.8	AC	8.0	B		11	1	6			TOM01
1990 08 17.89	S	3.9	SC	0.0	E		1	20	7			BOA
1990 08 17.89	S	4.0	SC	5.0	B		10	25	6/			BOA
1990 08 17.90	S	4.0	AA	8.0	B		20	26	7			BAR
1990 08 17.91	B	5.0	AA	5.0	B		8					BRA02
1990 08 17.91	I	5.0	AA	0.0	E		1					BRA02
1990 08 17.92	B	4.8	AA	5.0	B		7	>45	5			GOM
1990 08 17.92	S	4.2	SC	20	L	8	30	20				JAN02
1990 08 17.92	S	4.6	AA	5.0	B		9	&24				GON04
1990 08 17.93	S	3.8	SC	5.0	B		7	25	6			DAH
1990 08 17.93	S	4.3	SC	10.2	R	15	38	25	5	0.6	180	ERG
1990 08 17.94	S	4.7	SC	5.0	B		7	15	6	0.3	180	WAR01
1990 08 17.95	S	4.4	SC	8.0	B	4	20	20	6	0.5	190	DAN01
1990 08 18.01	I	4.3	AA	0.0	E		1	&38				PER01
1990 08 18.01	S	3.9	AA	3.4	B		9	&17	5	2.0	145	PER01
1990 08 18.14				31.7	L	6	55	16.5	7		170	BOR
1990 08 18.14	B	4.5	HR	5.0	B		10	24	6	1.0	170	BOR
1990 08 18.14	S	4.4	HR	0.0	E		1	48	5			BOR
1990 08 18.26	M	3.8	SC	0.0	E		1					SCO01
1990 08 18.46		4.0	Y	0.0	E		1					THO01
1990 08 18.46	M	4.0	A	0.0	E		1					GAR01
1990 08 18.68	B	4.3	A	5.0	B	4	10	30	5	2	230	ZHU
1990 08 18.84	S	4.4	SC	8.0	B	4	20	25	5			DAN01
1990 08 18.85	S	3.7	AC	20	T	10	77	1.5	6			TOM01
1990 08 18.85	S	4.0	AA	8.0	B		20	25	8			BAR
1990 08 18.88	B	4.3	AA	14.5	L	5	48	18	5	0.08		KUC
1990 08 18.88	B	4.5	AA	6	R	4	20	34	9			VEZ
1990 08 18.88	B	5.0	AA	5.0	B		8					BRA02
1990 08 18.89	B	4.3	A	20	L	4	29	28	6	2.0	195	KOR01
1990 08 18.89	S	4.5:	SC	3.5	B		7	16	5			GRA04
1990 08 18.90	B	4.3	A	5.0	B	4	7	30	6	2.5	190	KOR01
1990 08 18.90	M	3.7	A	5.0	B		20	30	5			GAL
1990 08 18.92	S	3.8	SC	0.0	E		1	24	6/			BOA
1990 08 18.92	S	4.6	SC	8.0	B		12	18		0.5	190	BEN03
1990 08 18.93	B	4.7	AA	5.0	B		7	&30	5			GOM
1990 08 18.94	N	8.0	S	31.6	L	5	62	12	5	0.2	180	MID01
1990 08 18.95	G	3.4	AA	0.0	E		1	&25	7			MIK
1990 08 18.95	S	3.9	SC	5.0	B		7	26	6			DAH
1990 08 18.95	S	4.1	S	0.7	E		1					MID01
1990 08 18.96	B	4.3	A	5.0	B	4	10	30	5	2	230	ZHU
1990 08 18.99				5.0	B		7	&20	5/			MIK
1990 08 19.02	S	3.9	SC	4.2	B		7	17.4	6			FIE
1990 08 19.04	B	4.8	AA	3.4	B		9					GON04
1990 08 19.04	B	4.8	AA	3.4	B		9					PER01
1990 08 19.04	I	4.2	AA	0.0	E		1					PER01
1990 08 19.04	I	4.6	AA	0.0	E		1					GON04
1990 08 19.04	M	4.1	AA	3.4	B		9					PER01
1990 08 19.04	M	4.3	AA	3.4	B		9					GON04
1990 08 19.04	S	4.1	AA	3.4	B		9	&13	4/			PER01
1990 08 19.04	S	4.7	AA	3.4	B		9	&23	4			GON04

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 19.15	M	3.7	SC	0.0	E		1					SCO01
1990 08 19.16		4.5	SP	0.0	E		1					SIM
1990 08 19.21	B	3.9	SC	1.0	E		1					HAL
1990 08 19.54	M	4.0	A	0.0	E		1			3.0		GAR01
1990 08 19.67	B	4.3	A	5.0	B	4	10	30	5	2	170	ZHU
1990 08 19.75	B	3.9	AA	0.0	E		1					PEA
1990 08 19.75	B	4.3	A	5.0	B	4	7	25	6	2.6	170	KOR01
1990 08 19.79	B	4.3	A	5.0	B	4	10	30	5	2	170	ZHU
1990 08 19.84	B	4.2	AA	14.5	L	5	48	20	5	0.08		KUC
1990 08 19.85	S	4.0	AA	8.0	B		20	23	8			BAR
1990 08 19.86	B	4.8	AA	5.0	B		7					GON04
1990 08 19.86	S	4.7	AA	5.0	B		7	&15				GON04
1990 08 19.88	S	3.7	SC	0.0	E		1	24	6/			BOA
1990 08 19.89	B	4.6	AA	6	R	4	20	47	9			VEZ
1990 08 19.89	M	3.7	A	5.0	B		20	25	5			GAL
1990 08 19.89	S	4.0	S	5.0	R		8	25	4			MID01
1990 08 19.89	S	4.5	SC	5.0	B		7	18				WAR01
1990 08 19.89	S	4.5	SC	14.0	S	4	28			0.3		WAR01
1990 08 19.90	B	4.8	AA	5.0	B		8					BRA02
1990 08 19.90	N	8.8	S	31.6	L	5	62	11				MID01
1990 08 19.90	S	4.1	SC	0.7	E		1					GRA04
1990 08 19.90	S	4.1	SC	6.0	R	4	10	&18	5/			GRA04
1990 08 19.92	B	4.2	AC	35	T	6	113	8	7	0.45	150	AMO
1990 08 19.94	I	4.8	AA	0.0	E		1					BRA02
1990 08 19.95	S	3.8	SC	5.0	B		7	28	6			DAH
1990 08 19.95	S	3.9	SC	0.7	E		1	&25	5			DAH
1990 08 19.95	S	4.1	SC	25.4	L	6	45	25	6	1	165	DAN01
1990 08 19.96	S	4.7	SC	8.0	B		20	12	4	0.25	170	SCH07
1990 08 20.04	G	3.5	AA	0.0	E		1	&25	7			MIK
1990 08 20.05	M	4.1	AA	5.0	B		7	&25	6			MIK
1990 08 20.10	B	3.7	SC	0.0	E		1					CHE
1990 08 20.12				5.0	B		12	&20	6/	&1	170	GRE
1990 08 20.13	B	3.7	AA	0.0	E		1					GRE
1990 08 20.17	S	3.8	AA	20.0	T	10	88	7.1	9			SHA04
1990 08 20.43				7.8	R	8	30		7	1.5	115	JON
1990 08 20.43	S	4.4	SC	2.3	B		3	15				JON
1990 08 20.58	B	3.8	Y	5.0	B		7		5	2.5		NAK07
1990 08 20.67	B	4.3	A	5.0	B	4	10	30	5	4	160	ZHU
1990 08 20.67	M	3.9	A	0.0	E		1					GAR01
1990 08 20.75				8.0	B		20	25	7/	2.0	156	PEA
1990 08 20.75	B	4.0	AA	0.0	E		1	30				PEA
1990 08 20.81	B	4.3	A	5.0	B	4	7	30	6	4.5	145	KOR01
1990 08 20.81	B	4.3	A	5.0	B	4	10	30	5	4	150	ZHU
1990 08 20.82	G	4.4	A	0.0	E		1	25	9	1.5	150	KOR01
1990 08 20.87	S	4.6	SP	8.0	B		12					WES02
1990 08 20.87	S	4.6	SP	8.0	B		12					WES02
1990 08 20.88	S	3.8	AA	8.0	B		20	30	8	1	70	BAR
1990 08 20.89	B	4.6	AA	5.0	B		7	&45	5			GOM
1990 08 20.90	B	4.7	AA	5.0	B		7	&15				GON04
1990 08 20.92	B	4.1	AC	35	T	6	113	12	7	0.30	160	AMO
1990 08 20.92	B	4.5	AA	3.4	B		9					PER01
1990 08 20.92	I	4.2	AA	0.0	E		1	&37				PER01
1990 08 20.92	M	3.9	AA	3.4	B		9					PER01
1990 08 20.92	S	3.9	AA	3.4	B		9	&26	5			PER01
1990 08 20.94	M	3.6	A	5.0	B		20	40	7			GAL
1990 08 21.00	B	4.1	SC	8.0	B		11		6			MAR06
1990 08 21.19				8.0	B		11	30	7	8	145	ROB03
1990 08 21.19	B	3.8	AA	0.0	E		1	&45	8	2	90	ROB03
1990 08 21.39	S	4.2	SC	2.3	B		3	20				JON

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 21.45	S	3.7	AA	0.0	E		1					SEA
1990 08 21.75				8.0	B		20	22	7	2		PEA
1990 08 21.75	B	4.0	AA	0.0	E		1	30				PEA
1990 08 21.83	B	4.2	A	5.0	B	4	7	30	6	3.5	144	KOR01
1990 08 21.84	S	5.4	AC	15.2	L	5	44	11	4	1.1	150	MOE
1990 08 21.85	B	4.2	A	5.0	B	4	10	30	5	3	135	ZHU
1990 08 21.85	S	3.9	SC	5.0	B		7	15	5	0.5	160	DAN01
1990 08 21.87	S	3.5:		0.0	E		1	25	4			DAN01
1990 08 21.87	S	3.8	SC	5.0	B		7	15	6			EKL
1990 08 21.88	S	3.8	SC	8.0	B		20	25	6			EKL
1990 08 21.88	S	3.9	SC	8.0	B	4	20	18	5			AND01
1990 08 21.89	B	4.4	AA	5.0	B		7	&60	5	&1		GOM
1990 08 21.89	I	4.1	AA	0.0	E		1	&27	6/			PER01
1990 08 21.89	S	3.7	AA	0.0	E		1					PER01
1990 08 21.89	S	3.7	AA	3.4	B		9	&14	4/			PER01
1990 08 21.89	S	3.9	SC	6.0	R	4	10	25	5/	0.46	61	GRA04
1990 08 21.90	S	3.9	AA	2.4	B		8		5			PER01
1990 08 21.92	B	4.4	S	5.0	B		7	40	7			COL02
1990 08 21.92	B	4.7	AA	5.0	B		7					GON04
1990 08 21.92	M	3.7	A	5.0	B		20	40	7	1.5	80	GAL
1990 08 21.92	S	4.0:	SC	25.4	L	6	35	30	5	1.1	150	ERG
1990 08 21.92	S	4.6	AA	5.0	B		7	&20				GON04
1990 08 21.94	S	3.7	AA	8.0	B		20	35	8	2		BAR
1990 08 21.96	S	4.1	SC	5.0	B		7	28	7			DAH
1990 08 21.97	S	3.9	SC	0.7	E		1	&26	6			DAH
1990 08 21.98	S	4.3	SC	8.0	B		20	8	4			SCH07
1990 08 21.99				5.0	B		7			1.64	139	DAH
1990 08 21.99	S	4.0	SC	5.0	B		7	20		0.5	80	BEN03
1990 08 22.00	B	4.6	AA	5.0	B		8					BRA02
1990 08 22.00	I	4.6	AA	0.0	E		1					BRA02
1990 08 22.03	S	3.8	SC	0.7	E		1					GRA04
1990 08 22.05		4.6	Y	0.0	E		1					STE01
1990 08 22.06	N	9.0	S	31.6	L	5	130			0.6	110	MID01
1990 08 22.07	B	4.5	AA	5.0	B		12	&15				GRE
1990 08 22.08	S	3.7	AA	5.0	B		12		6/			GRE
1990 08 22.17	S	3.2	AA	20.0	T	10	88	7.0	9			SHA04
1990 08 22.72	B	4.2	A	5.0	B	4	7	30	6	4.2	140	KOR01
1990 08 22.76				8.0	B		20	21	7	2		PEA
1990 08 22.76	B	4.0	AA	0.0	E		1					PEA
1990 08 22.83	B	4.1	A	5.0	B	4	10	30	5	5	120	ZHU
1990 08 22.83	S	3.5	SC	0.0	E		1	26	6/			BOA
1990 08 22.84	B	4.2	AA	6	R	4	20	43	9			VEZ
1990 08 22.86	S	3.7	AA	8.0	B		20	35	6	2	90	BAR
1990 08 22.86	S	4.0	SC	4.2	B		7	20.2	6			FIE
1990 08 22.87	B	4.4	AA	5.0	B		7	&45	5	>1		GOM
1990 08 22.87	S	3.5	AC	40	L	5	66	1.5	6			TOM01
1990 08 22.88	M	3.8	A	5.0	B		20	40	7			GAL
1990 08 22.91	S	3.7	SC	0.7	E		1	&33	6			DAH
1990 08 22.92	N	8.7	S	5.0	R		8	10	5	1.1	120	MID01
1990 08 22.95	S	3.9	SC	5.0	B		7	28	7	2.02	122	DAH
1990 08 22.98	S	3.7	SC	0.7	E		1					GRA04
1990 08 23.00				3.5	B		7	15	4/	0.57	57	GRA04
1990 08 23.01	N	9.5	AC	20.3	T	10	80	11	6			GRA04
1990 08 23.03	G	3.3	AA	0.0	E		1	&25	7			MIK
1990 08 23.03	S	4.0	SC	5.0	B		7	18				BEN03
1990 08 23.04				5.0	B		7	&20	6			MIK
1990 08 23.08		4.1	Y	0.0	E		1					STE01
1990 08 23.08	B	3.5	SC	0.0	E		1					CHE
1990 08 23.10	B	3.7	S	5.0	B		7	19	7			COL02

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 23.44	S	3.8	AA	0.0	E		1					SEA
1990 08 23.47	M	3.6	A	0.0	E		1					GAR01
1990 08 23.49				5.0	B		10			5.0		GAR01
1990 08 23.69	B	4.2	A	5.0	B	4	7	25	5	2.2	120	KOR01
1990 08 23.75	B	4.2	A	5.0	B	4	10	25	5	3	100	ZHU
1990 08 23.83	B	3.8	AA	5	R	4	10	40	5	0.28		KUC
1990 08 23.83	S	3.4	SC	0.0	E		1	28	6			BOA
1990 08 23.84	G	4.2	A	0.0	E		1	20	9	1.0	120	KOR01
1990 08 23.86	S	4.3	AA	5.0	B		7	&20				GON04
1990 08 23.87	I	4.8	AC	0.0	E		1					MOE
1990 08 23.88	S	3.4	AC	20	T	10	77	1.7	6			TOM01
1990 08 23.88	S	3.6	SC	6.0	B	4	9	20	6	0.5	110	AND01
1990 08 23.88	S	3.9	SC	25.4	L	6	45	20	5	1.2	105	DAN01
1990 08 23.88	S	5.0	AC	15.2	L	5	44	14	6	1.8	110	MOE
1990 08 23.89	S	5.3	AC	15.2	L	5	100	12.5	6			MOE
1990 08 23.90	S	3.6	SC	5.0	B		7	28	6			DAH
1990 08 23.90	S	3.9	SC	5.0	B		7	19	6			WAR01
1990 08 23.90	S	3.9	SC	15	L	5	42	20		0.5	70	BEN03
1990 08 23.91	B	3.7	AA	6	R	4	20	64	9	0.57		VEZ
1990 08 23.91	S	4.4	SP	8.0	B		12					WES02
1990 08 23.92				20	T	10	100	12	8	0.3	98	WES02
1990 08 23.92	B	4.8	AC	5.0	B		7	13	7	2.8	110	MOE
1990 08 23.93	G	3.4	AA	0.0	E		1	&30	6			MIK
1990 08 23.93	M	3.8	A	5.0	B		20	50	7			GAL
1990 08 23.95	S	3.4	AA	0.0	E		1					PER01
1990 08 23.95	S	3.4	AA	3.4	B		9	&17	4/			PER01
1990 08 23.97	I	4.0	AA	0.0	E		1					PER01
1990 08 23.97	S	4.3	SC	8.0	B		20	8	4			SCH07
1990 08 23.98	B	3.7	SC	8.0	B		11	20	6			MAR06
1990 08 23.99	S	4.0:	SC	3.5	B		7	&18	4/	&0.5		GRA04
1990 08 24.03	B	4.5	SC	15.5	L	5	36	15	8	1	290	MAR02
1990 08 24.10	B	3.4	SC	0.0	E		1					CHE
1990 08 24.17	B	3.7	SC	1.0	E		1					HAL
1990 08 24.34	M	3.6	SC	0.0	E		1					SCO01
1990 08 24.44	B	4.5	A	5.0	B		10	5	5	0.5	315	SEA01
1990 08 24.49	B	4.4	A	5.0	B		10	5	5	0.5	315	SEA01
1990 08 24.66	B	4.1	A	5.0	B	4	10	25	5	3	90	ZHU
1990 08 24.67	B	4.2	A	5.0	B	4	7	25	4	2.3	100	KOR01
1990 08 24.75	G	4.1	A	0.0	E		1	20	4	1.2	100	KOR01
1990 08 24.78	B	4.1	A	5.0	B	4	10	25	5	3	90	ZHU
1990 08 24.83	S	3.3	SC	0.0	E		1	27	6/			BOA
1990 08 24.85	S	3.4	AC	20	T	10	77	2	6			TOM01
1990 08 24.86	I	4.5	AA	0.0	E		1					MOE
1990 08 24.87	S	3.6	SP	10.0	B		25	25	4	2		BOD01
1990 08 24.88	B	4.2	AA	5.0	B		7	&30	5/	>1		GOM
1990 08 24.88	M	3.7	A	5.0	B		20	30	7	1.75		GAL
1990 08 24.89	S	4.6	AA	15.2	L	5	44	12	7	1.9	100	MOE
1990 08 24.90	B	4.4	AA	5.0	B		7	&20		0.5	100	GON04
1990 08 24.90	I	4.3	AA	0.0	E		1					GON04
1990 08 24.94	S	3.9	SP	10.0	B		25	35	3			MEH
1990 08 24.99	I	4.2	AA	0.0	E		1					PER01
1990 08 24.99	M	4.2	AA	3.4	B		9					PER01
1990 08 24.99	S	3.5	AA	3.4	B		9	& 9	7			PER01
1990 08 24.99	S	3.7	AA	0.0	E		1					PER01
1990 08 25.00	B	4.5	AA	3.4	B		9					PER01
1990 08 25.00	I	4.5	AA	0.0	E		1					BRA02
1990 08 25.06	S	3.9	AA	5.0	B		7	&18	6	2.6	90	MIK
1990 08 25.19	B	3.8	AA	0.0	E		1	&30	8	5	100	ROB03
1990 08 25.25				5.0	B		10			3.0	75	HAL

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 25.25	B	3.5	SC	1.0	E		1					HAL
1990 08 25.29	M	3.4	SC	0.0	E		1		7	&3		SCO01
1990 08 25.42				25	L	4	80	14	8	0.75		GAR01
1990 08 25.42	M	3.7	A	0.0	E		1					GAR01
1990 08 25.44	B	4.4	A	5.0	B		10	5	3	0.5	315	SEA01
1990 08 25.53	B	4.2	A	5.0	B		10	5	3	0.5	315	SEA01
1990 08 25.69	B	4.2	A	5.0	B	4	10	25	4	2	90	ZHU
1990 08 25.69	B	4.3	A	5.0	B	4	7	20	4	1.7	85	KOR01
1990 08 25.70	G	4.4	A	0.0	E		1	15	4	1.0	90	KOR01
1990 08 25.80	S	3.4	AC	8.0	B		11	2	6			TOM01
1990 08 25.82	B	3.9	AC	8.0	B		10	12	7	0.3	75	AMO
1990 08 25.83	S	3.3	SC	0.0	E		1	27	6/			BOA
1990 08 25.83	S	3.5	SC	8.0	B		11	25	6	1.5		BOA
1990 08 25.87	B	4.5	AA	5.0	B		7					GON04
1990 08 25.87	I	4.4	AA	0.0	E		1					GON04
1990 08 25.87	S	4.4	AA	5.0	B		7	&20		0.5	90	GON04
1990 08 25.88	B	4.3	AA	5.0	B		7	14	7	0.8	90	MOE
1990 08 25.88	S	3.5	SC	4.2	B		7	18.2	6			FIE
1990 08 25.89	B	3.5	SC	5.0	B		7		7			MAR06
1990 08 25.89	B	4.5	AA	3.4	B		9					PER01
1990 08 25.89	I	4.1	AA	0.0	E		1					PER01
1990 08 25.89	I	4.3	AA	0.0	E		1					MOE
1990 08 25.89	M	3.9	AA	3.4	B		9					PER01
1990 08 25.89	N	8.2	S	31.6	L	5	62	10	6	1.0	100	MID01
1990 08 25.89	S	3.5	AA	3.4	B		9	&12	6/			PER01
1990 08 25.89	S	3.9	AA	0.0	E		1					PER01
1990 08 25.90				5.0	B		7	23	7	0.98	96	DAH
1990 08 25.90	S	4.4	AA	15.2	L	5	44	15	6	2.1	90	MOE
1990 08 25.91	M	3.6	A	5.0	B		20	25	7	1.5		GAL
1990 08 25.91	S	3.6	SC	0.7	E		1	20	6			DAH
1990 08 25.91	S	3.9	SC	15	L	5	42	20		0.7	100	BEN03
1990 08 25.92	O	3.5	AA	33.5	T	4	30	1		2.0	75	RIP
1990 08 25.92	S	3.5	SP	10.0	B		25	25	4	2		BOD01
1990 08 25.94	S	3.8	SC	0.7	E		1					GRA04
1990 08 25.95	B	4.2	S	5.0	B		7	40	6			COL02
1990 08 25.95	S	3.6	SC	0.0	E		1					FIE
1990 08 25.98	S	3.4	SC	8.0	B		20	25	6	2.0	90	DAN01
1990 08 26.05				31.7	L	6	55	8.8	7	&1.0	95	BOR
1990 08 26.05	M	4.0	HR	5.0	B		10	13	6	2.0	95	BOR
1990 08 26.05	S	4.0	HR	0.0	E		1	30	5	1.0	95	BOR
1990 08 26.06	B	4.2	Y	3.5	B		7	&40	6	2	315	ARC
1990 08 26.06	B	4.2:	Y	0.0	E		1					ARC
1990 08 26.08	B	3.9	Y	0.0	E		1					MEI01
1990 08 26.08	B	4.1	Y	2.0	B		7					MEI01
1990 08 26.08	B	4.6	Y	5.0	B		7					MEI01
1990 08 26.13	B	3.2	SC	0.0	E		1					CHE
1990 08 26.19	M	3.3	SC	0.0	E		1					SCO01
1990 08 26.23	S	3.0	AA	20.0	T	10	88	7.0	9	&4.5	75	SHA04
1990 08 26.30	B	4.4	SC	8.0	B		11	8.2	6	0.33	90	PRY
1990 08 26.46	M	3.7	A	0.0	E		1					GAR01
1990 08 26.58	B	3.8	A	5.0	B		10	5	6	0.5	300	SEA01
1990 08 26.71	B	4.3	A	5.0	B	4	7	18	4	1.3	80	KOR01
1990 08 26.71	B	4.3	A	5.0	B	4	10	25	4	2	90	ZHU
1990 08 26.83	B	3.5	AA	5	R	4	10	45	5	0.50		KUC
1990 08 26.85	S	3.9	SP	8.0	B		12					WES02
1990 08 26.86	I	4.1	AA	0.0	E		1	&15	6			MOE
1990 08 26.87				20	T	10	100	8	7	0.1	60	WES02
1990 08 26.87	B	3.6	AA	6	R	4	20	30	9	0.25		VEZ
1990 08 26.87	B	4.4	AA	3.4	B		9					PER01

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 26.87	I	4.1	AA	0.0	E		1					PER01
1990 08 26.87	M	4.0	AA	3.4	B		9					PER01
1990 08 26.87	S	3.5	AA	3.4	B		9	&15	5			PER01
1990 08 26.87	S	3.6	AA	0.0	E		1					PER01
1990 08 26.87	S	3.7	SC	8.0	B	4	20	17	6	0.5	100	AND01
1990 08 26.88	M	3.6	A	5.0	B		20	50	8			GAL
1990 08 26.88	S	3.7	SC	5.0	B		7	17	5	0.5	50	WAR01
1990 08 26.88	S	3.9	SC	8.0	B		12	15		0.5	80	BEN03
1990 08 26.88	S	4.3	AA	15.2	L	5	44	15	6	2.2	90	MOE
1990 08 26.88	S	4.5	AA	15.2	L	5	100	&13	5	0.4	40	MOE
1990 08 26.89				6.0	R	4	10	14	5	0.64	66	GRA04
1990 08 26.89	B	3.5	SC	8.0	B		11	19	6			MAR06
1990 08 26.89	B	4.1	AA	5.0	B		7	16	6	1.9	90	MOE
1990 08 26.89	S	3.5	SC	8.0	B		20	15	6	1.5	75	DAN01
1990 08 26.89	S	3.5	SC	8.0	B		20	25	5	0.7	70	EKL
1990 08 26.89	S	3.9	SC	0.7	E		1					GRA04
1990 08 26.90	N	8.0	S	31.6	L	5	62	7	5	0.9	102	MID01
1990 08 26.92	B	4.4	AA	5.0	B		7					GON04
1990 08 26.92	S	3.6	SC	5.0	B		7	23	6	1.22	86	DAH
1990 08 26.92	S	3.7	SC	0.7	E		1	&20	6			DAH
1990 08 26.92	S	4.3	AA	5.0	B		7	&20		0.5	80	GON04
1990 08 26.93	S	4.0	SC	8.0	B		20	15	6	0.6	70	SCH07
1990 08 26.97	N	8.8	S	20.3	T	10	80	8.5	5/	0.37	95	GRA04
1990 08 27.06		4.0	AA	0.0	E		1					SIM
1990 08 27.06	M	4.0	HR	5.0	B		10	11	6	2.0	75	BOR
1990 08 27.06	N	10.0		31.7	L	6	55	7.4	7			BOR
1990 08 27.06	S	4.0	HR	0.0	E		1	36	5/			BOR
1990 08 27.17		4.0	AA	0.0	E		1					SIM01
1990 08 27.20	B	4.4	SC	8.0	B		11	8.2	6	0.33	90	PRY
1990 08 27.22	B	5.0	AA	5.0	B		12					GRE
1990 08 27.22	S	3.6	AA	5.0	B		12	&16	7			GRE
1990 08 27.60	B	3.7	A	5.0	B		10	5	5	0.67	290	SEA01
1990 08 27.64	B	3.7	A	5.0	B		10	5	5	0.67	290	SEA01
1990 08 27.81	B	3.7	AA	5	R	4	10	35	4/	0.50		KUC
1990 08 27.84	I	4.1	AA	0.0	E		1					MOE
1990 08 27.85	B	4.1	AA	5.0	B		7	&15	6	1.2	90	MOE
1990 08 27.86	B	4.5	AA	6	R	4	20	17	7			VEZ
1990 08 27.90	M	3.8	A	5.0	B		20	35	7	1.0		GAL
1990 08 28.03				5.0	B		8	15		0.5		BRA02
1990 08 28.03	I	4.8	AA	0.0	E		1					BRA02
1990 08 28.15	M	4.1	HR	5.0	B		10	13	6	2.0	77	BOR
1990 08 28.15	S	4.1	HR	0.0	E		1	36	5			BOR
1990 08 28.16	B	3.7	AA	0.0	E		1					GRE
1990 08 28.17	S	3.7:	AA	5.0	B		12	&15	6/	&2		GRE
1990 08 28.35	S	4.0	SC	5.0	B		7	15	3	0.5	40	JON
1990 08 28.44	S	3.7	AA	0.0	E		1					SEA
1990 08 28.62	B	3.8	A	5.0	B		10	5	3	0.67	300	SEA01
1990 08 28.63	B	3.2	Y	5.0	B		7	45	5	1.1		NAK07
1990 08 28.82	B	4.8	AA	6	R	4	20	17	9			VEZ
1990 08 28.83	B	4.0	AA	5.0	B		7	15	6	1.1	90	MOE
1990 08 28.84	S	4.1	AA	15.2	L	5	44	14.5	5	1.8	90	MOE
1990 08 28.85	S	3.9	SC	8.0	B	4	20	12	6	1.5	45	DAN01
1990 08 28.86	B	4.7	AA	5.0	B		7					GON04
1990 08 28.86	I	4.0	AA	0.0	E		1					MOE
1990 08 28.86	S	4.4	AA	5.0	B		7	&20		0.5	90	GON04
1990 08 28.91	B	4.0	AA	3.4	B		9					PER01
1990 08 28.91	I	4.2	AA	0.0	E		1					PER01
1990 08 28.91	M	4.0	AA	3.4	B		9					PER01
1990 08 28.91	S	3.4	AA	3.4	B		9	&15	5/			PER01

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 28.91	S	3.7	AA	0.0	E		1					PER01
1990 08 28.91	S	4.2	AA	3.4	B		9		6/			AND04
1990 08 29.27				5.0	B		10			3.0	76	HAL
1990 08 29.27	S	3.5	SC	1.0	E		1					HAL
1990 08 29.33	S	4.1	SC	5.0	B		7	14	5	0.3	60	JON
1990 08 29.81	S	3.8	SC	8.0	B		20	10	6	1	45	DAN01
1990 08 29.84	S	4.0:	AA	15.2	L	5	44	&11	5	&0.6	90	MOE
1990 08 29.85	S	4.2:	SC	8.0	B		12	12		0.5	50	BEN03
1990 08 29.88	M	3.7	A	5.0	B		20	30	8	1.0		GAL
1990 08 29.99	I	4.4	AA	0.0	E		1					PER01
1990 08 29.99	M	4.5	AA	3.4	B		9					PER01
1990 08 29.99	S	3.7	AA	3.4	B		9	&19	6			PER01
1990 08 29.99	S	3.8	AA	0.0	E		1					PER01
1990 08 30.48	B	4.5	SC	20.0	L	5	68	10	7			CUR01
1990 08 30.83	S	3.5	AA	5.0	B		7	20	7			BAR
1990 08 30.85	B	4.5	AA	5.0	B		7					GON04
1990 08 30.85	M	3.6	A	5.0	B		20	25	6			GAL
1990 08 30.95	S	4.3:	AA	3.4	B		9	&10	6			PER01
1990 08 31.04	S	3.7	AA	5.0	B		12	&15	5/			GRE
1990 08 31.08	M	4.2	HR	5.0	B		10	13	6			BOR
1990 08 31.91	B	4.6	AA	3.4	B		9					PER01
1990 08 31.91	M	4.2	AA	3.4	B		9					PER01
1990 08 31.91	S	3.6	AA	3.4	B		9	&11	6			PER01
1990 09 01.43	S	4.3	SC	5.0	B		7	13				JON
1990 09 01.88	M	3.7	A	5.0	B		20	20	6			GAL
1990 09 01.98	B	4.7	AA	3.4	B		9					PER01
1990 09 01.98	M	4.5	AA	3.4	B		9					PER01
1990 09 01.98	S	4.2:	AA	3.4	B		9	& 9	7			PER01
1990 09 02.84	! S	4.4:	SC	3.5	B		7					GRA04
1990 09 02.84	! S	5.0:	SC	20.3	T	10	80	6	4			GRA04
1990 09 02.94	B	4.7	AA	3.4	B		9					PER01
1990 09 02.94	M	4.3	AA	3.4	B		9					PER01
1990 09 02.94	S	4.2	AA	3.4	B		9	&10	7			PER01
1990 09 04.13	S	4.0	AA	20.0	T	10	88	3.3	8			SHA04
1990 09 04.22	B	5.0	SC	8.0	B		11	4.1	5	0.03	80	PRY
1990 09 04.70	B	4.5:	AA	8.0	B		20			1		PEA
1990 09 06.36	S	4.0:	AA	0.0	E		1					SEA
1990 09 06.84	S	5.0	AA	3.4	B		9					PER01
1990 09 06.85	B	5.3	AA	5.0	B		7	&10				GON04
1990 09 07.20	M	4.7	SC	5.0	B		10			2	70	HAL
1990 09 07.38				5.0	B		10	9	6	3.5	84	SEA
1990 09 07.38	S	4.1	AA	0.0	E		1					SEA
1990 09 07.84	S	4.8	AA	3.4	B		9	&11	6/			PER01
1990 09 07.85	B	5.3	AA	5.0	B		7					GON04
1990 09 07.85	S	5.2	AA	5.0	B		7	&10				GON04
1990 09 08.08	S	4.4	AA	20.0	T	10	88	3.3	8	&4	310	SHA04
1990 09 08.83	S	5.4	AA	5.0	B		7	&10				GON04
1990 09 08.86	! B	4.9	AA	3.4	B		9					PER01
1990 09 08.86	! M	4.8	AA	3.4	B		9					PER01
1990 09 08.86	! S	4.6	AA	3.4	B		9	&10	5			PER01
1990 09 09.01	B	4.9	AA	3.5	B		7	&17	7/			GRE
1990 09 09.02	S	4.2	AA	5.0	B		12	&10	6/	&1		GRE
1990 09 09.03	S	4.7	AA	3.5	B		7					GRE
1990 09 09.14				5.0	B		10			4	87	HAL
1990 09 09.14	B	4.3	SC	1.0	E		1					HAL
1990 09 09.19	B	5.4	SC	8.0	B		11	4.0	5	0.12	80	PRY
1990 09 09.79	M	5.1:	AA	5.0	B		7	& 8	7	2.0	83	MIK
1990 09 09.84	! S	4.7	AA	3.4	B		9	&11	5			PER01
1990 09 11.04		4.8	A	0.0	E		1					DEA

Comet Levy 1990c [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 09 11.79	M	5.0	AA	5.0	B		7	& 8	6	0.7	83	MIK
1990 09 12.78	M	5.2	AA	5.0	B		7	& 7	6			MIK
1990 09 12.83	B	4.5	SC	6.0	B		20	15	7	0.75	300	MAR02
1990 09 12.83	O	4.5	AA	10	R	4	15	30		1.0	300	RIP
1990 09 12.84	B	5.6	AA	5.0	B		7					GON04
1990 09 12.84	S	5.2	AA	5.0	B		7	&10		?	85	GON04
1990 09 13.03		4.9	A	0.0	E		1					DEA
1990 09 13.84	! B	5.0	AA	3.4	B		9					PER01
1990 09 13.84	B	5.5	AA	5.0	B		7					GON04
1990 09 13.84	! S	5.1	AA	3.4	B		9	&10	6/			PER01
1990 09 13.84	S	5.4	AA	5.0	B		7			?	70	GON04
1990 09 15.84	! S	4.8	AA	3.4	B		9	&12	5			PER01
1990 09 16.02				15.2	L	10	76	& 2	6	0.25	270	ARC
1990 09 16.02	B	5.3	AA	3.5	B		7					ARC
1990 09 16.04	B	5.2	A	7.0	B		10	5.6		3.2	85	DEA
1990 09 17.04		5.2	A	0.0	E		1					DEA
1990 09 20.99		5.4	A	0.0	E		1					DEA
1990 09 24.54	B	5.4	AA	8.0	B		20	5	7	0.5	111	PEA
1990 09 25.48	B	5.2	AA	8.0	B		20	4.5	7	0.7		PEA
1990 09 26.52	B	5.3	AA	8.0	B		20	4	7/	0.9	95	PEA
1990 09 27.52	B	5.4	AA	8.0	B		20	4	7	0.9	110	PEA
1990 09 28.52	B	5.5	AA	8.0	B		20	4	7	0.55	109	PEA
1990 10 08.50	B	5.9	AA	8.0	B		20	4	7	1.1	119	PEA

Comet Tsuchiya-Kiuchi 1990i

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 17.18	S	8.9:	PI	41	L	4	83		4/			HAL
1990 07 17.93	S	8.4	A	12.0	B		20	3	4			LOO01
1990 07 18.90	S	9.4	AA	8.0	B		15	& 3	3			MIK
1990 07 19.22	! S	8.9	AC	5.0	B		10					HAL
1990 07 19.93	S	8.9	A	12.0	R		20	3.7	4			LOO01
1990 07 21.40				25	L	4	80	3	4			GAR01
1990 07 21.40	S	8.8	A	5.0	B		10					GAR01
1990 07 21.88	S	8.8	S	8.0	B		20	2.3	2			CAV
1990 07 21.88	S	8.8	S	8.0	B	5	20	3	2			BAR
1990 07 21.89	S	9.0:	AC	15.2	L	5	44	& 3	2			MOE
1990 07 21.89	S	9.5	AA	8.0	B		15	& 4	2			MIK
1990 07 21.91	S	9.0	S	10.0	B		14		3			HAS02
1990 07 22.12	S	8.9	GA	20.0	L	5	35	3	3			MOD
1990 07 23.31	S	8.9	AA	25	L	4	36					BUN
1990 07 24.20	M	8.8	NP	5.0	B		10					HAL
1990 07 24.39	S	8.9	SM	8.0	B		20	5	0			CAM03
1990 07 24.93	S	9.6	AA	8.0	B		20	4.3	2			SHA02
1990 07 25.14	S	9.3	GA	20.0	L	5	35	3.5	2			MOD
1990 07 25.39	S	8.9	SM	8.0	B		20	6	0			CAM03
1990 07 25.40	S	9.5:		20	L	7	35	3	2			CAM03
1990 07 26.02	B	8.6	S	14	S	4	19					CHE
1990 07 26.05	S	9.0	NO	31.7	L	6	68	1.9	2			BOR
1990 07 26.91	S	8.4	A	12.0	R		20	7	3			LOO01
1990 07 27.46	S	8.7	AA	8.0	B		20	5	4			PEA
1990 07 28.10	S	8.9	NO	20.0	L	5	34	4.5	2			BOR
1990 07 28.24	B	8.5	S	20	T	10	63	2.7	4			PRY
1990 07 28.47	S	8.7	AA	8.0	B		20	4	4			PEA
1990 07 29.24	B	8.7	S	20	T	10	63	2.5	4			PRY
1990 07 30.10	S	8.9	NO	31.7	L	6	68	& 3	1			BOR
1990 07 30.15	S	8.6	GA	20.0	L	5	35	2.5	3			MOD
1990 07 31.08	M	9.4	GA	20.0	L	5	35	2.5	3			MOD
1990 08 09.15	! M	8.6	AC	41	L	4	83					HAL

Comet Tsuchiya-Kiuchi 1990i [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 10.83	S	8.3	AC	25	L	6	56	4	2/			BOA
1990 08 10.91	S	7.8:	S	31.6	L	5	62	2	4			MID01
1990 08 11.91	S	7.5	S	7.0	B		10					DEA
1990 08 19.13	! M	8.3	AC	41	L	4	83					HAL
1990 10 10.24	S	6.9	AA	3.4	B		9					PER01
1990 10 10.24	S	7.6	AA	15	L		26	& 2.5	4			PER01

Periodic Comet Encke

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 01.44	I[	13.0		41	L	4	83					HAL
1990 08 02.33	S[	12.0	GA	40	L	7	52	! 1				MOD
1990 08 19.44	S[	11.8	PC	41	L	4	83	& 3				HAL
1990 08 24.45	S	11.1	WA	41	L	4	83		0			HAL
1990 08 25.43	S	11.2	WA	41	L	4	83					HAL
1990 08 27.38	S[	12.5	GA	40	L	7	52	! 1				MOD
1990 08 30.36	S	11.0:	AC	31.7	L	6	68	& 2				BOR
1990 08 30.38	S	12.6	GA	40	L	7	100	1.2	1			MOD
1990 08 30.46	S	11.0	PC	41	L	4	83					HAL
1990 08 31.35	S	10.8	AC	31.7	L	6	68	3	0			BOR
1990 09 01.35	S	10.8	AC	31.7	L	6	68	2.5	0			BOR
1990 09 01.35	S	12.4	GA	40	L	7	52	2.0	1			MOD
1990 09 14.98	S	10.5	V	20	T	10	100	2				KAR02
1990 09 16.00	S	9.8	AA	15.2	L	5	44	4	2			MOE
1990 09 16.38	S	9.4	AC	31.7	L	6	68	2.3	3			BOR
1990 09 16.98	S	9.7	AA	15.2	L	5	44	4	2			MOE
1990 09 18.35	S	10.8	GA	35.8	L	7	85	2.4	3			MOD
1990 09 18.37	S	9.2	AC	8.0	B		20	2.7	2			BOR
1990 09 18.37	S	9.3	AC	31.7	L	6	68	2.3	3			BOR
1990 09 21.06	S	10 :	A	20	L	8	80	1.5	0/			JAN02
1990 09 21.34	M	10.3	GA	35.8	L	7	45	2.5	4			MOD
1990 09 21.38	S	9.1	AC	8.0	B		20	5.3	4			BOR
1990 09 23.39	S	9.0	AC	8.0	B		20	5.1	4			BOR
1990 09 24.99	S	8.6	AA	15.2	L	5	44	5	3			MOE
1990 09 25.38	S	8.9	AC	8.0	B		20	4.5	4			BOR
1990 09 26.09	S	8.4	AA	15.2	L	5	44	6	3			MOE
1990 09 28.38	S	8.7	HR	8.0	B		20	4.5	5			BOR
1990 10 01.39	S	8.6	HR	8.0	B		20	3.5	5			BOR
1990 10 09.22	B	8.5	AA	15	L		26					PER01
1990 10 09.22	S	8.1	AA	15	L		26	& 3	5			PER01
1990 10 10.23	! B	8.3	AA	15	L		26					PER01
1990 10 10.23	! S	7.9:	AA	3.4	B		9	& 4				PER01
1990 10 10.23	! S	8.2	AA	15	L		26	& 2.5	5/			PER01
1990 10 11.12	S	7.8	S	6	R	7	17	5	5	&0.1	250	WAR01
1990 10 12.15	S	8.0:	S	16	R	12	111	6	5			WAR01

Periodic Comet Grigg-Skjellerup (1987 X)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 04 15.83	I[	14.0	AC	40.0	L	5	170					MER
1987 04 16.86	I[	14.5	AC	40.0	L	5	170					MER
1987 04 30.89	S	14.0:	AC	40.0	L	5	170	1.0	2			MER

Periodic Comet Tuttle-Giacobini-Kresák (1989b1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 26.74	S	12.2	VN	32	L	5	78	2.8	1			PEA
1990 01 27.75	S	11.9	VN	32	L	5	78	2.5	2			PEA

Periodic Comet Tuttle-Giacobini-Kresák (1989b1) [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 30.74	S	12.0	VN	32	L	5	78	2.2	1			PEA
1990 01 31.73	S	12.0	VN	32	L	5	78	2.5	1			PEA

Periodic Comet Tempel 1 (1972 V)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 03 12.91	N	15.5	NP	36.0	D	2						KLE01
1972 03 12.91	P	15	NP	36.0	D	2		0.83	7/			KLE01
1972 05 06.93	P	12.2	NP	15.0	M	2			8/			KLE01
1972 05 11.95	P	12.1	A	5.3	A	5						KLE01
1972 06 01.95	P	12.4	NP	5.3	A	5						KLE01

Periodic Comet Schwassmann-Wachmann 3 (1989d1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 22.75	S	12.2	VN	41	L	4	90	1.2	4/			PEA
1990 03 23.78	S	12.2	VN	41	L	4	90	1.0	4			PEA
1990 03 26.80	S	12.0	VN	41	L	4	90	1.1	4/			PEA
1990 03 27.79	S	12.0	VN	41	L	4	90	1.4	5			PEA
1990 03 28.79	S	11.9	VN	41	L	4	90	1.0	5	0.02	275	PEA
1990 03 29.10	S	11.7	A	28.5	T	10	113	& 1.5	2			COM
1990 04 03.84	S	11.5	VN	41	L	4	90	1.4	6	0.05	278	PEA
1990 04 04.80	S	11.5	VN	41	L	4	90	1.1	6	0.05	273	PEA
1990 04 05.81	S	11.4	VN	41	L	4	90	1.4	5/	0.08	269	PEA
1990 04 06.83	S	11.4	VN	41	L	4	90	1.5	5	0.04	275	PEA
1990 04 23.64	S	10.2	AA	25.4	L	4	95	2	7			SEA
1990 04 24.64	S	10.1	AA	25.4	L	4	71	3	5			SEA
1990 04 25.65	S	10.2	AA	25.4	L	4	71		5			SEA
1990 04 26.36	S	10.0	AA	20.0	L	5	35	1.0	1			MOD
1990 04 27.67	S	10.0	AA	25.4	L	4	71		5			SEA
1990 04 28.78	S	10.3	VN	25	L	6	70	1.5	2	0.58		CLA
1990 04 30.70	S	9.9	AA	25.4	L	4	71	3	6	0.07	245	SEA
1990 05 08.81	S	10.2	VN	25	L	6	70	1.5	2	0.58		CLA
1990 05 19.80	S	10.5	VN	25	L	6	70	2	4	0.33	235	CLA
1990 05 20.76	S	10.3	VN	25	L	6	70	2	4	0.58	235	CLA
1990 05 21.83	S	10.3	VN	25	L	6	70	2	4	0.67	235	CLA
1990 05 23.87	S	10.4	VN	25	L	6	70	2	4	0.62	235	CLA
1990 05 27.45	S	9.4	AC	20	L	6	55	2.3	4			BOR
1990 05 27.47	M	10.1	AC	20	L	6	55					HAL
1990 05 27.82	S	10.6	LM	20	L	7	56	3	5		45	CAM03
1990 05 29.82	S	10.7	LM	20	L	7	56	2	5	0.06	60	CAM03
1990 06 01.44	! M	10.2	AC	41	L	4	83					HAL
1990 06 02.83	S	10.1	LM	20	L	7	56	5	5			CAM03
1990 06 02.86	S	10.5	VN	25	L	6	70	1.5	3	0.5	240	CLA
1990 06 03.87	S	10.5	VN	25	L	6	70	1.5	3	0.5	240	CLA
1990 06 04.89	S	10.6	VN	25	L	6	70	1.5	3	0.42	240	CLA
1990 06 15.88	S	11.6	VN	41	L	4	90	1.3	4			PEA
1990 06 23.87	S	12.0	VN	41	L	4	90		4/			PEA
1990 06 24.45	! S	12.0	AC	41	L	4	83					HAL
1990 06 24.88	S	12.0	VN	41	L	4	90	1.3	4			PEA
1990 06 25.88	S	12.3	VN	41	L	4	90	1.4	4			PEA
1990 06 26.88	S	12.4	VN	41	L	4	90	1.2	4/			PEA
1990 06 27.87	S	12.6	VN	41	L	4	90	1.1	3/			PEA
1990 06 28.88	S	12.5	VN	41	L	4	90					PEA
1990 06 29.45	! S	12.4	AC	41	L	4	83					HAL
1990 06 30.89	S	12.4	VN	41	L	4	90		4			PEA
1990 07 02.87	S	12.3	VN	25.6	L	4	58	1.7	4			PEA
1990 07 25.33	S[	12.5	GA	40	L	7	52	! 1				MOD

Periodic Comet Honda-Mrkos-Pajdušáková (1990f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 24.89	S	12.4	VN	25.6	L	4	57	2.5	0			PEA
1990 07 25.33	S[	12.5	GA	40	L	7	52	! 1				MOD
1990 07 25.88	S	12.4	VN	41	L	4	90	2.5	0			PEA
1990 07 26.46	S	12.5:	AC	41	L	4	83		0/			HAL
1990 07 27.88	S	12.2	VN	41	L	4	90	3	0			PEA
1990 07 29.90	S	12.0	VN	41	L	4	90	2.5	0			PEA
1990 07 30.45	S	12.3:	AC	41	L	4	83					HAL
1990 07 30.88	S	11.8	VN	41	L	4	90	3	0/			PEA
1990 07 31.45	S	11.8	AC	41	L	4	83		0/			HAL
1990 08 01.81	S	10.6	LM	20	L	7	35	6	1			CAM03
1990 08 02.34	S	10.8	GA	40	L	7	52	2.5	1			MOD
1990 08 02.34	S	11.2	AC	31.7	L	6	68	2.6	1			BOR
1990 08 02.35	S	10.5	GA	20.0	L	5	35	2.5	0			MOD
1990 08 03.33	S	11.0	AC	31.7	L	6	68	2.4	0/			BOR
1990 08 16.90	S	9.4	AA	20	L	4	45	4	2			PEA
1990 08 19.12	S	8.3	S	8.0	B		20	2.4	1			CAV
1990 08 19.46	! M	9.1	PC	41	L	4	83					HAL
1990 08 19.91	S	9.0	AA	20	L	4	45	3	3			PEA
1990 08 20.89	S	8.8	AA	20	L	4	45	3.2	3			PEA
1990 08 21.89	S	8.7	AA	20	L	4	45	2.8	3/			PEA
1990 08 24.47	! M	8.6	WA	41	L	4	83					HAL
1990 08 25.11	S	8.7	AA	6.0	B		20	& 3	2			MIK
1990 08 29.38	S	8.2	AC	8.0	B		20	2.3	3			BOR
1990 08 30.38				31.7	L	6	68	1.9	5			BOR
1990 08 30.38	S	8.3	AC	8.0	B		20	2.3	4			BOR
1990 08 30.41	M	8.4	AA	20.0	L	5	35	1.0	5			MOD
1990 08 30.48	S	7.8	CA	5.0	B		10					HAL
1990 08 31.38	S	8.3	AC	8.0	B		20	2.6	4/			BOR
1990 08 31.39	M	8.6	AA	20.0	L	5	35	1.0	5			MOD
1990 09 01.38	I	8.4	AA	7.0	B		10	1	8			MOD
1990 09 04.38	S	8.0	HR	8.0	B		20	1.5	5			BOR
1990 09 09.39				31.7	L	6	55	0.8	6			BOR
1990 09 09.39	S	7.9	HR	8.0	B		20	1.1	6/			BOR
1990 09 10.20	S	7.9	AA	15	L	4	26	& 1.5	8			PER01
1990 09 18.39				31.7	L	6	68	1.5	7	?0.1	310	BOR
1990 09 18.39	S	8.4	HR	8.0	B		20	2.0	7			BOR
1990 09 18.41				35.8	L	7	85	0.7	7	0.03	285	MOD
1990 09 18.42	S	8.3	AA	20.0	L	5	35	0.7	6			MOD
1990 09 21.39				35.8	L	7	45	1	7	0.05	290	MOD
1990 09 21.39	I	8.2	AA	3.5	B		7		9			MOD
1990 09 21.39	S	8.3	HR	8.0	B		20	1.5	7			BOR
1990 09 25.39	S	8.7	HR	8.0	B		20	1.5				BOR
1990 10 01.40	S	9.5	AC	31.7	L	6	55	1.1	5			BOR

Periodic Comet Kohoutek (1987 XXVII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 12 18.81	S	13.2	AC	20	L	6	106	1.1				NAK01
1987 12 19.73	S	13.0	AC	20	L	6	106	1.1	2/			NAK01
1987 12 24.79	S	12.9	AC	20	L	6	106	1.4				NAK01
1987 12 26.68	S	12.8	AC	20	L	6	106	1.8	2			NAK01
1987 12 27.77	S	12.9	AC	20	L	6	106	1.5	3			NAK01
1988 01 23.59	S	13.1	AC	20	L	6	106	1.4				NAK01

Periodic Comet Machholz (1986 VIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 05 30.00	S	12.7:		29.8	L	5	62					KEI

Periodic Comet Borrelly (1987 XXXIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 09 19.74	S	11.8	AC	20	L	6	106	1.3	5/			NAK01
1987 10 02.72	S	11.2	AC	20	L	6	106	1.6	4			NAK01
1987 10 03.76	S	11.3	AC	20	L	6	106	1.5	4/			NAK01
1987 10 19.74	S	10.3	AC	20	L	6	65	3.5	4			NAK01
1987 10 21.75	S	10.0	AC	20	L	6	65	3	5			NAK01
1987 10 27.74	S	9.6	AC	20	L	6	65	4	5			NAK01
1987 11 15.56	S	8.4	AC	20	L	6	58	4	6			NAK01
1987 11 16.93	S	8.3	AA	5.0	B		20	5	4			DES01
1987 11 17.57	M	8.7	S	12.0	B		20	3.5	5			MIT
1987 11 17.57	S	8.5	AA	13	L	6	24	4	3			ISH02
1987 11 21.58	M	8.5	S	12.0	B		20	4.4	5			MIT
1987 11 21.61	S	8.5	AA	13	L	6	24	4	4			ISH02
1987 11 22.51	S	7.9	AC	20	L	6	46	6	7			NAK01
1987 11 22.54	S	8.3	AA	13	L	6	24	5	3			ISH02
1987 11 22.97	S	7.6	AA	5.0	B		10					KEI
1987 11 22.97	S	7.6	AA	8.0	B		20	6.3	7	0.17	134	KEI
1987 11 23.54	S	8.4	AA	13	L	6	24	4	3			ISH02
1987 11 24.52	M	8.0	AA	12.0	B		20	4	5			MIT
1987 11 24.53	S	8.2	AA	13	L	6	24	5	4			ISH02
1987 11 24.56	S	7.9	AC	20	L	6	46	7	7	?	20	NAK01
1987 11 25.55	S	8.3	AA	13	L	6	62	4	3			ISH02
1987 11 25.57	S	7.7	AC	20	L	6	46	6	6/			NAK01
1987 11 26.99	S	7.6	AA	8.0	B		20	3.6				KEI
1987 11 27.99	S	7.6	AA	8.0	B		20	3.6	5/			KEI
1987 11 29.57	M	8.0	AA	12.0	B		20	4.0	5			MIT
1987 12 01.54	S	8.1	AC	20	L	6	46	4	7			NAK01
1987 12 02.45	S	8.5	AA	13	L	6	62	3	3			ISH02
1987 12 03.43	S	8.3	AA	13	L	6	62	3	2			ISH02
1987 12 08.48	S	8.2	AA	13	L	6	24	4	3			ISH02
1987 12 13.42	S	7.9	AC	20	L	6	46	7	5/			NAK01
1987 12 13.60	M	8.2	AA	12.0	B		20	3.8	5			MIT
1987 12 14.56	S	7.7	AC	20	L	6	46	6	6	?	80	NAK01
1987 12 14.99	S	7.2	AA	5.0	B		20	10	2			DES01
1987 12 15.42	S	7.9	AA	13	L	6	62	4	3			ISH02
1987 12 16.43	M	8.2	AA	12.0	B		20	3.8	5			MIT
1987 12 16.43	S	7.9	AA	13	L	6	24	4	3			ISH02
1987 12 16.51	S	7.7	AC	20	L	6	46	7.5	6	?	80	NAK01
1987 12 17.47	M	8.3	AA	12.0	B		20	4.5	5			MIT
1987 12 17.47	S	7.9	AA	13	L	6	24	5	3	0.17		ISH02
1987 12 19.47	S	7.6	AC	20	L	6	46	8	6	?	70	NAK01
1987 12 19.93	S	8.0	A	5.0	B		7	12	2			MER
1987 12 19.98	S	7.2	AA	5.0	B		20	14	3			DES01
1987 12 20.47	S	7.9	AA	13	L	6	24	5.5	3	0.17		ISH02
1987 12 21.46	S	7.8	AA	13	L	6	24	6	3	0.17		ISH02
1987 12 21.51	M	8.3	AA	12.0	B		20	4.2	6			MIT
1987 12 21.56	S	7.9	AC	20	L	6	46	6.5	6	?	85	NAK01
1987 12 22.45	S	8.0	AA	13	L	6	24	4	3	0.10		ISH02
1987 12 23.04	S	7.7	AA	5.0	B		20	15	3			DES01
1987 12 23.05	S	7.6	AA	15.0	L	6	55	17	6			DES01
1987 12 23.45	S	7.9	AA	13	L	6	24	5	3			ISH02
1987 12 23.49	S	8.0	AC	20	L	6	46	6	6	?	70	NAK01
1987 12 24.39	S	8.1	AA	13	L	6	24	4	3			ISH02
1987 12 24.90	S	7.6	AA	5.0	B		10	6.7	6/			KEI
1987 12 24.90	S	7.7	AA	8.0	B		20	5.9	7	0.20	35	KEI
1987 12 25.39	M	8.4	AA	12.0	B		20	4.4	5			MIT
1987 12 25.51	S	7.9	AA	13	L	6	24	4	3			ISH02
1987 12 26.46	S	7.9	AA	13	L	6	24	5	3	0.17		ISH02
1987 12 26.51	S	7.8	AC	20	L	6	46	6.5	5	?	75	NAK01
1987 12 27.41	S	8.2	AA	13	L	6	62	3	2			ISH02

Periodic Comet Borrelly (1987 XXXIII) [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 12 28.47	S	8.3	AA	13	L	6	62	3	3			ISH02
1987 12 30.41	S	8.0	AA	13	L	6	62	3	2			ISH02
1987 12 31.41	S	8.3	AA	13	L	6	62	3	3			ISH02
1988 01 01.44	S	8.0	AA	13	L	6	62	3	3			ISH02
1988 01 06.47	S	8.2	AA	13	L	6	24	4	3			ISH02
1988 01 07.78	S	7.8	AA	5.0	B		10	6.8	5/			KEI
1988 01 08.49	M	8.7	S	12.0	B		20	4	5			MIT
1988 01 08.53	S	8.2	AA	13	L	6	24	4	3			ISH02
1988 01 09.49	S	8.0	AC	20	L	6	46	6.5	5			NAK01
1988 01 10.43	S	8.1	AC	20	L	6	46	5.5	5	?	100	NAK01
1988 01 10.45	S	8.3	AA	13	L	6	24	4	3	0.08		ISH02
1988 01 11.48	S	8.3	AA	13	L	6	24	4	3	0.08		ISH02
1988 01 11.97	S	7.5	AA	5.0	B		10	9.6	4/			KEI
1988 01 13.43	S	8.7	AA	13	L	6	44	3	3			ISH02
1988 01 13.48	S	8.4	AC	20	L	6	46	5.5	5/	?	90	NAK01
1988 01 14.46	S	8.8	AA	13	L	6	24	3	3			ISH02
1988 01 14.50	M	8.8	S	12.0	B		20	4.4	3			MIT
1988 01 14.77	S	7.6	AA	5.0	B		10	5.6	5/			KEI
1988 01 17.44	S	8.9	AA	13	L	6	24	5	3			ISH02
1988 01 17.46	S	8.4	AC	20	L	6	46	4.5	5			NAK01
1988 01 18.43	S	8.9	AA	13	L	6	24	5	3			ISH02
1988 01 20.43	S	9.1	AA	13	L	6	44	3	2			ISH02
1988 01 23.46	M	9.2	S	12.0	B		20	& 3.5	5			MIT
1988 01 23.53	S	8.7	AC	20	L	6	46	4.5	5	?	90	NAK01
1988 01 23.56	S	9.2	AA	13	L	6	24	4	3			ISH02
1988 01 24.46	S	8.9	AC	20	L	6	46	4.5	5			NAK01
1988 01 24.48	S	9.3	AA	13	L	6	44	4	3			ISH02
1988 01 25.44	S	9.5	AC	13	L	6	62	3	1			ISH02
1988 01 27.42	S	9.5	AC	13	L	6	62	3	2			ISH02
1988 01 28.43	S	9.6	AC	13	L	6	62	3	2			ISH02
1988 02 03.44	S	9.8	AC	13	L	6	62	2.5	2			ISH02
1988 02 04.41	S	9.7	AC	13	L	6	62	3	2			ISH02
1988 02 05.45	S	9.8	AC	13	L	6	44	3	2			ISH02
1988 02 06.48	S	9.2	AC	20	L	6	46	3.0	4			NAK01
1988 02 07.45	S	9.4	AC	20	L	6	46	3.5	3			NAK01
1988 02 07.48	S	9.6	AA	16	L	6	31	3	3			MIT
1988 02 08.44	S	10.0	AC	13	L	6	44	3	2			ISH02
1988 02 10.44	S	9.4	AC	20	L	6	58	3.5	4			NAK01
1988 02 10.48	S	9.9	AC	13	L	6	44	3	2			ISH02
1988 02 13.48	S	10.1	AC	20	L	6	58	2.5	4/			NAK01
1988 02 16.48	S	10.4	AC	13	L	6	44	2	1			ISH02
1988 02 16.49	S	10.4	AC	16	L	6	31	2				MIT
1988 02 19.43	S	10.4	AC	13	L	6	44	2	1			ISH02
1988 02 20.47	S	10.6	AC	13	L	6	44	2	1			ISH02
1988 02 21.45	S	10.3	AC	20	L	6	58	4	3			NAK01
1988 02 21.46	S	10.6	AC	13	L	6	62	2	1			ISH02
1988 03 06.47	S	11.0	AC	13	L	6	44	2	1			ISH02
1988 03 08.49	S	11.1	AC	13	L	6	44	2	1			ISH02
1988 03 10.45	S	11.2	AC	13	L	6	64	2	1			ISH02
1988 03 12.44	S	10.7	AC	20	L	6	58	3	5			NAK01
1988 04 09.47	S	12.3	AC	20	L	6	106	1.2				NAK01
1988 04 10.49	S	12.6	AC	20	L	6	106	1.3				NAK01

Periodic Comet Kopff (1988k)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 06 22.43	I	[13.0		41	L	4	183					HAL
1990 06 29.44	I	[13.0		41	L	4	183					HAL

Periodic Comet Gunn

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 06 02.44	I	[13.0		41	L	4	183					HAL
1990 06 22.42	I	[13.0		41	L	4	244					HAL
1990 08 30.39	I	[13.5		41	L	4	244					HAL

Periodic Comet Wild 4 (1990a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 24.54	S	13.5	VN	32	L	5	224	0.6	5			PEA
1990 01 26.52	S	13.4	VN	32	L	5	224	0.6	5			PEA
1990 01 27.56	S	13.4	VN	32	L	5	224	0.9	4			PEA
1990 01 30.53	S	13.2	VN	32	L	5	224	1.0	5	0.02	310	PEA
1990 01 31.21	M	12.7	AC	31.8	L	4	150	0.8	2			KEE
1990 01 31.55	S	13.4	VN	32	L	5	224	1.0	5			PEA
1990 02 01.03	S	12.7:	A	28.5	T	10	113		2			COM
1990 02 03.15	S	12.4	A	28.0	T	10	113	& 1	3			COM
1990 02 09.80	S	12.3	A	28.0	T	10	112	& 0.7	2/			COM
1990 02 15.57	S	12.3:	VN	25	L	6	135	1	0			CLA
1990 02 17.00	S	12.5	A	28.0	T	10	112	& 0.8	3			COM
1990 02 18.61	S	12.2	VN	25	L	6	135	1	2			CLA
1990 02 21.93	S	12 :	A	28.0	T	10	112	& 0.8	2/			COM
1990 02 21.97	S	12.0	A	31.0	J	6	60	0.5	6			FEI
1990 02 22.91	S	12.2	A	28.0	T	10	112	& 0.7	3/			COM
1990 02 25.60	S	12.0	VN	25	L	6	135	1	2			CLA
1990 03 03.50	M	12.0	GA	25.4	L	4	114					SEA
1990 03 03.50	M	12.0	L	25.4	L	4	114					SEA
1990 03 14.50	S	12.8	VN	41	L	4	200	1.0	3/			PEA
1990 03 16.97	S	12.8	A	28.0	T	10	112	& 0.5	2			COM
1990 03 18.54	S	12.9	VN	41	L	4	200	0.9	4			PEA
1990 03 19.52	S	12.8	VN	41	L	4	90	1.0	3			PEA
1990 03 20.53	S	12.9	VN	41	L	4	90	1.0	3/			PEA
1990 03 23.53	S	12.9	VN	41	L	4	90	1.0	3			PEA
1990 03 23.81	S	12.0	AC	20.3	T	10	156	< 1	7			HAS02
1990 03 25.86	S	12.9	VB	30	R	18	235	1.1	3			SHA02
1990 03 27.53	S	12.9	VN	41	L	4	90	1.1	3/			PEA
1990 03 28.52	S	13.0	VN	41	L	4	90	1.0	3			PEA
1990 04 16.49	S	13.3	VN	41	L	4	90	0.5	3			PEA
1990 04 17.48	S	13.0	VN	41	L	4	90	1.1	3			PEA
1990 04 28.65	S	13.3	VN	41	L	4	92	1	0			CLA
1990 05 21.91	S	13.0	AC	25.4	J	6	115	0.8	3/			BOU
1990 05 25.90	S	13.0	AC	25.4	J	6	88	0.8	3			BOU
1990 06 19.20	M	12.9	AC	41	L	4	183					HAL

Periodic Comet Russell 3 (1989d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 28.98	S	15.0:	AC	52.0	L	4	265	0.25	5/			BOU
1990 06 02.40	I	[13.5		41	L	4	183					HAL
1990 06 17.30	I	[13.5		41	L	4	183					HAL

Periodic Comet Kearns-Kwee (1972 XI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 02 27.87	P	14.8	NP	36.0	D	2						KLE01
1973 03 09.89	P	13.5	NP	36.0	D	2		< 0.5	7	0.02	292	KLE01

Periodic Comet Peters-Hartley (1990d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 04 17.54	S	[13.5	VN	41	L	4	380					PEA

Periodic Comet Peters-Hartley (1990d) [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 27.40	S	13.0	SM	20	L	7	56	4	4			CAM03
1990 05 29.58	S	13.0	SM	20	L	7	56	3	5			CAM03
1990 06 15.51	S	13.2	VN	41	L	4	200	1.0	0			PEA
1990 06 16.22	S	12.8:	AC	41	L	4	183					HAL
1990 06 17.22	S	12.6	AC	41	L	4	83		1			HAL
1990 06 17.46	S	12.8	LM	20.3	L	7	56	4	3			CAM03
1990 06 20.44	S	13.0	GA	25.4	L	4	114					SEA
1990 06 24.56	S	12.9	VN	41	L	4	90	1.4	1			PEA
1990 06 25.56	S	12.9	VN	41	L	4	90	1.2	1			PEA
1990 06 26.56	S	13.0	VN	41	L	4	90	1.1	1/			PEA
1990 07 13.20	S	13.0	AC	41	L	4	83					HAL
1990 07 26.48		[13.0		20	L	7	56					CAM03

Periodic Comet Boethin (1986 I)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 02 26.81	S	8.9	AA	8.0	B		20	2.9				KEI
1986 02 26.81	S	9.5	AA	29.8	L	5	62	2.3	3/		175	KEI
1986 02 27.81	S	9.1	AA	8.0	B		20	3.3	4			KEI
1986 03 03.83	S[	9.5	AA	5.0	B		10					KEI
1986 03 07.90	S	9.8	PB	20.0	T	10	78	2.3	2			KEI
1986 03 08.86	S	9.6	PB	20.0	T	10	78	2.4	4			KEI
1986 03 09.86	S	9.7	PB	20.0	T	10	78	2.8	3/			KEI

Periodic Comet Brorsen-Metcalf (1919 III = 1989o)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1919 09 01.47		5.8:	HR	0.0	E		1					SEL01
1919 09 02.54		5.6	HR	0.0	E		1					SEL01
1919 09 03.39		5.6	HR	0.0	E		1					SEL01
1919 09 04.40		5.4	HR	0.0	E		1					SEL01
1919 09 05.46		5.3	HR		B		6					SEL01
1919 09 07.55		4.8	HR		B		6					SEL01
1919 09 12.37	O	6.4	UX	8.1	R							VAS01
1919 09 14.30	O	6.7	UX	8.1	R							VAS01
1919 09 15.36		5.0	HR	0.0	E		1					SEL01
1919 09 17.33	O	5.1	HR	8.1	R							VAS01
1919 09 18.30		5.0	HR	0.0	E		1					SEL01
1919 09 18.34	O	4.9	HR		B		2					VAS01
1919 09 19.3	O	5.1	HR	8.1	R							NAB
1919 09 20.3	O	4.8	HR	8.1	R							NAB
1919 09 21.3	O	4.8	HR	8.1	R							NAB
1919 09 23.2	O	4.7	HR	8.1	R							NAB
1919 09 24.2	O	5.2	HR	8.1	R							NAB
1919 09 25.2	O	4.8	HR	8.1	R							NAB
1919 09 29.59		4.6	HR	0.0	E		1					SEL01
1919 10 02.58		4.8	HR	0.0	E		1					SEL01
1919 10 07.60		4.5	HR	0.0	E		1					SEL01
1989 07 12.03	S	10.7	AA	30	R	18	95	0.8	2			SHA02
1989 07 16.05	S	8.9	A	25.4	J	6	60	2.5	2/			FEI
1989 07 28.91	K	8.4	S	8.0	B	4	10	7	1			EFI
1989 07 29.94	K	8.2	S	8.0	B	4	10	8	2			EFI
1989 07 31.95	S	7.8	AA	8.0	B		20	4.1	4			SHA02
1989 08 01.04	S	6.5	A	3.5	B		7	6	4			FEI
1989 08 01.96	K	7.5	S	8.0	B	4	10	10	4	0.17		EFI
1989 08 02.96	S	7.2	S	11.0	B	10	25	6	2			OST
1989 08 03.00	K	7.4	S	8.0	B	4	10	10	4			EFI
1989 08 03.92	S	6.8	S	11.0	B	10	25	4	4			OST
1989 08 03.98	K	7.3	S	8.0	B	4	10		4	0.9		KHA

Periodic Comet Brorsen-Metcalf (1989o) [Cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 04.99	S	7.9	AA	8.0	B		20	5.4	5			SHA02
1989 08 06.96	K	7.1	S	8.0	B	4	10	10	4	2.1	266	EFI
1989 08 07.90	S	6.9	S	11.0	B	10	25	4	4			OST
1989 08 10.98	K	6.4	S	8.0	B	4	10	10	4	2.0	276	KHA
1989 08 12.87	S	6.3	S	11.0	B	10	25	9	5			OST
1989 08 13.88	S	6.6	S	11.0	B	10	25	9	5			OST
1989 08 14.04	K	6.6	S	8.0	B	4	10	8.5		1.3	285	EFI
1989 08 15.98	S	6.0	S	11.0	B	10	25	8	4			OST
1989 08 17.07	S	6.1	AA	8.0	B		10	4.1	6			SHA02
1989 08 17.10	S	5.5	A	4.0	B		12	&10	5			FEI
1989 08 23.98	K	5.6	S	8.0	B	4	10	5	6			EFI
1989 08 29.01	K	5.4	S	8.0	B	4	10		7	3.5		EFI
1989 08 29.04	B	6.2	S	5.0	B		7	5	6	2.5	330	OST
1989 08 30.04	B	6.2	S	5.0	B		7	4		1.5		OST
1989 09 01.12	S	5.7	AA	8.0	B		10	5.7	8	0.7	305	SHA02
1989 09 02.00	K	5.6	S	8.0	B	4	10	2	5	1.5		EFI
1989 09 03.03	B	6.0	S	5.0	B		7					OST

Periodic Comet Schwassmann-Wachmann 1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 06 02.43	I	[12.5		41	L	4	183					HAL
1990 06 20.40	I	[13.0		41	L	4	183					HAL
1990 06 24.43	I	[13.5		41	L	4	183					HAL
1990 07 01.44	I	[13.5		41	L	4	244					HAL
1990 07 20.37	I	[13.0		41	L	4	183					HAL
1990 07 25.32	S	[13.0	GA	40	L	7	52	! 1				MOD
1990 07 26.43	I	[13.0		41	L	4	183					HAL
1990 08 01.43	I	[13.5		41	L	4	183					HAL
1990 08 15.34	I	[12.0		41	L	4	183					HAL
1990 08 17.25	I	[12.0		41	L	4	183					HAL
1990 08 19.40	S	[13.8	AC	41	L	4	183	& 1				HAL
1990 08 24.35	I	[13.5		41	L	4	183					HAL
1990 08 25.37	I	[13.5		41	L	4	183					HAL
1990 08 30.42	I	[13.5		41	L	4	183					HAL
1990 09 18.21	S	13.1	GA	35.8	L	7	85	1.0	2			MOD
1990 09 18.23	S	13.6	GA	20.0	L	5	167	& 0.5	0			MOD
1990 09 21.19	S	12.8	GA	40	L	7	52	1.2	2			MOD
1990 09 21.21	S	13.0	GA	40	L	7	100	1.2	2			MOD
1990 09 21.25	S	12.8	GA	35.8	L	7	85	1.2	2			MOD
1990 09 27.79	S	13.0	VN	41	L	4	90	1	1			PEA
1990 09 28.80	S	13.2	VN	41	L	4	90	1.3	1			PEA

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Corrigendum. In the July 1990 issue, page 76, second paragraph, under comment for Apr. 27.20, for "diffuse edige of fan" read "diffuse edge of fan"

Observers who still send observations for publication on paper are requested to either use ICQ report forms and/or strictly adhere to ICQ format, to prevent errors and reduce the amount of time necessary to process the data. The IHW report forms, while modelled after the ICQ form, have created problems both regarding date/time and comparison-star references. If your data have not been published in the ICQ within six months of sending them, you should assume that something in the format was incorrect (or illegible).

RECENT NEWS AND RESEARCH CONCERNING COMETS

Since compiling the July issue, we have learned of the deaths of two well-known visual discoverers of comets, Jack Bennett and Minoru Honda. Observations of comets discovered by both of these men appear in the tabulated data of this issue. Honda, discoverer of 12 comets and several novae, died at his home in Kurashiki, Okayama, Japan, on August 26 at the age of 77. Among his comets, the short-period comet Honda-Mrkos-Pajdušáková returns to perihelion every five years or so; this comet has one of the shortest orbital periods among known comets and has the small perihelion distance of $q = 0.54$ AU, allowing it often to get brighter than tenth magnitude, as seen from Earth when near perihelion.

Bennett, who died on May 30, is best known for finding the bright comet Bennett 1970 II. José A. S. Campos (Durban, South Africa) wrote in a letter dated June 4: "During the last few months, Jack had great difficulty in writing his letters; on his last card sent to me (some 3 weeks ago), Jack mentioned that if it was not for the arthritis, he would be (in his own words) '. . . conducting a voluminous correspondance with his many friends in the R.S.A., Australia, U.S.A., and elsewhere. . .' On the morning of May 24 (6 days before his death), I phoned him at the old age home (Motwa Haven), Pretoria, to let him know about David Levy's discovery of comet 1990c. Jack was very thrilled with the news. We also spoke briefly about the latest news on comet Austin 1989c_1. Little did I know that, according to Danie Overbeek, I was the last person of the astronomical community to speak to Jack. When he did hear my voice over the phone, I noticed that his own voice grew stronger — he obviously was pleased with my call and interested to know about comet 1990c. At that time, he told me that he was not too well and that we was feeling weak. Jack asked me to pass his regards and best wishes to his many friends here in South Africa and overseas, should I be writing to them. We lost a good friend and a great comet hunter. Jack was not married; he leaves a sister and a brother. His 5-inch apogee telescope, which he used to discover his two comets and the supernova in M83, was given by him, about a year ago, to the University of South Africa, Pretoria."

The year 1990 has seen two naked-eye comets, Austin 1989c_1 and Levy 1990c, dominate comet observers' attention. Comet 1989c_1 did not fulfill early hopes for a first- or second-magnitude comet, but it did reach 5th magnitude in April and May and was very well observed. When David Levy of Tucson, Arizona, discovered his sixth comet on May 20, comet 1990c was a tenth-magnitude small object moving slowly northeastward in Pegasus. Comet Levy 1990c sort of "rescued" comet Austin, as it reached maximum brightness near $m_1 \simeq 3.5$ in August. Both comets were well-placed for northern-hemisphere observers for many weeks while they were binocular objects, and thus a great many observations were made by professional and amateur astronomers, from which many papers will be published for years to come. Later in this article, I give some statistics regarding *ICQ* data that include these comets, but a quick glance through the pages of this issue will indicate the large number of observations made by amateurs of comets 1989c_1 and 1990c. Both comets had short ($\sim 1°$), broad dust tails and longer (several degrees), but very faint, gas tails.

The first ten months of 1990 has seen no fewer than thirteen comets brighter than $m_1 = 12$ under observation by visual observers, and another three comets brighter than $m_1 = 13$. This includes observations of an outburst of P/Schwassmann-Wachmann 1 in 1990 September, along with observations of such other predicted short-period comets as P/Schwassmann-Wachmann 3, P/Lovas 1, P/Honda-Mrkos-Pajdušáková, P/Tuttle-Giacobini-Kresák, and the brighter P/Encke.

Four new short-period comets and four new long-period comets had been discovered in 1990, as of this writing. Also, P/Peters-Hartley (1990d), P/Wolf-Harrington (1990e), P/Honda-Mrkos-Pajdušáková (1990f), P/Johnson (1990h), and P/Harrington-Abell (1990m) were recovered in the first ten months of 1990 — all recovered by Jim Scotti with the Kitt Peak 91-cm 'Spacewatch' telescope except P/Peters-Hartley (Rob McNaught at Siding Spring, Australia) and P/Johnson (Jim Gibson at Palomar); Hans Rickman and G. Tancredi independently recovered comet 1990m at Pic du Midi.

Other New Discoveries

Paul Wild of Switzerland found a short-period comet of photographs exposed 1990 Jan. 21 and 22. P/Wild 4 (1990a) was then near $m_1 = 13$, moving slowly northwestwards in Leo. This object, which has a 6-year orbital period, was followed by numerous visual observers from January until June, remaining in the brightness range $11 < m_1 < 13$ during the period.

Independent visual discoveries of comet 1990b were made by Kazimieras Černis in Lithuania on Mar. 14 and by Tsuruhiko Kiuchi and Yuji Nakamura in Japan on Mar. 16, when the object of $m_1 \sim 8.5$ was moving northeastward in Andromeda. This long-period comet reached perihelion on Mar. 17 at a distance of $q = 1.07$ AU, Comet Černis-Kiuchi-Nakamura 1990b faded very rapidly in April to $m_1 = 12$ and was not seen visually after mid-May.

Kiuchi was also a co-discoverer of comet 1990i, which he first located, visually and independently, on July 16. Three days earlier, the comet was photographed by Kiyoshi Tsuchiya, who then reported his find after inspecting the T-Max films. Upon discovery, comet Tsuchiya-Kiuchi 1990i was a fairly large (9′ coma) ninth-magnitude object moving southwestward in Coma Berenices. It slowly brightened to $m_1 \sim 8$ by mid-August, when it was lost in the solar glare. This long-period comet passed perihelion on Sept. 28 ($q = 1.10$ AU), after which it appeared in the morning sky as an object of $m_1 = 7.5$ in October.

(Continued on next page...)

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Rob McNaught found a long-period comet on a U.K. Schmidt Telescope plate taken by Shaun M. Hughes on June 19.6 UT. Comet McNaught-Hughes 1990g was then at $m_1 \sim 17$ and quite far south ($\delta = -65°$); it will pass perihelion on 1991 Feb. 27 at $q = 2.7$ AU. This comet may be observable visually with 30-cm or larger telescopes as a faint object ($m_1 \sim$ 13-14) when the comet passes opposition in April of next year.

Jean Mueller found two new faint short-period comets in the course of the second Palomar Sky Survey, on plates taken with the 48-inch (1.2-m) Oschin Schmidt Telescope. P/Mueller 2 (1990j) was found on a Sept. 15 plate ($m_1 \sim$ 17), and P/Mueller 3 (1990l) was found on plates taken Sept. 24 and 25 ($m_1 \sim 18$). Comet 1987 XXXI now becomes P/Mueller 1. P/Mueller 2 has an orbital period of 6.4 years, and P/Mueller 3 has one of 8.6 years.

Other News

The 'minor planet' (2060) Chiron has exhibited a faint, tenuous atmosphere or coma since 1989 April 10, when Karen J. Meech and Michael J. S. Belton (*IAUC* 4770) found a 0''.9 coma with the Kitt Peak 4-m reflector. As it nears perihelion on 1996 Feb. 6, it will be interesting to see how the coma develops. Although Commission 20 of the International Astronomical Union may be requested to drop Chiron from the list of numbered minor planets and call it a short-period comet, this probably will not happen; astronomers are increasingly realizing the difficulty in making rigid distinctions between all asteroids and all comets — there are comets that have very little outgassing left and also minor planets that may exhibit minute traces of levitated dust and/or sublimated ices, making a class of 'transition' objects.

The CRAF mission to a comet, with launch scheduled for 1995 or 1996, has survived the U.S. budget cuts for fiscal year 1991, although delays in funding may mean that the spacecraft may not visit P/Kopff, but rather a 'back-up' comet such as P/Tempel 2 or P/Wild 2.

New Comet Catalogue

The sixth edition of the *Catalogue of Cometary Orbits*, by Brian G. Marsden, was published several months ago, and is available for US$15.00 postpaid from the Minor Planet Center, Smithsonian Observatory, 60 Garden St., Cambridge, MA 02138, U.S.A. This latest edition contains 96 pages, and has 1292 orbits for 655 long-period comets (*i.e.*, those with orbital periods > 200 years) and 155 short-period comets. New to this edition of the *Catalogue* is a table listing 'original', osculating, and 'future' orbits of long-period comets. Also new is a convenient table listing only the preliminary letter designations for all comets, along with their corresponding Roman-numeral designations.

ICQ Archive

The fourth edition of the *ICQ* Photometric Archive of Comets on 9-track magnetic tape, containing information published in the *ICQ* through the July 1990 issue, is now available. It includes 35,371 observations of comets (where one observation is an 80-character ASCII line), of which 33,211 are magnitude estimates and 602 are limiting magnitudes for negative detections (LMNDs); thus more than 95 percent of the observations contain some sort of magnitude information. The archive includes data on 89 short-period comets and 138 long-period comets and spans the period 1909 to 1990. There are 17,676 magnitude estimates (plus 101 LMNDs) of long-period comets, and 15,535 magnitude estimates (plus 501 LMNDs) of short-period comets.

Following are the top 15 long-period comets in the archive, in terms of magnitude estimates (given in parentheses): Bradfield 1987 XXIX (1857); Liller 1988 V (1066); Kohler 1977 XIV (1040); Okazaki-Levy-Rudenko 1989r (909); Austin 1982 VI (829); Wilson 1987 VII (737); Bradfield 1979 X (579); Kobayashi-Berger-Milon 1975 IX (566); Sorrells 1987 II (530); Austin 1989c_1 (475); Panther 1981 II (473); Kohoutek 1973 XII (466); Hartley-Good 1985 XVII (448); Bradfield 1974 III (407); West 1976 VI (394). Note that, with the numerous magnitude estimates of comets Levy 1990c and Austin 1989c_1 in this issue, these comets vault to second and sixth places, respectively, among long-period comets; this means that 6 of the top 8 long-period comets, in terms of archival numbers, were observed in the last 3 years! Thus, we have seen numerous moderately-bright (maximum magnitude $\sim$ 4) comets in the past few years, although we are "overdue" for a really bright (mag < 0) comet.

The similar list for short-period comets is: P/Halley (6345); P/Giacobini-Zinner (890); P/Brorsen-Metcalf (805); P/Borrelly (665); P/Kopff (620); P/Churyumov-Gerasimenko (568); P/Tempel 2 (521); P/Stephan-Oterma (487); P/Schwassmann-Wachmann 1 (445, including 201 LMNDs); P/Tempel 1 (384); P/Encke (373); P/d'Arrest (328); P/Tuttle (316); P/Crommelin (297); P/Grigg-Skjellerup (219); P/Swift-Gehrels (199).

The top ten observers in the archive, in terms of numbers of total visual magnitude estimates of comets [given in parentheses as (positive detections)+(limiting magnitudes for negative detections)], are: Max Beyer (2186); John Bortle (2079+76); Albert Jones (1962+1); Charles Morris (1880+43); Reinder Bouma (1023+9); Andrew Pearce (883+46); Daniel Green (878+3); Alan Hale (763+315); Warren Morrison (666); Graham Keitch (663+1). Beyer's observations are still being entered into the archive from his numerous *Astron. Nachrichten* papers published during the 1930s to the early 1970s, so the above figure is preliminary (*i.e.*, it will increase); his observations are *not* included in the statistics listed in the preceding paragraph, and will not appear on the distributed magnetic tape until 1991.

— Daniel W. E. Green (1990 October 31)