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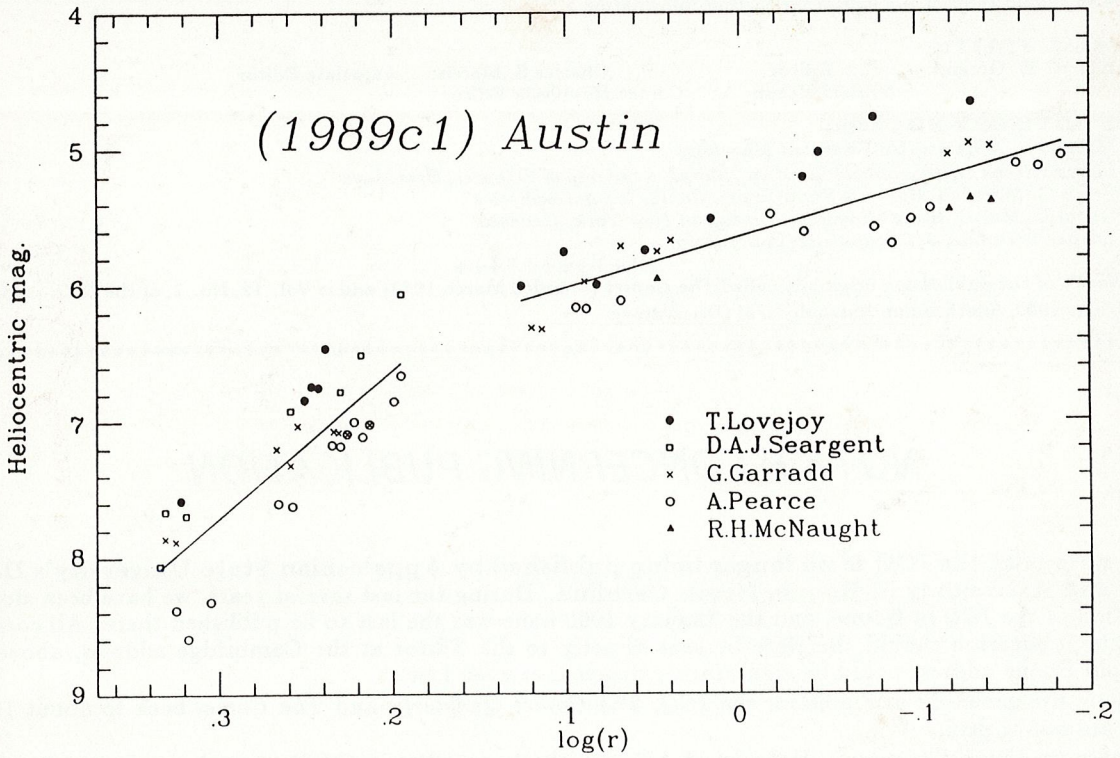

Above is a plot of the heliocentric magnitude of comet Austin 1989c$_1$ versus the logarithm of its heliocentric distance, produced by Rob H. McNaught. The heliocentric magnitudes are from 68 total visual magnitude estimates made by five observers in Australia during 1989 Dec. 25-1990 Mar. 20, and a distinct change in the rate of brightness increase is visible. The first line represents the formula $m_1 = 4.47 + 5 \log \Delta + 10.80 \log r$, and the second line is from $m_1 = 5.65 + 5 \log \Delta + 3.68 \log r$.

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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; the *ICQ* is also indexed in *Astronomy and Astrophysics Abstracts* and in *Science Abstracts Section A*.

The regular (invoiced) subscription rate is US$24.00 per year (price includes the annual *Comet Handbook*; the price without the *Handbook* is US$16.00 per year). Subscribers who do not wish to be billed may subscribe at the special rate of US$18.00 per year, or US$20.00/year outside North America (rates are $10.00 and $12.00, respectively, without *Handbook*). [The last set of digits (after the hyphen) on the top line of the mailing address label gives the Whole Number that signifies the last *ICQ* issue which will be sent under the current subscription status.] Make checks or money orders payable in U.S. funds to *International Comet Quarterly* and send to Daniel Green; Smithsonian Astrophysical Observatory; 60 Garden St.; Cambridge, MA 02138, U.S.A. [Group subscription rates available upon request.] Back issues are $4.00 each — *except* for the *Comet Handbook*, which is available for $10.00 ($8.00 to subscribers if ordered with their *ICQ* subscription; see above). Up-to-date information concerning comet discoveries, orbital elements, and ephemerides can be obtained by subscribing to the *IAU Circulars* and/or the *Minor Planet Circulars* (via postal mail and also available via computer access); for further information, contact the *ICQ* Editor at the above address.

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NOTICE CONCERNING PUBLICATION

Please note that the ICQ is no longer being published by Appalachian State University's Department of Physics and Astronomy in Boone, North Carolina. During the last several years, we have been slowly phasing out publication of the *ICQ* in Boone, and the January 1990 issue was the last to be published there. All correspondence regarding this publication should therefore be sent directly to the Editor at the Cambridge address, above. Anything sent to the old Boone address could be significantly delayed, or even lost.

Back issues are generally available for the *ICQ*, *The Comet Quarterly*, and *The Comet* back to about 1975, though some issues are out of print.

Once again we thank Thomas L. Rokoske of ASU for the tremendous amount of work on the publication end and for the invaluable support he has given to the *ICQ* over the last two decades. I was honored to be able to name minor planet (3736) Rokoske two years ago, in recognition of his efforts with the *ICQ*. Arrangements now have been made for the *ICQ* to become an official publication of the Smithsonian Institution's Astrophysical Observatory, and the slightly revised cover format reflects this change. Many thanks are also due to Brian G. Marsden for his continuing support of the *ICQ* at SAO during the past 12 years. — The Editor

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— CORRIGENDA —

• In the January 1990 issue, page 39, under "Electronic Sending of Comet Observations", 6th paragraph, second line, *for* Columns 6-7 *read* Columns 56-57, and *for* column 7 *read* column 57

• In the October 1989 issue, page 45, Periodic Comet Pons-Winnecke (1989g), last two lines, Charles Morris (MOR) is indicated as having two observations on Aug. 26.18; the second observation should in fact read "1989 08 27.18" for the date. The comment on page 40 has the correct dates given.

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TABULATION OF COMET OBSERVATIONS

Descriptive Information (to complement the Tabulated Data):

◇ *Comet Okazaki-Levy-Rudenko 1989r [NOTE: all photos by MIK below were with a 20-cm f/2 Baker-Schmidt camera using TP 2415 gas-hypered film]* ⟹ 1989 Sept. 20.17 UT: possible jets at p.a. 45° and 60° [SPR]. Sept. 30.79: 7-min exp. yields 2.′1 coma, DC = 7, faint 0.°7 tail [MIK]. Oct. 3.79: 8-min exp. yields 2.′6 coma, DC = 8, faint 0.°4 tail [MIK]. Oct. 5.03: at 167×, stellar central cond. of mag 11-12 [MOD]. Oct. 5.83: "dia. of central cond. 1.′5, coma clearly elliptical in p.a. ~ 80°" [AND01]. Oct. 19.74: 7-min exp. yields 2.′6 coma, DC = 8, 2.°4 tail in p.a. 18° [MIK]. Oct. 22.77: 5-min exp. yields 2′ coma, DC = 8, 2.°4 tail in p.a. 19° [MIK]. Oct. 22.78: visually, central cond. dia. 2′ [MIK]. Oct. 23.75: 8-min exp. yields 3′ coma, DC = 8, 3.°1 tail in p.a. 16°, split 30′ from the nucleus w/ several knots recorded; fan tail from p.a. 16° to 60° [MIK]. Oct. 23.77: "stellar nucleus", central cond. dia. 2.′5 [MIK]. Oct. 23.81: in 10×70 B, m_1 ~ 6, 2′ coma, DC = 8 [LUE]. Oct. 23.84: also 0.°25 tail in p.a. 322° [PLE01]. Oct. 24.74: 7-min exp. w/ Schott GG495 filter yields 2.′5 coma, DC = 8, 2.°1 tail that is split at 6′ from the nucleus and is kinked at 42′ from the nucleus from p.a. 8° to 17° [MIK]. Oct. 25.74: 5-min exp. yields coma dia. 2.′5, DC= 8, total tail length 3.°6, split 3.′4 from nucleus; tail disconnection from 1.°4 to 1.°9; first part of tail at p.a. 5°, changing to p.a. 15° after disconnection; fan from p.a. 5° to 65° [MIK]. Oct. 26.74: 6-min exp. yields coma dia. 2.′5, DC = 8, total tail length 3.°0, slightly curved beginning at p.a. 8° and ending at p.a. 14°; fan from p.a. 8° to 60° [MIK]. Oct. 27.73: 7-min exp. yields coma dia. 3.′4, DC = 8, total tail length 2.°9 in p.a. 3°; fan from p.a. 30° to 65° [MIK]. Oct. 28.73: 6-min exp. yields coma dia. 3′, DC = 8, straight tail 2.°7 long in p.a. 2° [MIK].

Nov. 6.19: at 13×, tails very weak; at 56×, coma dia. 2.′5, DC = 6, two weak tails ~ 0.°13 long in p.a. ~ 20° and 60°, m_2 ~ 9 [JAH]. Nov. 8.18: 7-min exp. yields coma dia. 2.′5, DC = 8, total tail length 3.°3 in p.a. 338°, split 24′ from nucleus in two parallel tails; the northern part is straight and narrow, while the southern has several kinks and knots; fan from p.a. 35° to 70° [MIK]. Nov. 8.21: at 56×, 2.′3 coma, DC = 5 [JAH]. Nov. 9.19: 5-min exp. yields coma dia. 2.′5, DC = 8, total tail length 2.°7 in p.a. 340°; cirrus clouds affected [MIK]. Nov. 11.18: 7-min exp. yields coma dia. 2.′6, DC = 8, total tail length 3.°6 in p.a. 328°; conspicuous knot is placed 1.°7 from nucleus [MIK]. Nov. 12.21: at 56×, 2.′7 coma, DC = 8, 0.°13 and 0.°10 tails in p.a. ~ 30° and 345° [JAH]. Nov. 16.20: in 5.0-cm R (56×), 3.′0 coma, DC = 5, 0.°20 and 0.°16 tails in p.a. ~ 25° and 335° [JAH]. Nov. 16.21: in 20.4-cm f/6 L (72×), coma dia. 3.′0, DC = 4, m_2 ~ 11, 0.°40 and 0.°20 tails in p.a. ~ 30° and 350° [JAH]. Nov. 17.20: in 5.0-cm R (56×), coma dia. ~ 4.′0, DC = 5, two ~ 0.°30 tails in p.a. ~ 25° and 335° [JAH]. Nov. 19.20: in 20.4-cm L, also 0.°14 and 0.°06 tails in p.a. ~ 75° and 358°; dia. of central cond. ~ 30″ [JAH]. Nov. 21.74: in 20-cm f/4.6 L (71×), 20′ tail [GAR01]. Nov. 23.18: in 20.4-cm L, also 0.°09 tail in p.a. 9° [JAH]. Nov. 25.71: in 20-cm f/4.6 L (71×), coma dia. 8′, DC = 6, 1.°2 tail in p.a. 285° [GAR01]. Nov. 27.20: 7-min exp. yields coma dia. 6′, DC = 7, total tail length 3.°9 in p.a. 287°; very conspicuous knot is placed 48′ from the comet nucleus; the main tail is split into several sub-tails [MIK]. Nov. 29.70: in 25.4-cm L, "coma appeared elongated ⊥ to tail" [SEA]. Nov. 30.70: in 20-cm f/4.6 L (71×), coma dia. 5′, 2.°0 tail in p.a. 280° [GAR01]. Nov. 30.70: in 25.4-cm f/4.5 L (71×), 0.°47 tail in p.a. 275°; "elongated coma probably due to dust feature to N of ion tail" [SEA].

Dec. 1.69: in 25.4-cm f/4.5 L (71×), 0.°01 ion tail in p.a. 275°, greatly fainter than in previous days; also 0.°006 tail in p.a. 320° that was a "broad (dust?) feature giving coma elongated appearance" [SEA]. Dec. 1.71: in 20-cm L (46×), tail in p.a. 270° [GAR01]. Dec. 4.77: in 20×80 B, tail very faint and broad; in 20-cm L, faint outer coma visible that was not seen in binoculars [PEA]. Dec. 10.81: comet had faded considerably since Dec. 8.81 [PEA]. Dec. 18.54: in 20-cm f/4.6 L (71×), 40′ tail [GAR01]. 1990 Jan. 5.71: in 41-cm f/4 L (90×), 0.°2 broad, diffuse tail in p.a. 48° [PEA]. Jan. 16.59 and 23.57: comet not visible in 25-cm f/5.6 L at 70× [CLA].

◇ *Comet Helin-Roman-Alu 1989v* ⟹ 1989 Nov. 20.83: "using a Lumicon Swan-band filter reveals a coma dia. of 3′ [KOR]. Nov. 22.80: with Swan-band filter, coma dia. 3.′5 [KOR]. Nov. 28.75: with Swan-band filter, coma dia. 2.′5 [KOR]. Nov. 30.75: with Swan-band filter, coma dia. 3′ [KOR]. 1990 Jan. 8.51: comet very vague and diffuse [HAL]. Jan. 23.00: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 11, coma dia. 3′, DC = 5 [MIK]. Jan. 24.51: "the comet is surprisingly bright and easy to see, considering its vague appearance earlier in January" [HAL]. Feb. 5.18: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 13.5, coma dia. 0.′2, two 4′ tails in p.a. 330° and 348° [MIK]. Feb. 19.27 and Feb. 24.33: limiting magnitude is for a large, low-surface-brightness coma [HAL]. Feb. 24.33: comet searched for both at 83× and 183×, both with and without C_2 filter [HAL].

◇ *Comet Aarseth-Brewington 1989a*$_1$ ⟹ 1989 Nov. 21.96-Dec. 23.47: "extinction corrections applied when necessary" [BOR]. Nov. 22.70 and Dec. 2.69: coma slightly elongated [JAN02] Nov. 22.70: also 0.°06 tail in p.a. 194°, m_2 ~ 11, possible anti-tail or jet in p.a. 194° [JAH]. Nov. 25.73: "with a Lumicon Swan-band filter, the coma dia. increases slightly while the contrast between coma and sky background is enhanced significantly" [KOR]. Nov. 28.19: in 20.4-cm L, also 0.°03 tail in p.a. 147°, elliptical coma; tail at p.a. 359° was curved to p.a. ~ 350° at end [JAH]. Nov. 28.95: in 31.7-cm L, m_2 = 11.5-12 [BOR]. Nov. 29.21: in 5.0-cm R (56×), m_2 ~ 9 [JAH]. Dec. 2.66: central cond. of dia. 1′ [AND01]. Dec. 7.22: in 5.0-cm R (56×), 2.′7 coma, DC = 7, tails of length 0.°31 and 0.°11 in p.a. 357° and 79°; m_2 ~ 9 [JAH]. Dec. 7.23: in 20.4-cm f/6 L (72×), 2.′0 coma, DC = 5, 0.°64 and 0.°07 tails in p.a. 353° and 44° [JAH]. Dec. 9.45: in 20×80 B, narrow tail [BOR]. Dec. 9.45: in 20.3-cm f/5 L (35×), very narrow tail; in 10×50 B, tail is 2-3× wider [MOD]. Dec. 10.24: in 5.0-cm R (56×), 2.′4 coma, DC = 6, 0.°18 tail in p.a. 0° [JAH]. Dec. 14.45: in 10×50 B, long thin tail [BOR]. Dec. 18.45: in 20×80 B, 2.′2 coma, DC = 8 [BOR]. Dec. 19.46: comet also seen with naked eye as a faint "star" [BOR]. Dec. 22.47: in 20×80 B, 1.′5 coma, DC = 9, "planetary nucleus" [BOR]. *(Continued...)*

(Cont. from page 43) 1989 Dec. 26.74: trace of tail in very bright sky [SEA]. Dec. 27.75: comet seen w/ naked eye [GAR01]. Dec. 29.73: visible to the naked eye [SEA]. Dec. 29.74: comet seen w/ naked eye, strong greenish color [GAR01]. Dec. 30.73: short, broad fan to N of main tail [SEA]. Dec. 30.83: broad, fan-shaped tail [PEA]. 1990 Jan. 2.75: in 20-cm f/4.6 L (71×), 2′ coma, DC = 7, 0°.67 tail in p.a. ~ 230° [GAR01]. Jan. 3.84: parabolic-shaped tail [PEA]. Jan. 17.38: in 20-cm f/4.6 L (71×), very broad 1°.0 dust tail [GAR01]. Jan. 22.45: in 20-cm f/4.6 L (71×), narrower 1°.0 tail in p.a. ~ 175° [GAR01]. Jan. 23.44: "virtually no coma; tail just appeared as a faint nebulous streak in the binocular field" [SEA].

◇ *Comet Austin 1989c*$_1$ ⟹ 1989 Dec. 17.45 UT: in 25.4-cm L, mag 12.6 central cond. [SEA]. 1990 Jan. 31.42: in 31.7-cm f/5 L (86×), mag 9.4, ref GA [JON]. Feb. 2.42: in 31.7-cm f/5 L (86×), mag 9.1, DC = 5 [JON]. Feb. 16.10: in 41-cm L, the beginning of a faint, featureless tail was seen pointing roughly southward [HAL]. Feb. 19.10: "tail is faint, fairly broad, and featureless; this tail was usually seen during most subsequent observations with the 41-cm L, but was never as long as it was during this observation" [HAL]. Feb. 24.10 and Mar. 15.10: a very faint fan seems to "shroud" the tail where it joins the coma [HAL]. Feb. 21.38: in 31.7-cm f/5 L (86×), faint tail suspected; DC = 5 [JON]. Feb. 25.06: tail was fan-shaped [PEA01]. Feb. 25.37: in 4.5-cm f/6 R (13×), mag 7.8 [JON]. Mar. 30.82: very narrow tail; "another 0°.1 tail at p.a. 110° [MID01]. Mar. 31.82: another 0°.05 tail in p.a. 110° [MID01]. Apr. 4.83: in 20.3-cm L, another tail ~ 0°.1 long at p.a. ~ 100° [GRA04]. Apr. 4.83: in 31.6-cm L, another tail 0°.1 long at p.a. 100° [MID01].

◇ *Comet Skorichenko-George 1989e*$_1$ ⟹ 1989 Dec. 29.74 UT: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (7-min exp.) yields mag ~ 10.5, dia. 1′, DC = 7, stellar central cond. with slight coma fanned to p.a. 222° [MIK]. 1990 Jan. 14.76: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (7-min exp.) yields mag ~ 9.5, coma dia. 3′, DC = 8, fan-shaped 5′ tail in p.a. 245 ° [MIK]. Jan. 17.74: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 9.5, coma dia. 1′.5, DC = 8, fan-shaped 4′ tail in p.a. 248° [MIK]. Jan. 21.75: coma appeared elongated in E-W direction [GRA04]. Jan. 22.10 UT: photograph on Tech Pan emulsion (41-cm L) shows a 12″ central cond. in a 28″ coma, and a 56″ long diffuse, faint tail in p.a. 235° [Paul Roques, Williams, AZ]. Jan. 27.13: short fan tail toward p.a. ~ 340 [MOR]. Jan. 28.12: "a faint, stubby tail-like structure extending a few arcmin to the NW was suspected" [HAL]. Jan. 28.13: short fan tail between p.a. ~ 310 and 340 [MOR]. Feb. 19.13: "the tail-like structure noticed on Jan. 28 was not seen on Feb. 16, but was suspected again during this observation" [HAL]. Feb. 21.79: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (6-min exp.) yields mag ~ 9, coma dia. 1′, DC = 7, fan-shaped 8′ tail in p.a. 270° [MIK]. Feb. 24.80: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 9, coma dia. 1′.2, DC = 7, fan-shaped 3′ tail in p.a. 260° [MIK]. Mar. 13.80: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (7-min exp.) yields mag ~ 9, coma dia. 1′.7, DC = 7, fan-shaped 12′ tail in p.a. 252°-318° [MIK]. Mar. 18.81: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (6-min exp.) yields mag ~ 9, coma dia. 1′.8, DC = 6, fan-shaped 5′ tail in p.a. 277°-330° [MIK]. Mar. 24.82: broad tail [MID01]. Mar. 28.90: in 25.6-cm f/4.5 L (96×), 3′ coma with central cond. of mag 13 [Magne A. Svanemsli, Kyrksaeteroera, Norway].

◇ *Comet McKenzie-Russell 1989f*$_1$ ⟹ 1989 Dec. 29.79 UT: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (7-min exp.) yields mag ~ 13.5, dia. 0′.5, DC = 8, 12′ tail in p.a. 60° [MIK]. 1990 Jan. 14.14: "a very faint candidate was suspected, but could not be confirmed because of impending moonrise; the fact that the comet was not seen on the following night casts pretty strong doubt on the reality of the candidate" [HAL]. Jan. 14.79: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 14, dia. 0′.5, trace of very faint tail 6′ long in p.a. 80° [MIK].

◇ *Comet Černis-Kiuchi-Nakamura 1990b* ⟹ 1990 Mar. 13.15: pre-discovery observation; "unable to confirm due to clouds" [SPR]. Mar. 17.12: "in 41-cm L, comet looks rather like a globular cluster; C_2 filter did not enhance or degrade comet image" [HAL]. Mar. 19.83: in 31.6-cm L, fan-shaped tail spanning p.a. 300°-45°, with length at p.a. 45° being 0°.05 [MID01]. Mar. 21.83: in 31.6-cm L, fan-shaped tail spanning p.a. 320°-20°, with length at p.a. 20° being 0°.03 [MID01]. Mar. 26.86: in 31.6-cm L, m_2 = 11, fan-shaped tail spanning p.a. 320°-0° [MID01]. Mar. 29.83: broad tail at p.a. 300°-10° [MID01].

◇ *Periodic Comet Wild 4 (1990a)* ⟹ 1990 Jan. 25.26: "comet small and very condensed; coma is noticeably fan-shaped, with the fan extending westward" [HAL]. Feb. 5.14: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (7-min exp.) yields mag ~ 12, coma dia. 1′.5, DC = 8, 3′ tail in p.a. 280° [MIK]. Feb. 13.83: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (9-min exp.) yields mag ~ 12.5, coma dia. 0′.4, DC = 8; comet appears nearly stellar [MIK]. Feb. 17.80: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (6-min exp.) yields mag ~ 12.5, coma dia. 0′.6, DC = 8; comet appears nearly stellar [MIK]. Feb. 21.80: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 12, coma dia. 0′.6, DC = 7, 6′ fan-shaped tail in p.a. 292° [MIK]. Feb. 24.84: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (7-min exp.) yields mag ~ 12.5, coma dia. 0′.3, DC = 8; comet appears nearly stellar [MIK]. Mar. 3.33: possibly observed through thin cirrus [HAL]. Mar. 5.12: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (9-min exp.) yields mag ~ 12, coma dia. 0′.5, DC = 8 [MIK]. Mar. 13.81: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (5-min exp.) yields mag ~ 13, coma dia. 1′.0, DC = 8 [MIK]. Mar. 18.78: photograph on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera (8-min exp.) yields mag ~ 12.5, coma dia. 1′.0, DC = 8, slight fan 2′ long in p.a. 123° [MIK].

◇ *Periodic Comet Brorsen-Metcalf (1989o)* ⟹ 1989 July 11.32 UT: glimpsed with 10×50 B [BOR]. July 11.32-Sept. 6.37: "extinction correction applied where necessary" [BOR]. July 15.33: at 142×, "slight cond. of 0′.5 near center of coma" [MOD]. July 29.32: in 31.7-cm L, coma elongated [BOR]. (Continued...)

(Cont. from page 44) 1989 Aug. 8.34: in 20×80 B, coma dia. 8′, DC = 5 [BOR]. Aug. 9.35: in 31.7-cm L, tail 4′ wide; dense 2′.5 cond.; "stellar nucleus (m_2 = 11-12) offset tailward (!) within the coma/cond.; sunward fan from nucleus" [BOR]. Aug. 10.35: in 31.7-cm L, "eccentric nucleus" [BOR]. Aug. 12.38: in 40-cm L, tail 5′-7′ wide [MOD]. Aug. 13.01: 21-min exp. on hypered TP 2415 film with 4.0-cm *f*/3.4 A shows 7′ coma with a straight 11′ tail in p.a. 280° and a 30′ tail bent to the north [Jens and Mattias Ergon, Sweden]. Aug. 25.35: in 31.7-cm L, "tail 0′.8 wide!; strong suggestion of sunward fan at 110× directed opposite the tail and 70° wide" [BOR]. Aug. 26.35: in 31.7-cm *f*/6 L (55×), coma dia. 2′.4, DC = 7, 0°.7 tail (0′.8 wide) in p.a. 304° [BOR]. Aug. 27.35: coma has "strong" blue color [MOD]. Aug. 27.35: in 20×120 B, coma dia. 2′.9, DC = 7-8, 1°.2 tail (1′.5 wide) in p.a. 306°; "stongly cond. coma w/ intensely bright center; faint, diffuse outer hale" [BOR]. Aug. 31.37: in 20×120 B, coma dia. 2′.5, DC = 7-8, 1°.3 tail in p.a. 312°; "intense starlike center to coma, surrounded by a bright cond. and then a diffuse halo" [BOR]. Sept. 1.37: in 20×80 B, tail 2/3 as wide as coma [BOR]. Sept. 4.38: in 20×80 B, coma dia. 3′.6, DC = 7-8, 2°.3 tail in p.a. 306°; "tail initially 3/4 as wide as coma's dia.; first half of tail very obvious" [BOR]. Sept. 4.40: tail subtends 10° [MOD]. Sept. 4.5: blue plate photograph with wide-angle press camera shows tail 9°.5 long with four distinct streamers [R. Royer, CA, U.S.A.].

◇ *Periodic Comet Lovas 1 (1989p) [All notes by HAL]* ⟹ 1989 Dec. 29.22: "comet is fairly condensed, suggesting there may have been a minor outburst recently". 1990 Jan. 1.42: "comet noticeably less condensed than on Dec. 29". Jan. 7.51: "comet noticeably fainter and even less condensed than it was on Jan. 1". Jan. 15.17: "several bright stars were in comet's vicinity".

◇ *Periodic Comet Tuttle-Giacobini-Kresák (1989b_1) [All notes by HAL]* ⟹ 1990 Jan. 25.54: "this observation confirms a sighting on Jan. 24.52, when the comet was strongly suspected, but deteriorating weather conditions prevented confirmation; the comet is fairly large, vague, and diffuse; some enhancement when viewed with a C_2 filter." Jan. 7.53: "the estimate is of a rather-strongly-suspected candidate; attempts to confirm the candidate on the next two mornings were unsuccessful, although on Jan. 8 the comet would have been very close to an ~ 11th-mag star (the nearby galaxy MCG -2-37-12 was seen); based on the comet's relative brightness when observed later in January, together with the observations reported by Pearce (*IAUC* 4946), it is quite possible that the object observed this morning was indeed the comet." Jan. 9.53: "the window between moonset and dawn was very brief (~ 15 min); the sky was probably never completely dark". Feb. 21.52: "possibly some thin cirrus in the vicinity; also, the star field is quite rich; nevertheless, the comet's invisibility is surprising, considering its brightness in early Feb." Feb. 23.52: "sky conditions good; star field still quite rich; the comet was searched for both with and without C_2 filter."

◇ *P/Schwassmann-Wachmann 1 [all by MIK, 7-min-exposure photographs on TP 2415 hypered film w/ 20-cm f/2 Baker-Schmidt camera]* ⟹ 1989 Dec. 29.76 UT: mag ~ 14, coma dia. 1′.5, DC = 2. 1990 Jan. 14.77: mag ~ 13.5, coma dia. 2′, DC = 3; object diffuse with slight cond.

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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 [09 = Comet Section, Royal Astronomical Society of New Zealand; 11 = Dutch Comet Section (Werkgroep Kometen); 14 = Australian comet group (c/o David Seargent); 17 = Kiev Komet. Tsirk.; 21 = Comet Section, Swedish League of Amateur Astronomers, c/o J. Danielsson; 23 = Coordinated amateur Czechoslovak group (c/o Jiri Dusek, Brno); 24 = Norwegian Astronomical Society (c/o B. H. Granslo, Blindern, Oslo); 18 = Coordinated amateur Polish group, c/o J. Rafalski, Torun, Poland; etc.]. Those with asterisks (*) preceding the 5-character code are new additions to the Observer Key:

CODE	S	OBSERVER, LOCATION
ADA01	18	Andrzej Adamski, Poland
AND01	21	Karl-Gustav Andersson, Sweden
*AND03	17	Krasimir Andreev, U.S.S.R.
*ANO	24	Odd Ivar Andersen, Norway
BAN	18	Jaroslaw Bandurowski, Poland
BAR		Sandro Baroni, Italy
*BAR04		Antonella Bartolini, Italy
BOA		Andrea Boattini, Italy
BOD	18	Robert Bodzon, Poland
BOR		John E. Bortle, NY, U.S.A.
BRI01	11	H. J. Bril, The Netherlands
BUS01	11	E. P. Bus, The Netherlands
*BYS	23	Eva Bystrenova, Czechoslovakia
CAM03	14	Paul Camilleri, Australia
CAV		Marco Cavagna, Italy
CHE		G. R. Chester, VA, U.S.A.
CHE03	17	K. T. Cernis, Lithuania, U.S.S.R.
*CHO01	18	Franciszek Chodorowski, Poland
CLA	07	Maurice L. Clark, Australia
COL02		Mike J. Collins, England
COM	11	Georg Comello, The Netherlands
CUR01	09	David J. Curtis, New Zealand
DAH	24	Haakon Dahle, Norway
DAL01	18	Grzegorz Dalek, Poland
*DAN01	20	Jorgen Danielsson, Sweden
DEA		V. F. de Assis Neto, Brazil
*DUS01	23	Jiri Dusek, Czechoslovakia
EKL	21	Anders Ekloef, Sweden
*FIE		Marsilio Fierimonte, Italy
FIL02	17	V. S. Filonenko, Ukraine, U.S.S.R.
*FON	17	Mari Fonovich, U.S.S.R.
GAM	18	Mariusz Gamracki, Poland
GAR01	14	Gordon Garradd, N.S.W., Australia
*GOR02	18	Marcin Gorko, Poland
GRA04	24	Bjoern Haakon Granslo, Norway
GRE		Daniel W. E. Green, U.S.A.
*GRO03	18	Radoslaw Grochowski, Poland
HAL		Alan Hale, U.S.A.
*HAL03	21	P. Hallsten, Sweden
HAS02		Werner Hasubick, West Germany
HAV		Roberto Haver, Italy
*HOR02	23	Kamil Hornoch, Czechoslovakia
*HRO	23	Filip Hroch, Czechoslovakia
IWA02	18	Mariusz Iwanski, Poland
JAH		Jost Jahn, West Germany
*JAN02	21	Christer Jansson, Sweden
JON	09	Albert F. Jones, New Zealand
*KAC	18	Grzegorz Kaczmarczyk, Poland
*KAF	23	Pavla Kafonkova, Czechoslovakia
KAM01		Andreas Kammerer, West Germany
KEE		Richard A. Keen, CO, U.S.A.
KIL	09	P. M. Kilmartin, New Zealand
KOB01		Juro Kobayashi, Japan
KOL02	18	Andrzej Kolasinski, Poland
KOR		Stefan Korth, West Germany
KOR01	19	Valeriy L. Korneyev, Zelenograd, U.S.S.R.
KOS03	18	Kazimierz Kosz, Poland
*KRY01	17	T. V. Kryachko, U.S.S.R.
*KUC	17	A. Kuchinskas, Lithuania
*LAM01	23	Vilem Lamer, Czechoslovakia
LOO01		Frans R. van Loo, Belgium
LUE		Hartwig Luethen, West Germany
MER		Jean-Claude Merlin, France
MID01	24	Oernulf Midtskogen, Norway
MIK		Herman Mikuz, Yugoslavia
*MOD		Robert J. Modic, OH, U.S.A.
MOE		Michael Moeller, West Germany
MOR		Charles S. Morris, U.S.A.
MOR04	19	V. G. Mormil, Chernigovka, U.S.S.R.
NOW		Gary T. Nowak, VT, U.S.A.
PAR03	18	Mieczyslaw Paradowski, Poland
PEA	14	Andrew R. Pearce, Australia
PEA01		Don C. Pearce, TX, U.S.A.
PER01		Alfredo Jose Serra Pereira, Portugal
PLE01	18	Janusz Pleszka, Poland
*POL	23	Jiri Polak, Czechoslovakia
PRY		Jim Pryal, WA, U.S.A.
RAD01	17	Veselka Radeva, U.S.S.R.
RAF	18	Jerzy Rafalski, Poland
REN		Alexandre Renou, France
RIP	13	Jose Ripero, Spain
ROB03		Paul C. Robinson, WV, U.S.A.
ROO		M. C. Roos, The Netherlands
SCH04	11	A. H. Scholten, The Netherlands
SCI	18	Tomasz Sciezor, Poland
SEA	14	David A. J. Seargent, Australia
SEL	19	G. Selevich, Vilnius, U.S.S.R.
SIM		Karl Simmons, FL, U.S.A.
SIM01		Wanda Simmons, FL, U.S.A.
*SKJ	24	Olaf Skjaeraasen, Norway
*SLA01	23	Zdenek Slavik, Czechoslovakia
SPE01	18	Jerzy Speil, Poland
*SPO	24	Jul Spongsveen, Norway
SPR		C. E. Spratt, BC, Canada
STE09	17	Plamen Stefanov, U.S.S.R.
SZA01	18	Robert Szaj, Poland
*TOM		Maura Tombelli, Italy
*TRU01	23	Karel Trutnovsky, Czechoslovakia
URB	18	Piotr Urbanski, Poland
*VAL	23	Petr Valasek, Czechoslovakia
*VAS	17	V. Vasilyus, Lithuania
*VEZ	17	T. Vezhauskas, Lithuania
WAR01	21	Johan Warell, Sweden
WES02	21	Margareta Westlund, Sweden
WIL02	14	Peter F. Williams, Australia
WOL01		Graham W. Wolf, New Zealand
*YDE	20	Mats Yderstig, Sweden
ZAN01	11	W. T. Zanstra, The Netherlands
*ZIO	18	Zbigniew Ziolkowski, Poland

Comet Bradfield 1987 XXIX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 08 17.31	M	9.2	AA	6.2	R	11	76	2.6	3			WOL01
1987 08 19.29	M	9.0	AA	6.2	R	11	76	2.64	3			WOL01
1987 08 23.33	M	8.8	AA	6.2	R	11	76		3			WOL01
1987 08 29.42	M	8.6	AA	21	L	9	105	& 3.0	3	&0.01		WOL01
1987 08 31.31	M	8.4	AA	6.2	R	11	76	& 2.8	4	&0.01		WOL01
1987 09 07.31	M	8.4	AA	6.2	R	11	76		4			WOL01
1987 09 09.31	M	8.4	AA	6.2	R	11	76		4			WOL01
1987 09 11.31	M	8.4	AA	6.2	R	11	76		4			WOL01
1987 09 15.31	M	8.3	AA	6.2	R	11	76		4			WOL01
1987 09 18.31	M	8.2	AA	6.2	R	11	76	& 3.5	4	&0.02		WOL01
1987 09 21.31	M	8.2	AA	6.2	R	11	76	4.6	4			WOL01
1987 10 03.73	M	7.3	SC	10.0	B		25					VAL
1987 10 13.73	M	6.3	SC	10.0	B		25	6		0.1		HRO
1987 10 13.73	M	7.5	SC	3.5	B		7	3				HRO
1987 10 13.75	B	7.8	SC	5.0	B		7			0.2		DUS01
1987 10 13.75	M	6.6	SC	8.0	B		10	9				HOR02
1987 10 14.73	S	6.8	SC	10.0	B		25	4		0.2		HRO
1987 10 14.74	M	6.6	SC	8.0	B		10	8				HOR02
1987 10 14.75	M	6.4	SC	3.5	B		7	2		0.1		HRO
1987 10 16.72	M	6.4	SC	8.0	B		10	4				HOR02
1987 10 16.73	M	5.8	SC	10.0	B		25	7				HRO
1987 10 16.74	B	6.1	SC	6.0	B		12					TRU01
1987 10 16.77	B	6.4	SC	8.0	B		10			0.5		DUS01
1987 10 19.74	S	6.2	AA	14	L	6	25	6	8	0.6		FON
1987 10 20.75	S	6.1	AA	14	L	6	25	6.5	8	0.7		FON
1987 10 26.73	M	6.8	SC	10.0	B		25					VAL
1987 10 27.72	M	5.6	SC	10.0	B		25	5		0.4		HRO
1987 10 27.73	M	6.2	SC	8.0	B		10	12				HOR02
1987 10 27.74	B	6.2	SC	8.0	B		10	12		0.8		DUS01
1987 10 27.74	M	5.7	SC	3.5	B		7	3		0.1		HRO
1987 10 27.75	B	5.6	SC	6.0	B		12	10				TRU01
1987 10 29.72	B	6.2	SC	8.0	B		10	6		0.3		HOR02
1987 10 29.73	M	6.1	SC	5.0	B		10					HOR02
1987 10 29.74	B	5.4	SC	6.0	B		12	8				TRU01
1987 10 29.75	B	6.1	SC	3.5	B		7	10				HRO
1987 10 29.75	M	5.8	SC	10.0	B		25	9		0.2		HRO
1987 10 29.75	M	6.6	SC	5.0	B		7					VAL
1987 10 30.73	B	6.5	SC	10.0	B		25					LAM01
1987 10 30.73	M	5.9	SC	8.0	B		10	6		0.5		HOR02
1987 10 30.76	B	5.9	SC	10.0	B		25	9		0.3		HRO
1987 10 30.78	B	5.8	SC	3.5	B		7	4		0.2		HRO
1987 10 30.78	B	7.0	SC	8.0	B		10	6				DUS01
1987 10 31.10	B	5.8	SC	5.0	B		10					HOR02
1987 10 31.10	B	5.9	SC	8.0	B		10	6		0.3		HOR02
1987 10 31.69	B	5.8	SC	5.0	B		7	2.5				SLA01
1987 10 31.72	B	5.8	SC	8.0	B		10	10		0.5		DUS01
1987 10 31.73	B	5.5	SC	6.0	B		12	8				TRU01
1987 10 31.76	B	5.6	SC	3.5	B		7	6				HRO
1987 10 31.77	B	4.8	SC	10.0	B		25	4		0.4		HRO
1987 11 03.71	B	5.9	SC	8.0	B		10	18		0.6		DUS01
1987 11 03.72	B	6.2	SC	8.0	B		10	6				HOR02
1987 11 03.72	B	6.4	SC	5.0	B		7	8		0.3		DUS01
1987 11 03.73	B	6.5	SC	6.0	B		12	8				TRU01
1987 11 03.73	S	6.0	AA	14	L	6	25	5	7	0.5		FON
1987 11 03.75	B	5.6	SC	3.5	B		7	8				HRO
1987 11 03.75	B	6.3	SC	5.0	B		10					HOR02
1987 11 03.76	B	5.6	SC	10.0	B		25	8				HRO
1987 11 04.71	B	6.1	SC	8.0	B		10	6				HOR02
1987 11 04.72	B	6.4	SC	5.0	B		7	3		0.2		DUS01

Comet Bradfield 1987 XXIX [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 11 04.72	S	5.9	AA	14	L	6	25	6	8	0.45		FON
1987 11 04.73	B	6.1	SC	8.0	B		10	9		0.4		DUS01
1987 11 04.75	B	5.6	SC	3.5	B		7	3				HRO
1987 11 04.76	B	5.9	SC	10.0	B		25					HRO
1987 11 05.71	B	6.2	SC	8.0	B		10	3				HOR02
1987 11 05.73	B	6.2	SC	5.0	B		10					HOR02
1987 11 05.74	S	5.8	AA	14	L	6	30	6	8			FON
1987 11 07.72	S	5.8	AA	11.0	B		10	5	8			FON
1987 11 10.71	S	5.8	AA	14	L	6	25	4	7	0.34		FON
1987 11 11.72	B	6.5	SC	5.0	B		10					KAF
1987 11 11.74	S	5.7	AA	14	L	6	25	5	7	0.3		FON
1987 11 14.72	M	5.1	SC	5.0	B		7					VAL
1987 11 14.74	B	4.9	SC	8.0	B		10	12		0.4		HOR02
1987 11 14.75	B	4.9	SC	5.0	B		10					HOR02
1987 11 15.71	B	5.6	SC	8.0	B		10	12		0.5		HOR02
1987 11 15.73	B	6.0	SC	10.0	B		25	8		0.5		LAM01
1987 11 15.74	B	5.6	SC	5.0	B		10					HOR02
1987 11 15.74	S	5.7	AA	14	L	6	25	6	7	0.18		FON
1987 11 15.77	B	5.8	SC	10.0	B		25	5				HRO
1987 11 15.78	B	5.6	SC	3.5	B		7	5				HRO
1987 11 17.73	B	5.6	SC	6.0	B		12	15				TRU01
1987 11 17.73	S	5.5	AA	14	L	6	25	6	7	0.2		FON
1987 11 18.72	B	5.3	SC	8.0	B		10	15		0.7		HOR02
1987 11 18.72	S	5.6	AA	14	L	6	25	7	5			FON
1987 11 18.73	B	5.3	SC	5.0	B		10					HOR02
1987 11 20.77	S	5.5	AA	14	L	6	25	8	6	0.9		FON
1987 11 21.75	S	5.6	AA	14	L	6	25	8	7	1.3		FON
1987 11 22.73	S	5.7	AA	14	L	6	25	7	6	1.8		FON
1987 11 22.76	B	6.0	SC	5.0	B		10					KAF
1987 11 23.71	B	6.0	SC	5.0	B		10					KAF
1987 11 23.74	B	6.0	SC	8.0	B		10	6		0.5		DUS01
1987 11 23.75	B	6.1	SC	10.0	B		25	8		0.5		DUS01
1987 11 23.80	B	5.8	SC	5.0	B		10					HOR02
1987 11 25.70	B	5.6	SC	8.0	B		10	12		0.9		HOR02
1987 11 25.70	B	5.6	SC	8.0	B		10	14		1.9		DUS01
1987 11 25.74	B	5.7	SC	10.0	B		25	8		0.3		POL
1987 11 29.72	S	5.9	AA	14	L	6	30	6	6			FON
1987 11 29.75	B	6.1	SC	5.0	B		7					SLA01
1987 12 02.73	S	5.8	AA	14	L	6	25	5	5	0.8		FON
1987 12 03.74	B	6.1	SC	5.0	B		10					HOR02
1987 12 03.74	B	6.1	SC	8.0	B		10	4				HOR02
1987 12 04.75	S	5.9	AA	14	L	6	25	4	7	0.7		FON
1987 12 08.69	B	5.7	SC	8.0	B		10	16		1.5		DUS01
1987 12 08.71	B	5.7	SC	5.0	B		10					HOR02
1987 12 08.71	B	5.7	SC	8.0	B		10	12		1.6		HOR02
1987 12 08.71	B	6.0	SC	10.0	B		25					LAM01
1987 12 08.72	B	6.0	SC	6.0	B		12	10		0.3		TRU01
1987 12 08.73	B	6.4	SC	5.0	B		7	6		0.5		DUS01
1987 12 08.73	S	6.1	AA	14	L	6	25	4	7	0.5		FON
1987 12 09.68	B	6.3	SC	6.0	B		12	7		0.3		TRU01
1987 12 09.71	B	6.1	SC	5.0	B		7					VAL
1987 12 09.72	B	5.6	SC	8.0	B		10	12		2.2		HOR02
1987 12 09.72	B	5.7	SC	5.0	B		10	12		2.2		HOR02
1987 12 10.73	S	5.9	AA	14	L	6	25	5	7			FON
1987 12 11.74	B	5.6	SC	5.0	B		10					HOR02
1987 12 11.74	B	5.7	SC	8.0	B		10	12		1.6		HOR02
1987 12 11.74	S	6.0	AA	14	L	6	25	6	8	0.7		FON
1987 12 13.75	S	6.2	AA	14	L	6	25	7	8	0.7		FON
1987 12 18.73	S	6.1	AA	14	L	6	25	8	8	1.0		FON

Comet Bradfield 1987 XXIX [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 12 19.72	S	6.0	AA	11.0	B		10	7	6			FON
1987 12 21.73	B	6.0	SC	8.0	B		10	18		1.4		HOR02
1987 12 21.74	B	6.1	SC	5.0	B		10					HOR02
1987 12 21.75	S	6.2	AA	14	L	6	25	6	5	1.5		FON
1987 12 22.72	S	6.4	AA	14	L	6	25		6			FON
1987 12 22.75	M	6.1	SC	5.0	B		10	18		1.8		HOR02
1987 12 22.75	M	6.1	SC	8.0	B		10	18		1.8		HOR02
1987 12 23.71	M	6.1	SC	5.0	B		10	12		1.7		HOR02
1987 12 23.71	M	6.1	SC	8.0	B		10	12		1.7		HOR02
1987 12 23.73	M	6.3	AA	14	L	6	25	7	6	1.9		FON
1987 12 23.88	B	6.5	SC	10.0	B		25					HRO
1987 12 23.88	B	7.3	SC	3.5	B		7	5				HRO
1987 12 25.74	S	6.5	AA	14	L	6	25	6	7	2.2		FON
1987 12 30.72	B	6.6	SC	5.0	B		10	12				HOR02
1987 12 30.72	M	6.5	SC	8.0	B		10	12				HOR02
1987 12 30.74	S	6.7	AA	14	L	6	25	7	7			FON
1988 01 01.72	S	7.0	AA	14	L	6	25	6	7	1		FON
1988 01 07.00	B	6.8	AA	5.0	B		10	&10	4	0.75	60	ROB03
1988 01 07.71	S	7.0	AA	14	L	6	25	6	8			FON
1988 01 09.73	M	6.6	SC	8.0	B		10	12				HOR02
1988 01 09.75	M	6.5	SC	5.0	B		10	12				HOR02
1988 01 09.80	S	7.5	AA	14	L	6	25	5	7	0.8		FON
1988 01 10.99	B	7.2	AA	5.0	B		10	& 9	6			ROB03
1988 01 12.78	S	7.3	AA	14	L	6	25	3	5			FON
1988 01 13.73	M	6.8	SC	5.0	B		10	6				HOR02
1988 01 13.73	M	6.9	SC	8.0	B		10	6				HOR02
1988 01 21.88	B	7.6	SC	6.0	B		12	18				BYS
1988 01 30.79	S	7.9	AA	14	L	6	25	3	2			FON
1988 02 11.80	S	8.8	AA	14	L	6	40	5	4			FON
1988 02 15.81	S	9.5	AA	14	L	6	40	4	4			FON

Comet Yanaka 1988 XX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 10.22	M	11.6	AC	20.3	T	10	80	1.8	1			GRA04
1989 02 11.38	S	11.6	AC	44.5	L	4	154	& 1.5	1			PEA01

Comet Shoemaker-Holt-Rodriquez 1988h

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 07 27.41	S	11.9	SM	20	L	7	56	2	4			CAM03
1989 08 31.87	S	13.0	VN	20	L	4	190		2			PEA
1989 09 04.88	S	13.0	VN	20	L	4	190		2			PEA
1990 01 05.80	S[	14.0	VN	41	L	4	380					PEA
1990 02 18.14	I[	12.5		41	L	4	183					HAL
1990 02 24.17	I[	13.0		41	L	4	183					HAL
1990 03 17.15	I[	13.5		41	L	4	183					HAL

Comet Aarseth-Brewington 1989a1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 18.72	S	8.5	A	20.4	L	6	72	2.9	3			JAH
1989 11 19.71	B	8.9	A	20.4	L	6	72					JAH
1989 11 19.71	S	8.5	A	20.4	L	6	72	1.8	1			JAH
1989 11 19.72	S	8.7	S	20.3	T	10	50	2.5	4			LUE
1989 11 19.73	S	8.3	S	9.0	M	6	25	& 2.5	3			LUE
1989 11 21.96	S	8.6	AC	8.0	B		20	3.8	3/			BOR
1989 11 22.70	B	8.2	A	20.4	L	6	72			0.08	56	JAH
1989 11 22.70	S	8.1	A	20.4	L	6	72	3.3	5	0.16	71	JAH

Comet Aarseth-Brewington 1989a1 [cont].

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 22.70	S	8.3	V	26	L	5	60	2				JAN02
1989 11 23.22	B	8.4	A	20.4	L	6	72			0.03	160	JAH
1989 11 23.22	S	8.0	A	20.4	L	6	72	2.0	3	0.07	40	JAH
1989 11 23.70	S	8.3	V	26	L	5	60	2		0.3		JAN02
1989 11 24.72	S	8.3	V	26	L	5	60	2		0.4		JAN02
1989 11 24.73	S	8.0	S	9.0	M	6	25	2	4			LUE
1989 11 24.96	S	8.3	AC	31.7	L	6	55	1.7	4			BOR
1989 11 24.96	S	8.4:	AC	8.0	B		20	2.1	3			BOR
1989 11 25.66	B	8.0:	AA	12.0	R	4	22	2	3			CHE03
1989 11 25.73	S	7.7	AA	8.0	B		15	4	5	0.33	10	KOR
1989 11 25.74	S	7.9	S	10.3	R	7	40	5	6			COL02
1989 11 26.70	S	8.0	AA	8.0	B	5	20	3	4			BAR
1989 11 26.72	S	8.1	AC	8.0	B		20	4	4	0.5	3	BOA
1989 11 26.72	S	8.2	AC	8.0	B		20					BAR04
1989 11 26.95	B	8.2	AC	31.7	L	6	55	3.0	5	?	15	BOR
1989 11 26.95	S	8.0:	AC	5.0	B		10					BOR
1989 11 27.19	S	7.7	AA	8.0	B		15	4.5	5	0.2	7	HAV
1989 11 27.44	B	7.9	AC	8.0	B		20	3.0	5			BOR
1989 11 28.19	B	8.2	A	20.4	L	6	72			0.14	359	JAH
1989 11 28.19	S	8.0	A	20.4	L	6	72	1.7	4	0.14	26	JAH
1989 11 28.20	B	8.2	A	5.0	R	10	13					JAH
1989 11 28.20	S	7.9	A	5.0	R	10	13	2.4	2			JAH
1989 11 28.21	B	8.0	A	5.0	R	10	56					JAH
1989 11 28.21	S	7.8	A	5.0	R	10	56	2.4	3	0.20	10	JAH
1989 11 28.68	B	7.6	AA	6.0	R	4	20		3			VEZ
1989 11 28.71	S	7.8:	S	9.0	M	6	25	2	5			LUE
1989 11 28.72	S	7.8	A	5.0	R	10	56	2.0	2			JAH
1989 11 28.73	S	8.0	AA	8.0	B		15	3	3/			KOR
1989 11 28.95	B	8.3	AC	31.7	L	6	55	2.5	5			BOR
1989 11 28.95	S	7.8	AC	5.0	B		10					BOR
1989 11 29.19	S	7.5	AA	8.0	B		15	4.5	5	0.3	355	HAV
1989 11 29.20	B	7.6	A	5.0	R	10	13					JAH
1989 11 29.20	S	7.6	A	5.0	R	10	13	4.0	3			JAH
1989 11 29.21	B	7.6	A	5.0	R	10	56					JAH
1989 11 29.21	S	7.6	A	5.0	R	10	56	2.4	4			JAH
1989 11 29.21	S	8.2	S	10.0	B		14	2.4	3			HAS02
1989 11 29.22	B	8.2	A	20.4	L	6	72					JAH
1989 11 29.22	S	8.2	A	20.4	L	6	72	3.4	5	0.34	30	JAH
1989 11 29.69	B	7.7	A	20.4	L	6	72					JAH
1989 11 29.69	S	7.6	A	20.4	L	6	72	2.4	3			JAH
1989 11 29.70	S	7.5	SC	14	L	4	56	2.5				WAR01
1989 11 29.70	S	7.6	A	5.0	R	10	13	2.1	2			JAH
1989 11 29.71	S	8.2	AC	40	L	5	66	3.5	4/			BOA
1989 11 29.73	B	7.6	AA	15.0	L	5	25	7.3	4			MER
1989 11 29.74	B	7.4	AA	5.0	B		7	7.5	4			MER
1989 11 29.75	S	7.3	S	10.3	R	7	40	5	5			COL02
1989 11 29.75	S	8.3	AC	40	L	5	66					TOM
1989 11 29.95	B	7.9	AC	31.7	L	6	55	2.4	5/	0.4	20	BOR
1989 11 29.95	S	7.5	AC	8.0	B		20	2.5	5			BOR
1989 11 30.68	S	7.8	V	9	M	11	56	3	4			WES02
1989 11 30.72	S	8.0	AC	8.0	B		20					BAR04
1989 12 01.07	S	7.4	SC	20	T	10	95	3.5	7	0.17	10	PRY
1989 12 01.74	B	7.3	AA	5.0	B		7	4.0	5			MER
1989 12 01.95	S	7.3	AC	8.0	B		20	2.5	5			BOR
1989 12 02.12	S	6.8	AA	8.0	B		15	4	6	0.5	10	KOR
1989 12 02.66	S	7.5	V	8.0	B		20	3.5				AND01
1989 12 02.69	S	7.6	V	26	L	5	40	2.5				JAN02
1989 12 02.70	S	7.4	V	9	M	11	56	3	5			WES02
1989 12 02.72	S	7.1	AA	8.0	B		20					CAV

Comet Aarseth-Brewington 1989a1 [cont].

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 03.19	S	7.4	SC	8.0	B		20	3	6			EKL
1989 12 04.44	B	7.1	AC	8.0	B		20	2.4	6			BOR
1989 12 04.44	S	7.1	AC	5.0	B		10	4	5			BOR
1989 12 04.67	S	7.2	V	8.0	B		20	4				AND01
1989 12 05.19	B	5.8	AA	6.0	B	4	20	4	4			CHE03
1989 12 05.20	S	6.5	AA	8.0	B		15	4	6	0.93	348	HAV
1989 12 07.21	B	6.3	A	5.0	R	10	13			0.19	355	JAH
1989 12 07.21	S	6.2	A	5.0	R	10	13	4.6	8	0.29	51	JAH
1989 12 07.23	B	6.4	A	20.4	L	6	72	2.0	5	0.64	353	JAH
1989 12 09.19	B	5.7	AA	6.0	B	4	20	3	4			CHE03
1989 12 09.23	S	6.5	SC	8.0	B		20	3	7	0.3	20	EKL
1989 12 09.45	B	5.8	HR	5.0	B		10	4.5	6	0.9	353	BOR
1989 12 09.45	B	5.9	HR	8.0	B		20	3.6	7	0.9	353	BOR
1989 12 09.46				20.0	L	5	35	1	8	&0.75	0	MOD
1989 12 09.46	M	6.0	AA	5.0	B		10			&1	0	MOD
1989 12 09.50	B	5.8	AA	5.0	B		10	& 5	9			ROB03
1989 12 10.20	S	5.6	AA	8.0	B		15	4	7	1.17	339	HAV
1989 12 10.20	S	5.8	AC	15.2	L	5	44	4.5	8	1.1	350	MOE
1989 12 10.21	S	6.2	SC	5.0	B		10	4	6/			BOA
1989 12 10.23	B	5.7	A	5.0	R	10	13					JAH
1989 12 10.23	S	5.6	A	5.0	R	10	13	2.9	7			JAH
1989 12 10.24	B	5.8	A	20.4	L	6	72	1.9	4	0.4	355	JAH
1989 12 14.45	B	5.3	HR	5.0	B		10	2	7/	2.5	338	BOR
1989 12 14.45	B	5.4	HR	8.0	B		20	1.8	8	&2	338	BOR
1989 12 15.45	B	5.2	HR	5.0	B		10	2.5	7/	?		BOR
1989 12 17.21	S	3.7	AA	8.0	B		15	3	8	2.67	328	HAV
1989 12 18.25	B	4.2	A	5.0	B		7	& 2.0	7	&0.5	330	JAH
1989 12 18.45	B	4.0	HR	5.0	B		10	2	8/	1.0	323	BOR
1989 12 18.48				20.0	L	5	35	0.3	8	&0.03	340	MOD
1989 12 18.48	M	4.2	AA	5.0	B		10	& 1				MOD
1989 12 19.46	B	3.6	HR	5.0	B		10	2.5	8/	2.2	322	BOR
1989 12 20.22	B	3.1	S	5.0	B		10	3	8	1.33	333	SCI
1989 12 20.52	B	3.7	AA	5.0	B		10	&10	8	1	310	ROB03
1989 12 22.22	S	2.2:	AA	5.0	B		10	& 2.5	8/	&1	305	HAV
1989 12 22.47	B	3.3	HR	5.0	B		10	1.5	9	0.4	305	BOR
1989 12 22.48	M	3.9	AA	5.0	B		10	1				MOD
1989 12 22.54 !	B	3.5	SP	4.0	B		8			3	290	KEE
1989 12 22.55	I	3.2	SP	0.9	E		1					KEE
1989 12 22.56 !	I	3.1	SP	0.9	E		1					KEE
1989 12 23.47	B	3.8	HR	5.0	B		10	1.5	8/			BOR
1989 12 23.47	I	3.8	HR	5.0	B		10					BOR
1989 12 24.50				20.0	L	5	35	0.5	8	&0.03	315	MOD
1989 12 24.50	M	3.7	AA	5.0	B		10	1				MOD
1989 12 24.51	S	2.9	SC	20.3	L	4	28		7	&0.5		PEA01
1989 12 24.75	S	2.8	A	5.0	B		10	1.5	8			GAR01
1989 12 26.25	S	2.5:	AA	5.0	B		10	4	8/	0.6	271	BOA
1989 12 26.74	I	3.0	AA	8.0	B		15		9			SEA
1989 12 27.75	M	2.3	A	5.0	B		10	2	8	1.0	260	GAR01
1989 12 29.73	I	3.3	AA	8.0	B		15		9	&1	255	SEA
1989 12 29.74	M	2.9	A	5.0	B		10		8	0.67		GAR01
1989 12 30.73	I	3.5	AA	8.0	B		15		9	1.5	240	SEA
1989 12 30.83	S	3.3	AA	8.0	B		20	3	8	1	236	PEA
1990 01 01.75	M	3.1	A	5.0	B		10		8			GAR01
1990 01 03.84	S	3.6	AA	8.0	B		20	2	8	0.5	222	PEA
1990 01 05.84	S	4.0	AA	8.0	B		20	2	8			PEA
1990 01 14.96	B	6.2	S	7.0	B		10			0.6	180	DEA
1990 01 23.44		8 :		8.0	B		15			&0.25	150	SEA

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 25.55	S	13.0	VN	41	L	4	180	1.0	3/			PEA
1989 12 26.50	S	13.3	GA	25.4	L	4	114					SEA
1989 12 27.71	S	12.7	AC	40	L	5	333					TOM
1989 12 27.80	S	12.8	AC	40	L	5	333	0.8	7			BOA
1989 12 27.80	S	12.9	AC	40	L	5	333	0.8	7			BAR04
1989 12 28.63	S	13.3	VN	41	L	4	200	1.0	3			PEA
1989 12 29.15	S	12.1	PC	41	L	4	83					HAL
1989 12 30.58	S	13.4	VN	41	L	4	200	1.0	3			PEA
1990 01 01.38	S	12.3	PC	41	L	4	183					HAL
1990 01 01.57	S	13.4	VN	41	L	4	200	0.8	3			PEA
1990 01 05.71	S	13.5	VN	41	L	4	200	0.7	2			PEA
1990 01 14.14	I	[13.0		41	L	4	183					HAL
1990 01 15.15	I	[13.5		41	L	4	183					HAL
1990 01 21.53	S	13.8	A	31.0	L	6	120	0.5	7			KOB01

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 27.93	S	10.2	A	20.0	T	10	80	& 3	2/			COM
1989 08 28.83	S	10.2	A	20.0	T	10	80	& 4	2/			COM
1989 08 29.84	S	10.2	A	20.0	T	10	80	& 5	2			COM
1989 08 30.47	S	10.4	VN	20	L	4	45		2			PEA
1989 08 30.83	S	9.5	AA	8.0	B		15	7.5	2/			HAV
1989 08 30.83	S	10.3	A	20.0	T	10	80	4	3			COM
1989 08 31.06	S	10.1	AC	31.7	L	6	68	2.4	1/			BOR
1989 08 31.82	S	10.3	AA	8.0	B		15	3	0			MIK
1989 09 01.05	S	9.9	AC	31.7	L	6	68	2.5	2			BOR
1989 09 01.86	S	10.2	AC	20.3	T	10	62	2.1	3			GRA04
1989 09 01.87	S	11.1	AC	20.3	L	6	49	1.0	4			SPO
1989 09 02.84	S	10.3	A	20.0	T	10	80	3	2			COM
1989 09 02.85	S	10.6	AC	20.3	T	10	80	1.0	3			DAH
1989 09 02.94	S	10.4	AC	20.3	T	10	50	1.8	3			GRA04
1989 09 03.05	S	9.9	AC	31.7	L	6	68	2.6	2			BOR
1989 09 03.06	M	10.4	AC	20.0	L	6	60	1	2			NOW
1989 09 03.09	M	9.9	AA	20.0	L	5	35	& 8	4			MOD
1989 09 03.83				31.6	L	5	130	2	2			MID01
1989 09 03.83	S	10.2	A	20.0	T	10	80	4	2	0.1		COM
1989 09 03.85	S	10.6	AC	20.3	T	10	80	1.5	3			DAH
1989 09 03.92	S	9.8	AC	20.3	T	10	80	1.9	3			ANO
1989 09 03.93	S	9.9	AC	20.3	T	10	50	2.1	3			GRA04
1989 09 03.94	S	10.7	V	20	L	4	33	1.8	0			YDE
1989 09 04.04	M	9.8	AC	20.0	L	6	60	1	2			NOW
1989 09 04.05	S	9.9	AC	31.7	L	6	68	2.1	2			BOR
1989 09 04.07	M	9.9	AA	20.0	L	5	35	& 8	4			MOD
1989 09 04.82	S	9.4	S	10.9	L	4	22	4.5	1/			BUS01
1989 09 05.06	S	9.7	AC	31.7	L	6	68	2.4	2			BOR
1989 09 05.60	B	9.9	AA	12.0	R	4	22	5	1			CHE03
1989 09 05.83	S	10.2	A	20.0	T	10	80	& 2	2/			COM
1989 09 06.08	S	9.8	AC	31.7	L	6	68	2.2	2			BOR
1989 09 06.83	S	10.1	A	20.0	T	10	80	& 3	3			COM
1989 09 07.84	S	9.4:	S	20.3	T	10	81	3.5	1/			KAM01
1989 09 07.87	S	10.3	A	20.0	T	10	50	3	3			COM
1989 09 08.80	S	9.7	AA	12.0	R	4	22	5	2			CHE03
1989 09 08.83	S	11.6:	AC	31.6	L	5	130	3	3			MID01
1989 09 08.88	S	9.3	AC	20.3	T	10	50	4.1	3			GRA04
1989 09 09.27	S	9.5	AA	20	T	10	77	3.5	2			PRY
1989 09 09.85				31.6	L	5	130		2			MID01
1989 09 09.85	S	8.9	AC	20.3	T	10	50	4.3	4			GRA04
1989 09 09.88	S	9.7	AC	20.3	T	10	80	3	4			DAH

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 09.89	S	9.5	V	8.0	B		20	3	2			EKL
1989 09 09.97	S	9.6:	AC	20.3	T	10	77	3.2	3/			SKJ
1989 09 10.21	S	9.5	AA	20.0	T	10	64	3.5	2			SPR
1989 09 10.30	S	9.4	AA	20	T	10	77	3.7	2			PRY
1989 09 10.84				31.6	L	5	130	2.5	4			MID01
1989 09 10.90	S	9.0	AC	20.3	T	10	50	4.4	3			GRA04
1989 09 11.21	S	9.2	AA	20.0	T	10	64	4	3			SPR
1989 09 11.84				31.6	L	5	130	2.5	2			MID01
1989 09 12.20	S	9.0	AA	14.0	S	4	28	4	2			SPR
1989 09 12.85				31.6	L	5	130	2.5	3			MID01
1989 09 17.82	S	8.6	VF	12.0	L	6	40	2	4/			REN
1989 09 18.79	S	8.3	AA	8.0	B		15	8	4			HAV
1989 09 19.16	S	8.7	AA	20.0	T	10	64	4.5	4			SPR
1989 09 19.17	S	8.5	AA	8.0	R	4	19	5	4			SPR
1989 09 19.78	B	8.5	AA	15.0	L	15	70		3			CHE03
1989 09 19.83	S	8.5	VF	8.0	B		12					REN
1989 09 20.17	S	8.4	AA	20.0	T	10	64	4.5	4			SPR
1989 09 20.78	B	8.5	AA	12.0	R	4	35		3			CHE03
1989 09 20.80	S	8.5	AA	8.0	B		15	4	5			MIK
1989 09 20.80	S	9.7	V	40	R		30	3				AND01
1989 09 20.83	B	8.5	VF	8.0	B		12	4	6			REN
1989 09 20.85	S	8.2	AA	12.0	R	4	20	4	6			LOO01
1989 09 21.17	S	8.3	AA	20.0	T	10	64	4.5	5			SPR
1989 09 21.79	B	8.3	AA	12.0	R	4	22	6	3			CHE03
1989 09 21.79	S	8.7	AA	8.0	B		15	3.5	5			MIK
1989 09 22.18	S	8.2	AA	20.0	T	10	64	& 5	5	0.25	120	SPR
1989 09 22.76	S	8.6:	S	5.0	B		10	& 6	4			SCI
1989 09 22.88	B	8.4	S	20.0	B	15	60	8				KOR01
1989 09 23.17	S	7.9	AA	8.0	R	4	19	5	5			SPR
1989 09 23.24	S	8.5	AA	20	T	10	95	3.2	4			PRY
1989 09 23.88	B	8.4	S	20.0	B	15	60	10				KOR01
1989 09 23.90	B	8.4	AA	12.0	R	4	35	6	3			CHE03
1989 09 24.18	S	7.8	AA	14.0	S	4	28	5	4			SPR
1989 09 24.80	S	9.2	V	11.4	L	8	37	5	4			EKL
1989 09 24.82	B	8.5	VF	8.0	B		12	4	6			REN
1989 09 24.83				31.6	L	5	130	3.5	6	0.08	040	MID01
1989 09 24.83	S	8.5	SC	5.0	R		8					MID01
1989 09 24.83	S	8.8	V	9	M	11	56		3			WES02
1989 09 25.03	B	9.6	AC	20.0	L	6	50	3.75	3			NOW
1989 09 25.03	S	8.1	AC	5.0	B		10	3.5	4			BOR
1989 09 25.03	S	8.3	AC	31.7	L	6	68	2.6	5	?	0	BOR
1989 09 25.07	M	8.6	AA	20.0	L	5	35	& 2.5	4			MOD
1989 09 25.16	S	7.7	AA	20.0	T	10	64	5	5	0.25	125	SPR
1989 09 25.46	B	8.4	S	5.0	R	4	10	5	3			KRY01
1989 09 25.76	S	8.6	AC	33	L	4	50	4.5	5			BOA
1989 09 25.78	S	8.0	AA	8.0	B		15	6.5	4/	0.25	45	HAV
1989 09 25.79	S	7.8	AA	5.0	B		10	7	4			HAV
1989 09 26.81				31.6	L	5	130	3	5			MID01
1989 09 26.81	S	8.5	A	20.0	T	10	50	4	5			COM
1989 09 26.81	S	8.5	SC	5.0	R		8					MID01
1989 09 27.02	S	8.2	AC	5.0	B		10	4	4			BOR
1989 09 27.02	S	8.3	AC	31.7	L	6	68	3.0	5			BOR
1989 09 27.78	S	7.7	AA	10.0	B		14	3.5	7			LOO01
1989 09 27.8	S	8.1	AC	20.3	T	10	80	3	5			DAH
1989 09 27.81				31.6	L	5	130	3.5	6	0.08	300	MID01
1989 09 27.81	S	8.3	SC	5.0	R		8					MID01
1989 09 28.06	M	8.6	AA	20.0	L	5	35	& 2.5	4			MOD
1989 09 28.46	B	8.3	S	5.0	R	4	10	6	3			KRY01
1989 09 28.8	S	7.9	AC	20.3	T	10	80	3	5			DAH

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 28.81				31.6	L	5	130	4.5	5	0.17	050	MID01
1989 09 28.81	S	8.2	SC	5.0	R		8					MID01
1989 09 28.85	S	9.0	V	20	L	4	33	4				YDE
1989 09 28.88	S	8.6	V	9	M	11	56	4	3			WES02
1989 09 29.03	B	8.5	AC	31.7	L	6	68					BOR
1989 09 29.03	S	8.0	AC	8.0	B		20	3.5	4/			BOR
1989 09 29.03	S	8.3	AC	31.7	L	6	68	2.3	5			BOR
1989 09 29.17	S	8.1	AA	20	T	10	77	3.5	6			PRY
1989 09 29.47	B	8.1	S	5.0	R	4	10	5	2			KRY01
1989 09 29.82				31.6	L	5	130	3.5	6	0.08	045	MID01
1989 09 29.82	B	8.3	VF	8.0	B		12	4	5/			REN
1989 09 29.82	S	8.0	SC	5.0	R		8					MID01
1989 09 29.83				20.3	T	10	50	3.5	5	0.2:	060	GRA04
1989 09 29.83	S	7.6	AC	3.5	B		7					GRA04
1989 09 29.84	S	8.9	V	25	L	5	60	5				JAN02
1989 09 30.45	B	8.1	S	5.0	R	4	10	5	3			KRY01
1989 09 30.76	S	8.4	AA	8.0	B		15	4	6			MIK
1989 09 30.77	S	8.1	AA	33	L	4	50	6.5	4/			BOA
1989 09 30.78	S	7.8	AA	5.0	B		10	7	5			BOA
1989 09 30.80	S	8.8	V	25	L	5	100	5				JAN02
1989 09 30.83	S	7.6	AC	3.5	B		7	4	5			GRA04
1989 10 01.05	M	8.5:	AA	20.0	L	5	35	& 3.0	4			MOD
1989 10 01.45	B	8.1	S	5.0	R	4	10	5	2			KRY01
1989 10 01.75	B	8.4	S	6.6	B		20	& 6	4/			SCI
1989 10 01.77	S	7.8	AA	8.0	B		15	5	5	0.33	40	HAV
1989 10 01.79	B	8.4	S	6.6	B	6	20	8	5			PLE01
1989 10 01.82	B	8.3	VF	8.0	B		12	4	5/			REN
1989 10 02.02	B	8.4	AC	20.0	L	6	37	3.3	5			NOW
1989 10 02.47	B	8.3	S	5.0	R	4	10	4	2			KRY01
1989 10 02.75	S	8.0	AA	33	L	4	50	5.5	5			BOA
1989 10 02.83	S	8.3	V	15	L		40	7				HAL03
1989 10 02.85	B	7.8	AA	7.8	B	8	40	7	4			CHE03
1989 10 03.00	S	8.1	A	20.0	T	10	50	& 5	5			COM
1989 10 03.02	B	8.6	AA	10.0	B	4	14		2			SIM
1989 10 03.24	B	8.3	S	5.0	B	2	10		2			AND03
1989 10 03.47	B	8.1	S	5.0	R	4	10	4	3			KRY01
1989 10 03.79				20.3	T	6	60	2.7	4/			KAM01
1989 10 03.79	S	8.2	S	7.0	B		20					KAM01
1989 10 03.82	S	7.7	AA	12.0	R	4	20	2.5	7			LOO01
1989 10 03.85	S	7.2	S	5.0	B		10	10	0			ZAN01
1989 10 03.85	S	8.5	V	20	L	4	33	4.5	4			YDE
1989 10 04.02	B	8.6	AA	10.0	B	4	14	4	4			SIM
1989 10 04.47	B	8.0	S	5.0	R	4	10	5	3			KRY01
1989 10 04.77	S	7.2	S	5.0	B		10	10	0			ZAN01
1989 10 04.77	S	8.0	A	20.0	T	10	50					COM
1989 10 04.78	S	8.2	AA	8.0	B		15	3.5	6			MIK
1989 10 05.00				31.7	L	6	55	2.3	5/	?	40	BOR
1989 10 05.00	S	7.8	AC	8.0	B		20	3.4	5			BOR
1989 10 05.00	S	7.8	HR	8.0	B		20					BOR
1989 10 05.03	B	9.0	AA	5.0	B	4	7		0			SIM
1989 10 05.03	M	8.5	AA	20.0	L	5	35	1.5	6			MOD
1989 10 05.24	B	8.1	S	5.0	B	2	10		2			AND03
1989 10 05.45	B	7.8	S	5.0	R	4	10	5	3			KRY01
1989 10 05.78	B	8.2	AA	26.0	L	4	35	4	4			SEL
1989 10 05.79	S	8.7	V	11.4	L	8	37	5	6			EKL
1989 10 05.82	B	7.5	AA	5.0	B		7	8	3			MER
1989 10 05.83	S	8.0	V	6.0	B		12	6	6		80	AND01
1989 10 06.00				31.7	L	6	55	2.7	5	?0.25	50	BOR
1989 10 06.00	S	7.7	HR	5.0	B		10	3.5	4			BOR

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 06.00	S	7.8	AC	5.0	B		10					BOR
1989 10 06.46	B	7.8	S	5.0	R	4	10	5	3			KRY01
1989 10 06.78	B	8.3	AA	12.0	R	4	35	4	4	0.6	46	CHE03
1989 10 06.80	B	8.2	S	6.6	B	6	20	5	4/			PLE01
1989 10 07.13	S	7.2	SC	8.0	B	3	11	3.5	5			PRY
1989 10 08.00	S	7.9	HR	8.0	B		20	3.4	5/			BOR
1989 10 08.46	B	7.8	S	5.0	R	4	10	5	3			KRY01
1989 10 11.77	S	7.5	V	8.0	B		20	7				AND01
1989 10 12.59	B	7.9	AA	25.0	L	5	40	3	3			CHE03
1989 10 13.58	B	7.8	AA	25.0	L	5	40	3	3			CHE03
1989 10 13.67	E	8.3	HD	11.0	L	7	32					FIL02
1989 10 13.68	B	8.0	HD	11.0	L	7	32	2	3		50	FIL02
1989 10 13.75	B	7.3	S	8.0	B		20		4			HAS02
1989 10 13.75	S	7.4	V	8.0	B		20	7			80	AND01
1989 10 13.80	B	6.9	S	20.0	B	15	60			0.2	225	KOR01
1989 10 14.80	B	6.7	S	20.0	B	15	60					KOR01
1989 10 15.59	B	7.5	AA	25.0	L	5	40	2	3			CHE03
1989 10 15.72	B	7.4	S	6.6	B		20	& 7	5			SCI
1989 10 15.72	S	7.0:	S	20.3	T	10	80	3	5			LUE
1989 10 15.74	S	7.3	V	8.0	B		20	7			80	AND01
1989 10 15.75	S	7.8	AA	8.0	B		15	3	7			MIK
1989 10 15.80	B	7.4	S	6.6	B	6	20	6	5			PLE01
1989 10 16.60	B	7.5	AA	25.0	L	5	40	2	3			CHE03
1989 10 16.74	M	7.8	AA	8.0	B		15	3.5	7			MIK
1989 10 17.59	B	7.4	AA	25.0	L	5	40	2	3	0.1		CHE03
1989 10 17.74	S	6.5	AA	8.0	B		15	4.5	6/	0.5	25	HAV
1989 10 17.78	S	7.6	SC	8.0	B		20	3.4	0			FIE
1989 10 18.60	B	7.2	AA	11.0	B	4	20					CHE03
1989 10 18.77	M	7.7	AA	8.0	B		15	4	7			MIK
1989 10 19.43	B	6.6	S	5.0	R	4	10	6	5			KRY01
1989 10 19.60	B	6.8	AA	11.0	B	4	20			0.1		CHE03
1989 10 19.68	E	7.5	HD	6.5	L	8	33	2	6			FIL02
1989 10 19.71	B	7.5	S	6.7	L	6	30	& 1.5	6			GOR02
1989 10 19.76	M	6.8	AA	8.0	B		15	4	6			MIK
1989 10 19.77	B	6.8	AA	10.0	B		14	4.5	4			HAS02
1989 10 19.80	B	6.2	S	20.0	B	15	60			0.4	280	KOR01
1989 10 20.08	B	6.6	AA	4.0	B		8					KEE
1989 10 20.41	B	6.6	S	5.0	R	4	10	6	5			KRY01
1989 10 20.60	B	6.8:	AA	11.0	B	4	20			0.1		CHE03
1989 10 20.68	E	7.8	HD	6.5	L	8	33	3	6			FIL02
1989 10 20.70	B	7.2:	S	5.0	B	4	7	& 2	6			PAR03
1989 10 20.71	B	7.4	S	6.7	L	6	30	& 1.5	6/			GOR02
1989 10 20.72	B	7.2:	S	6.8	R	6	20	& 2	6			PAR03
1989 10 20.73	B	7.2:	S	15.0	L	9	33	& 2	6			PAR03
1989 10 20.75	B	6.0	S	20.0	B	15	60			0.2	280	KOR01
1989 10 20.81	B	7.2	S	6.6	B	6	20	9.5	6			PLE01
1989 10 21.29	B	6.7	S	5.0	B	2	10		2			RAD01
1989 10 21.29	B	6.7	S	6	L		24		2			AND03
1989 10 21.60	B	7.0:	AA	11.0	B	4	20					CHE03
1989 10 21.73	B	7.5	S	7.5	R	3	15					IWA02
1989 10 22.00	B	6.8	AA	10.0	B	4	14	3.3	7			SIM01
1989 10 22.00	B	7.0	AA	10.0	B	4	14	2.5	5			SIM
1989 10 22.01	B	7.5	AA	8.0	B	4	11		5			SIM
1989 10 22.25	B	7.3	S	6.4	R	6	20		5			SZA01
1989 10 22.26	B	6.6	S	6	L		24		2			AND03
1989 10 22.26	B	6.6	S	6	L		24		2			STE09
1989 10 22.41	B	7.2	S	5.0	R	4	10	6	4			KRY01
1989 10 22.60	B	7.0	AA	11.0	B	4	20	5.5	5	0.5		CHE03
1989 10 22.71	B	7.2:	S	6.8	R	6	20	& 2	6			PAR03

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 22.72	B	7.2:	S	15.0	L	9	33	2.2	6			PAR03
1989 10 22.72	B	7.3:	S	4.0	B		11		6			RAF
1989 10 22.72	B	7.5:	S	7.5	R	3	15					IWA02
1989 10 22.73	S	7.5	S	6.4	R	12	20		3			URB
1989 10 22.74	B	7.2:	S	5.0	B	4	7	& 2	6			PAR03
1989 10 22.74	S	6.3	AA	8.0	B		15	4.5	6/	1.13	12	HAV
1989 10 22.75	B	7.2	S	6.4	R	12	32	& 5	3			CHO01
1989 10 22.77	B	6.7	AA	10.0	B		14		4	0.37	10	HAS02
1989 10 22.78				7.5	L	9	30	1.8	6/	?	0	KAM01
1989 10 22.78	M	6.9	AA	8.0	B		15	4	7	0.8		MIK
1989 10 22.78	M	7.4	S	6.4	R	6	16	4.3	3		355	ADA01
1989 10 22.78	S	7.1	AA	6.3	B		9					KAM01
1989 10 22.82	B	6.6	S	7.0	B		10	5	5			LUE
1989 10 23.01	M	7.4	AA	20.0	L	5	35	1.5	6			MOD
1989 10 23.19	B	6.6	S	5.0	B	2	10		2			RAD01
1989 10 23.20	B	6.6	S	5.0	B	2	10		2			AND03
1989 10 23.20	B	6.6	S	5.0	B	2	10		2			STE09
1989 10 23.25	B	7.2	S	6.4	R	6	20		6			SZA01
1989 10 23.41	B	7.1	S	5.0	R	4	10	6	4			KRY01
1989 10 23.66	E	7.3	HD	6.5	L	8	33					FIL02
1989 10 23.70	B	7.0	S	6.0	B		20		5			BAN
1989 10 23.70	B	7.4:	S	8.0	B	4	10	& 2	6			PAR03
1989 10 23.70	S	7.5	S	6.4	R	12	40	0.7	5			BOD
1989 10 23.71	S	7.5	S	6.4	R	12	20	1.3	2			URB
1989 10 23.73	B	7.1	S	5.0	B		7		7			SPE01
1989 10 23.73	M	6.5	S	15.0	L	8	48		4			KOS03
1989 10 23.74	B	7.2	S	8.0	B		20	& 2	6			SPE01
1989 10 23.74	B	7.4	S	7.5	R	3	15					IWA02
1989 10 23.74	B	7.5	S	5.0	R	10	20		4			GRO03
1989 10 23.74	S	7.5	S	6.7	R	12	38		2			DAL01
1989 10 23.75	B	6.7	AA	10.0	B		14	4.0	5	0.60	10	HAS02
1989 10 23.77				20.3	T	10	50	1.8	7/			KAM01
1989 10 23.77	B	7.0	AA	15.0	L	5	25	4	5	0.17	7	MER
1989 10 23.77	M	7.0	AA	8.0	B		15	4.5	7			MIK
1989 10 23.77	S	7.1	AA	6.3	B		9					KAM01
1989 10 23.78	B	6.9	AA	5.0	B		7	6.5	4			MER
1989 10 23.84	B	7.2	S	6.6	B	6	20	7	6/	0.5	355	PLE01
1989 10 23.98	B	7.0	HR	5.0	B		10	5	6			BOR
1989 10 23.98	B	7.4	HR	31.7	L	6	55	2.0	7	?	355	BOR
1989 10 24.19	B	6.5	S	5.0	B	2	10		2			RAD01
1989 10 24.20	B	6.5	S	5.0	B	2	10		2			AND03
1989 10 24.41	B	7.0	S	5.0	R	4	10	6	4			KRY01
1989 10 24.66	E	7.4:	HD	6.5	L	8	33					FIL02
1989 10 24.72	S	6.3	V	8.0	B		20	6		0.03	50	AND01
1989 10 24.98	B	7.1	HR	5.0	B		10	5	6			BOR
1989 10 24.98	B	7.4	HR	31.7	L	6	55	2.1	6	?0.5	27	BOR
1989 10 25.60	B	6.9	AA	11.0	B	4	20	4.5	5	0.4		CHE03
1989 10 25.71	S	7.2:	S	5.0	B		10	& 7	6/			SCI
1989 10 25.72	B	7.2	S	5.0	B		7		5			SPE01
1989 10 25.74	B	7.3	S	8.0	B		20	& 2.8	6			SPE01
1989 10 25.74	M	7.0	S	6.4	R	6	16					ADA01
1989 10 25.75	S	7.3	SC	8.0	B		20	5	6	0.5	20	EKL
1989 10 25.76	S	7.0	V	9	M	11	80	5	6		10	WES02
1989 10 25.81	B	7.2	S	6.6	B	6	20	5	6			PLE01
1989 10 26.41	B	7.2	S	5.0	R	4	10	5	4			KRY01
1989 10 26.60	B	7.0	AA	11.0	B	4	20	5.0	5	0.4		CHE03
1989 10 26.71	S	7.2:	S	6.6	B		20	& 6	5			SCI
1989 10 26.72	B	7.3:	S	7.5	R	3	15					IWA02
1989 10 26.72	S	7.0	S	6.4	R	12	20		2			URB

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 26.72	S	7.2	V	9	M	11	56	5	5			WES02
1989 10 26.73	B	7.3	S	8.0	B		20	& 2.8	5			SPE01
1989 10 26.76	B	6.7	AA	5.0	B		7	12	5			MER
1989 10 26.79	B	7.2	S	6.6	B	6	20	6	6			PLE01
1989 10 27.17	B	7.2:	S	7.5	R	3	15					IWA02
1989 10 27.58	B	7.1	AA	11.0	B	4	20	5.5	5	0.4		CHE03
1989 10 27.69	B	7.2	S	6.7	L	6	30	& 2.0	7			GOR02
1989 10 27.71	B	7.2:	S	7.5	R	3	15					IWA02
1989 10 27.71	S	6.5	V	6.0	B		12	6		0.08		AND01
1989 10 27.72	B	7.0	S	10.0	R	10	25					KOL02
1989 10 27.73	S	7.0	S	6.4	R	12	20		2			URB
1989 10 27.73	S	7.4	S	6.8	R	12	30		3			DAL01
1989 10 27.76	B	7.1	S	6.4	R	12	32	& 5	3			CHO01
1989 10 27.76	M	6.8	AA	8.0	B		15	4	8			MIK
1989 10 28.25	B	7.4:	S	6.4	R	6	20		5/			SZA01
1989 10 28.40	B	7.1	S	5.0	R	4	10	6	4			KRY01
1989 10 28.58	B	6.9	AA	11.0	B	4	20			0.4		CHE03
1989 10 28.69	B	6.9	S	6.7	L	6	30	& 2.5	7			GOR02
1989 10 28.69	B	7.3:	S	6.6	R	6	40		3/			GAM
1989 10 28.70	B	7.2:	S	6.6	R	6	19		4			GAM
1989 10 28.71	B	6.6	S	5.0	B		10	& 8	5			SCI
1989 10 28.71	B	6.9:	S	10.0	R	10	25					KOL02
1989 10 28.71	B	7.5:	S	6.8	R	6	20	& 2	6			PAR03
1989 10 28.75	B	6.5	S	6.4	R	12	32	& 5	3			CHO01
1989 10 28.82	B	6.6	S	6.6	B	6	20	6	5/	0.5	353	PLE01
1989 10 29.10	S	5.5	SC	8.0	B	3	11	4.5	7	0.17	20	PRY
1989 10 29.15	S	7.2	S	6.4	R	12	40	0.7	5			BOD
1989 10 29.16	B	7.2	S	5.0	B	4	7		6			PAR03
1989 10 29.16	B	7.4	S	6.6	R	6	19		4			GAM
1989 10 29.16	S	6.0	AA	8.0	B		15	5	7	2	0	HAV
1989 10 29.17	B	7.3	S	6.8	R	6	20		6			PAR03
1989 10 29.17	B	7.4	S	6.6	R	6	40	1.8	4			GAM
1989 10 30.73	B	7.3	S	5.0	R	10	20		4			GRO03
1989 10 31.85	B	6.8	S	5.0	R	4	10	8	4			KRY01
1989 11 01.17	S	5.9	AA	8.0	B		15	6	7	1.48	349	HAV
1989 11 01.85	B	6.9	S	5.0	R	4	10	8	4			KRY01
1989 11 02.17	B	6.8	S	7.5	R	3	15					IWA02
1989 11 02.25	B	6.7	S	6.4	R	6	20		5			SZA01
1989 11 03.16	B	6.6	S	8.0	B		20	4.5	6			SPE01
1989 11 03.17	B	6.6	S	5.0	B		7	& 4.5	7			SPE01
1989 11 03.17	B	6.8	S	5.0	R	10	20		4/			GRO03
1989 11 03.69	B	7.0:	S	6.8	R	6	20		5			PAR03
1989 11 04.15	S	6.9	S	6.4	R	12	40	0.9	4			BOD
1989 11 04.16	S	6.4	S	5.0	B		10	& 6	5			SCI
1989 11 04.42				8.0	B		20	4.2	6/	0.35	357	BOR
1989 11 04.42	B	6.8	HR	5.0	B		10	4	6			BOR
1989 11 05.18	S	5.6	SC	8.0	B		20	3.5	3			FIE
1989 11 06.15	B	6.3	S	6.6	R	6	19		4	0.33		GAM
1989 11 06.15	B	6.4	S	5.0	B		10	& 6	6			SCI
1989 11 06.15	B	6.4	S	6.6	R	6	40	2.4	6			SCI
1989 11 06.16	B	6.7	S	5.0	B	4	7		5			PAR03
1989 11 06.17	B	6.3	S	6.6	R	6	40	3.0				GAM
1989 11 06.17	B	6.8	S	6.8	R	6	20		5			PAR03
1989 11 06.17	B	6.9	S	5.0	R	10	20		4/			GRO03
1989 11 06.18	B	6.7	S	15.0	L	9	33	3.2	5			PAR03
1989 11 06.19	B	5.5	A	5.0	R	10	13			&0.17	45	JAH
1989 11 06.19	S	5.8	A	5.0	R	10	13	3.3	7	&0.17	320	JAH
1989 11 08.17	S	5.1	AA	0.0	E		1					HAV
1989 11 08.17	S	5.4	AA	8.0	B		15	7	7/	3	333	HAV

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 08.17	S	5.8	SC	8.0	B		20	3.5	2			FIE
1989 11 08.19	M	6.2	AA	8.0	B		15	7	7	2.5	340	MIK
1989 11 08.20	B	6.0	A	5.0	R	10	13					JAH
1989 11 08.20	S	5.8	A	5.0	R	10	13	3.5	7			JAH
1989 11 09.05	B	6.2:	AA	11.0	B	4	20	6	5	0.5		VAS
1989 11 09.85	B	5.8	S	5.0	R	4	10	10	3			KRY01
1989 11 10.16	B	6.2	S	5.0	B		7	& 4.7	7			SPE01
1989 11 10.17	S	6.2	SC	8.0	B		20	5	7	0.75	340	EKL
1989 11 10.18	B	6.1	S	8.0	B		20	4.7	7	0.3	336	SPE01
1989 11 10.18	B	6.3	S	5.0	R	10	20		4/			GRO03
1989 11 10.18	S	5.6	S	9.0	M	6	25	5	6			LUE
1989 11 10.18	S	5.7	S	5.0	B		10	5	5			LUE
1989 11 10.21				20.3	T	10	50	3.5	8			KAM01
1989 11 10.21	B	5.9	AA	6.3	B		9			0.75	340	KAM01
1989 11 10.42				8.0	B		20	3.3	7	1.6	332	BOR
1989 11 10.42	B	6.3	HR	5.0	B		10	4.5	7	?		BOR
1989 11 10.85	B	5.9	S	5.0	R	4	10	10	3			KRY01
1989 11 11.10	E	6.1	S	6.5	L	8	33					FIL02
1989 11 11.12	M	6.0	S	6.5	L	8	33		4		340	FIL02
1989 11 11.16	B	6.0	S	8.0	B		20	4.0	6	0.7	325	SPE01
1989 11 11.17	B	6.4	S	5.0	R	10	20	& 5.5	5			GRO03
1989 11 11.17	S	4.9	AA	0.0	E		1					HAV
1989 11 11.17	S	5.0	AA	5.0	B		10	8	7	3.1	330	HAV
1989 11 11.18	B	6.1	S	5.0	B		7	& 3	7	0.3	325	SPE01
1989 11 11.19	M	6.0	AA	8.0	B		15	8	7	1.1	330	MIK
1989 11 11.19	S	5.4	S	0.0	E		1					CAV
1989 11 11.20	B	5.9:	A	5.0	B		10					JAH
1989 11 11.20	S	5.7:	A	5.0	B		10	& 3.3	6	&0.20	330	JAH
1989 11 11.42	B	6.3	HR	5.0	B		10	5	7	?		BOR
1989 11 11.42	B	6.4	HR	8.0	B		20	3.7	7	1.2	337	BOR
1989 11 12.05	B	6.0	AA	11.0	B	4	20	4	6	0.3		VAS
1989 11 12.16	B	6.1:	S	5.0	B		7		8			SPE01
1989 11 12.17	S	5.9	S	6.4	R	12	40	1.3	5/			BOD
1989 11 12.17	S	6.5	SC	8.0	B		20	5.5	1			FIE
1989 11 12.18	B	6.0	S	8.0	B		20	2.7	6			SPE01
1989 11 12.19	B	5.6	SC	5.0	B		10	4.5	7			BOA
1989 11 12.20	B	6.0	A	5.0	R	10	13			0.12	345	JAH
1989 11 12.20	S	5.5	A	5.0	R	10	13	4.0	7	0.16	33	JAH
1989 11 13.06	B	5.8	AA	11.0	B	4	20					VAS
1989 11 13.17	M	5.9	AA	8.0	B		15	5	8			MIK
1989 11 13.46	M	6.4	AA	20.0	L	5	35	1.2	7			MOD
1989 11 14.85	B	6.2	S	5.0	R	4	10	10	3			KRY01
1989 11 15.09	B	4.8	S	5.0	B	2	10		4			AND03
1989 11 15.17	B	6.1	S	7.5	R	3	15					IWA02
1989 11 16.12	B	5.4	S	5.0	B	2	10		4			AND03
1989 11 16.13	B	6.0	S	5.0	B		10	& 5	7			SCI
1989 11 16.19	B	5.5	A	5.0	R	10	13			0.2	335	JAH
1989 11 16.19	M	5.9	SC	15	L	8	67	2		0.08	300	WAR01
1989 11 16.19	S	5.3	A	5.0	R	10	13	4	7	0.3	25	JAH
1989 11 16.21	S	5.5	S	9.0	M	6	25	& 2	7			LUE
1989 11 16.21	S	5.6	S	5.0	B		10	& 2	6			LUE
1989 11 17.16	B	6.1	S	5.0	B		10	& 7	7			SCI
1989 11 17.16	B	6.1	S	6.6	R	6	40	& 3	7	0.25	327	SCI
1989 11 17.16	B	6.2	AA	6.0	B	4	20	6		0.2		CHE03
1989 11 17.17	B	6.2	S	8.0	B		20	& 3.8	6	&0.3	324	SPE01
1989 11 17.17	B	6.3	S	6.6	R	6	19		6/			GAM
1989 11 17.18	B	6.2	S	5.0	B		7	& 3	7			SPE01
1989 11 17.19	B	6.0	S	7.5	R	3	15					IWA02
1989 11 17.19	B	6.1	A	5.0	R	10	13					JAH

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 17.19	S	5.9	A	5.0	R	10	13	& 6	7	&0.3	355	JAH
1989 11 17.19	S	6.0	S	6.4	R	12	40	1.6	5/			BOD
1989 11 17.23	B	6.4	A	20.4	L	6	72			0.12	35	JAH
1989 11 17.23	S	5.7	A	20.4	L	6	72	2.3	5	0.23	10	JAH
1989 11 17.28	B	6.0	S	6.6	B	6	20	5	7	0.3	325	PLE01
1989 11 18.12	B	5.5	S	5.0	B	2	10		4			AND03
1989 11 18.15	B	6.1:	S	6.6	R	6	40	3.5	6/			SCI
1989 11 18.17	B	6.0	AA	6.0	B	4	20	5	5			CHE03
1989 11 18.17	B	6.3	S	8.0	B		20	& 3.9	6	&0.25	322	SPE01
1989 11 18.18	B	6.2	S	5.0	B		7	& 4	6			SPE01
1989 11 18.18	B	6.2	S	6.0	B		20		5			BAN
1989 11 18.19	S	6.1	S	9.0	M	6	25	1.8	6	0.2	315	LUE
1989 11 18.26	B	5.9	S	6.6	B	6	20	5	7	0.25	322	PLE01
1989 11 18.42	B	6.2	HR	5.0	B		10	4	7/			BOR
1989 11 19.12	B	5.4	S	5.0	B	2	10		4			AND03
1989 11 19.16	B	6.0	AA	6.0	B	4	20	4	5			CHE03
1989 11 19.17	B	6.2	S	8.0	B		20	3.6	6	&0.4	320	SPE01
1989 11 19.18	B	5.9	A	5.0	R	10	13					JAH
1989 11 19.18	B	6.1	A	5.0	R	10	56			0.11	0	JAH
1989 11 19.18	S	5.8	A	5.0	R	10	13	4.7	7	0.39	78	JAH
1989 11 19.18	S	6.0	A	5.0	R	10	56	3.2	5	0.19	75	JAH
1989 11 19.19	B	6.1	S	5.0	B		7	& 4	6			SPE01
1989 11 19.20	B	6.6	A	20.4	L	6	72	3.8	4	0.40	325	JAH
1989 11 19.20	S	6.1	S	9.0	M	6	25	3	7			LUE
1989 11 19.42	B	6.1	HR	5.0	B		10	5	7			BOR
1989 11 19.85	B	6.0	S	5.0	R	4	10	10	3			KRY01
1989 11 20.17	B	5.9	S	15.0	L	9	33	3.8	6			PAR03
1989 11 20.17	B	6.2	S	5.0	B		7	& 3.2	6			SPE01
1989 11 20.18	B	6.2	S	8.0	B		20	3.3	6			SPE01
1989 11 20.19	B	6.1	S	5.0	B	4	7		6			PAR03
1989 11 20.20	B	6.1	S	6.8	R	6	20		6			PAR03
1989 11 20.73	S	5.5:	AA	8.0	B		15	& 2	6			SEA
1989 11 20.85	B	6.2	S	5.0	R	4	10	10	3			KRY01
1989 11 21.17	B	6.2	S	6.6	R	6	19		6			GAM
1989 11 21.18	B	6.1	S	5.0	R	4	7		6/			GAM
1989 11 21.50	B	5.8	AA	4.0	B		8			1.5	310	KEE
1989 11 21.72	M	5.0	AA	8.0	B		15		6			SEA
1989 11 21.73	M	5.6	A	5.0	B		10		5			GAR01
1989 11 21.85	B	5.8	S	5.0	R	4	10	10	3			KRY01
1989 11 22.12	B	5.9	S	5.0	B	2	10		4			AND03
1989 11 22.21	B	5.8	S	6.6	B	6	20	4	6/	0.5	320	PLE01
1989 11 22.43	B	5.9	NO	5.0	B		10	5.5	6/	0.5	312	BOR
1989 11 22.43	B	6.0	HR	5.0	B		10					BOR
1989 11 22.43	B	6.0	NO	8.0	B		20	5.5	6/	0.85	312	BOR
1989 11 22.43	B	6.1	HR	8.0	B		20					BOR
1989 11 22.72				15.2	L	5	29			0.17	255	SEA
1989 11 22.72	M	5.4	AA	8.0	B		15		6			SEA
1989 11 22.74	M	5.5	A	5.0	B		10		5			GAR01
1989 11 22.84	B	6.1	S	5.0	R	4	10	10	3			KRY01
1989 11 23.17	B	5.7	A	5.0	R	10	13					JAH
1989 11 23.17	S	5.5	A	5.0	R	10	13	5.6	7	0.47	68	JAH
1989 11 23.18	B	5.5	A	20.4	L	6	72	3.6	5	0.80	320	JAH
1989 11 23.19	B	6.4	S	4.0	B		11		6			RAF
1989 11 23.21	S	5.7	S	5.0	B		10					CAV
1989 11 23.72	M	5.3	AA	8.0	B		15		6			SEA
1989 11 23.73	M	7.3	S	6.4	R	12	36	1.7	2			ZIO
1989 11 23.85	B	5.9	S	5.0	R	4	10	10	3			KRY01
1989 11 24.20	B	6.3	S	7.5	R	3	15					IWA02
1989 11 24.21	M	5.7	AA	8.0	B		15	6.5	6			MIK

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 24.42	B	6.4	AC	10.7	L	4	21	3.3	6	0.08	15	NOW
1989 11 24.70	M	7.2	S	6.4	R	12	36	1.7	3			ZIO
1989 11 24.87	B	6.2	S	5.0	R	4	10	12	2			KRY01
1989 11 25.11	B	6.0	HD	5.0	B		7	4	5	0.03		MOR04
1989 11 25.18	B	5.6	A	5.0	R	10	13					JAH
1989 11 25.18	B	6.0	S	8.0	B		20	5.0	6			SPE01
1989 11 25.18	S	5.6	A	5.0	R	10	13	5.2	6	0.46	70	JAH
1989 11 25.18	S	6.3	S	6.4	R	12	40					BOD
1989 11 25.19	B	5.8	S	5.0	R	10	20		5/			GRO03
1989 11 25.19	B	6.0	S	5.0	B		7	& 4.2	6			SPE01
1989 11 25.19	B	6.1	A	20.4	L	6	72	3.2	4	0.53	303	JAH
1989 11 25.70	M	4.9	A	5.0	B		10	8	6	1.2		GAR01
1989 11 26.19	B	6.4	S	7.5	R	3	15					IWA02
1989 11 26.20	S	5.3	S	0.0	E		1					CAV
1989 11 26.71	M	7.0	S	6.4	R	12	36	1.9	3			ZIO
1989 11 26.72	M	5.0	A	5.0	B		10	6	6	0.5		GAR01
1989 11 27.14	B	5.6	HD	5.0	B		7	7		0.11		MOR04
1989 11 27.16	B	5.9	S	5.0	B	2	10		4			AND03
1989 11 27.20	M	5.8	AA	8.0	B		15	7	6	1.5		MIK
1989 11 27.20	S	5.3	AA	8.0	B		15	8	6/	1.5	283	HAV
1989 11 27.20	S	5.6	S	5.0	R	10	20					GRO03
1989 11 27.22	S	5.8	SC	5.0	B		10	5.5	6			BOA
1989 11 27.22	S	6.1	AA	10.0	B		14	2.0	5			HAS02
1989 11 27.43	B	5.8	HR	5.0	B		10	8	5			BOR
1989 11 27.70				20	L	5	71	6	6	2	280	GAR01
1989 11 27.70	M	5.6	A	5.0	B		10			2		GAR01
1989 11 28.15	B	6.1	S	5.0	B	2	10		4			AND03
1989 11 28.21	B	6.2	A	5.0	R	10	13					JAH
1989 11 28.21	S	6.1	A	5.0	R	10	13	5.2	7	&0.69	100	JAH
1989 11 28.23	B	6.4:	A	20.4	L	6	72	2.7	3	&0.45	325	JAH
1989 11 28.23	S	5.7	S	9.0	M	6	25	& 2	3			LUE
1989 11 28.52	B	5.9	AA	4.0	B		8					KEE
1989 11 28.73	M	5.8	A	5.0	B		10		6			GAR01
1989 11 28.74	M	6.9	S	6.4	R	12	36	1.9	3			ZIO
1989 11 28.81	S	5.5	AA	25	L	6	70	6	7	1.0	287	CLA
1989 11 28.87	B	6.1	S	5.0	R	4	10	10	2			KRY01
1989 11 29.18	S	5.6	AA	8.0	B		15	8	5/	1.33	270	HAV
1989 11 29.70				25.4	L	4	71	4	5	0.5	275	SEA
1989 11 29.70	S	5.6	AA	2.5	B		2					SEA
1989 11 29.72	I	5.7	AA	0.0	E		1					SEA
1989 11 29.72	M	5.8	A	5.0	B		10	5	6	1.5		GAR01
1989 11 29.81	S	5.4	AA	3.0	R		6					CLA
1989 11 29.81	S	5.6	AA	25	L	6	70	6	7	1.25	285	CLA
1989 11 30.16	B	6.4	S	5.0	B	2	10		4			AND03
1989 11 30.69	M	5.8	A	5.0	B		10	5	6			GAR01
1989 11 30.69	M	5.8	AA	8.0	B		15	4	5		274	SEA
1989 11 30.80	S	5.4	AA	3.0	R		6					CLA
1989 11 30.80	S	5.6	AA	25	L	6	70	7.5	7	1.6	282	CLA
1989 12 01.69	M	5.6	AA	8.0	B		15		5			SEA
1989 12 01.71	M	5.9	A	5.0	B		10		5	4.0		GAR01
1989 12 02.14	S	6.1	AA	6.3	B		9	7	6			KAM01
1989 12 02.52	B	6.2	AA	4.0	B		8					KEE
1989 12 03.15	S	6.0	AA	6.3	B		9	5	5/			KAM01
1989 12 03.53	B	6.1	AA	4.0	B		8					KEE
1989 12 03.72	M	5.9	A	5.0	B		10	5	6	2.0		GAR01
1989 12 04.77	B	6.2	AA	8.0	B		20	4	5	0.25	265	PEA
1989 12 04.78	B	6.3	AA	20	L	4	45	5	6	0.33	266	PEA
1989 12 04.80		5.8	AA	0.0	E		1					CLA
1989 12 04.80	S	5.8	AA	3.0	R		6					CLA

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 04.80	S	5.9	AA	25	L	6	70	7.5	7	1.75		CLA
1989 12 05.64	M	6.3	A	5.0	B		10					GAR01
1989 12 05.79	B	6.3	AA	8.0	B		20					PEA
1989 12 05.79	S	6.2	AA	8.0	B		20	7	5	0.75	275	PEA
1989 12 05.80		5.9	AA	0.0	E		1					CLA
1989 12 05.80	S	5.9	AA	3.0	R		6					CLA
1989 12 05.80	S	6.0	AA	25	L	6	70	8	8	1.6		CLA
1989 12 05.80	S	6.3	AA	20	L	4	45	6.5	6	0.67	273	PEA
1989 12 06.72	M	6.4	A	6.3	B		9					GAR01
1989 12 06.80	B	6.2	AA	8.0	B		20	6	5	0.5	270	PEA
1989 12 06.80	B	6.3	AA	20	L	4	45	5.5	6	0.5	270	PEA
1989 12 07.68	M	6.4	A	5.0	B		10	4	5			GAR01
1989 12 08.59	M	6.3	AA	8.0	B		15					SEA
1989 12 08.74	M	6.6	A	5.0	B		10	3	4			GAR01
1989 12 08.80	S	6.2	AA	3.0	R		6					CLA
1989 12 08.80	S	6.3	AA	25	L	6	70	7	7/	0.75		CLA
1989 12 08.81	S	6.5	AA	8.0	B		20	5.5	4/			PEA
1989 12 09.73	M	6.6	A	5.0	B		10	3	4			GAR01
1989 12 10.60	M	6.6	AA	8.0	B		15					SEA
1989 12 10.78	S	6.5	AA	3.0	R		6					CLA
1989 12 10.78	S	6.6	AA	25	L	6	70	6	7	0.4		CLA
1989 12 10.81	S	7.8	AA	8.0	B		20	4	5			PEA
1989 12 10.81	S	7.8	AA	20	L	4	45		5/			PEA
1989 12 11.83	S	7.4	AA	8.0	B		20	3.5	4			PEA
1989 12 15.45	M	7.7	A	5.0	B		10	3	3			GAR01
1989 12 15.45	S	6.7	AA	5.0	B		10		8			WIL02
1989 12 15.51	M	6.8	AA	8.0	B		15					SEA
1989 12 17.44	S	6.8	AA	5.0	B		10		8			WIL02
1989 12 17.48	S	7.2	AA	8.0	B		15					SEA
1989 12 18.48	S	6.9	AA	8.0	B		15	7	4			SEA
1989 12 18.51	S	6.6	AA	5.0	B		10					WIL02
1989 12 18.53	M	7.5	A	5.0	B		10	3	4			GAR01
1989 12 22.51				20	L	5	71	4	4	1	315	GAR01
1989 12 22.52	M	8.2	A	5.0	B		10		3			GAR01
1989 12 25.08	B	7.9	S	7.0	B		10	6				DEA
1989 12 25.60	S	8.5	VN	20	L	4	45	3.5	4			PEA
1989 12 26.45	S	8.7	AA	8.0	B		15					SEA
1989 12 28.47	M	9.1	A	5.0	B		10	4	3			GAR01
1989 12 28.60	S	8.9	VN	20	L	4	45	3.5	3			PEA
1989 12 28.63	S	7.6	AA	25	L	6	70	5	8			CLA
1989 12 31.76	S	7.9	AA	25	L	6	70	5	7		185	CLA
1990 01 03.56	S	9.7	VN	20	L	4	45	3	2			PEA
1990 01 03.59	S	8.1	AA	25	L	6	70	5	8			CLA
1990 01 05.71	S	10.0	VN	20	L	4	45	5	2			PEA

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 04.62	S	12.5	SM	20	L	7	56	2	2			CAM03
1989 10 05.88	S	12.7	AC	40.0	L	5	170	1.2	3			MER
1989 10 06.64	S	12.2	SM	20	L	7	56	3	2			CAM03
1989 10 17.75	S	10.3	GA	8.0	B		15	2.5	2			HAV
1989 10 18.54	S	11.7	SM	20	L	7	35	3	2			CAM03
1989 10 19.80	S	11.1	AC	20	T	10	77	3	1/			BOA
1989 10 20.14	S	10.1	AC	31.8	L	4	33	6	1			KEE
1989 10 20.53	S	11.5	SM	20	L	7	56	4	3			CAM03
1989 10 21.52	S	11.4	SM	20	L	7	56	4	3			CAM03
1989 10 22.13	S	10.5	AC	33.2	L	4	115	& 2.5	2			PEA01
1989 10 22.55	S	11.5	SM	20	L	7	56	3	3			CAM03

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DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 22.79	S	11.0	AC	20.3	T	10	51	2.9	3			HAS02
1989 10 23.03	S	11.3:	GA	20.0	L	5	35	2	2			MOD
1989 10 23.16	S	10.5	AC	31.8	L	4	63	4	1			KEE
1989 10 23.51	S	11.4	SM	20	L	7	56	4	2			CAM03
1989 10 23.85	S	10.8	AC	20.3	T	10	50	3	1			LUE
1989 10 25.56	S	11.3	SM	20	L	7	56	& 2.5	2			CAM03
1989 10 26.79	S	10.2	AC	15.0	L	5	25	3.9	2			MER
1989 10 26.88	S	10.7	A	20.0	T	10	80	& 4	1/			COM
1989 10 27.48	S	11.2	SM	20	L	7	56	3	2			CAM03
1989 10 28.14	S	10.1	AC	33.2	L	4	115	& 5	2/			PEA01
1989 10 28.51	S	10.2	SM	8.0	B		20	6	3			CAM03
1989 10 28.52	S	11.0	SM	20	L	7	56	4	3			CAM03
1989 10 28.53	S	10.8	SM	20	L	7	35	5	2			CAM03
1989 10 28.85	S	10.1	GA	8.0	B		15	5.0	2			HAV
1989 10 29.48	S	10.1	SM	8.0	B		20	5	2			CAM03
1989 10 29.48	S	11.0	SM	20	L	7	56	4	3			CAM03
1989 10 31.47	S	10.0	SM	8.0	B		20	5	2			CAM03
1989 10 31.51	S	11.0	SM	20	L	7	56	4	2			CAM03
1989 11 01.46	S	11.0	SM	20	L	7	56	& 3.5	1/			CAM03
1989 11 01.48	S	10.1	SM	8.0	B		20	& 4.5	1/			CAM03
1989 11 02.17	S	10.1	AA	20	T	10	63	2.7	2			PRY
1989 11 02.48	S	10.5	SM	8.0	B		20	& 4.5	1/			CAM03
1989 11 04.09	S	10.2	AC	31.7	L	6	68	2.2	0/			BOR
1989 11 04.73	S	10.4	AC	20.4	L	6	72	2.0	1			JAH
1989 11 05.76	S	10.2	AC	20.4	L	6	72	3.3	1			JAH
1989 11 16.72	S	10.3	AC	20.4	L	6	72	3.3	2			JAH
1989 11 17.74	B	10.2	AC	20.4	L	6	72					JAH
1989 11 17.74	S	9.7	AC	20.4	L	6	72	2.6	2			JAH
1989 11 18.77	B	9.7	AC	20.4	L	6	72					JAH
1989 11 18.77	S	9.5	AC	20.4	L	6	72	3.6	2			JAH
1989 11 19.73	S	10.2	AC	20.4	L	6	72	3.0	0			JAH
1989 11 19.83	S	9.9	AC	20.3	T	10	50	4	0			LUE
1989 11 20.83	S	10.9	AC	36	T	11	123	1.5	0/			KOR
1989 11 22.72	B	10.4	AC	20.4	L	6	72					JAH
1989 11 22.72	S	10.2	AC	20.4	L	6	72	2.6	2			JAH
1989 11 22.80	S	10.6	AC	36	T	11	123	2	1			KOR
1989 11 24.74	S	10.3	AC	20.4	L	6	72	2.2	1			JAH
1989 11 25.05	S	10.7	AC	31.7	L	6	68	1.8	0			BOR
1989 11 27.01	S	10.5	AC	31.7	L	6	68	2.5	1			BOR
1989 11 28.75	S	10.5	AC	36	T	11	123	1	3/			KOR
1989 11 28.78	S	10.7	AC	20.4	L	6	72	2.3	0			JAH
1989 11 29.70	S	10.5	AC	40	L	5	333					TOM
1989 11 29.74	S	10.8	AC	20.4	L	6	72	1.5	1			JAH
1989 11 29.75	S	10.5	AC	40	L	5	66	4.5	1			BOA
1989 11 29.76	S	10.3	AC	15.0	L	5	25	3.1	2			MER
1989 11 30.75	S	10.7	AC	36	T	11	123	1.5	2			KOR
1989 12 01.15	S	10.0	AA	20	T	10	63	2.0	2			PRY
1989 12 01.76	S	10.2	AC	15.0	L	5	25	5.0	2			MER
1989 12 02.02	S	10.6	GA	20.0	L	5	35	4	2			MOD
1989 12 07.73	S	10.5	AC	20.4	L	6	72	2.5	0			JAH
1989 12 17.98	M	11.0	AC	20.0	L	6	37	0.5	1			NOW
1989 12 21.72	S	10.6	AC	20.4	L	6	72	& 4.0	0			JAH
1989 12 24.76	S	10.3	AC	15.0	L	5	25	5.3	1			MER
1989 12 30.10	! S	11.2	NP	25.6	L	4	67	4.0	0/			MOR
1989 12 31.10	! S	11.2	NP	25.6	L	4	67	3.5	0/			MOR
1990 01 01.54	S	11.2	AC	41	L	4	83					HAL
1990 01 08.51	S	11.7	AC	41	L	4	83					HAL
1990 01 12.74	S	9.2	A	25.0	L	6	75	4.6	3			LOO01
1990 01 23.06	S	11.4	AC	20.3	T	10	80	2.5	1			GRA04

Comet Helin-Roman-Alu 1989v [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 24.04	S	11.0	AC	20.3	T	10	80	3.5	2			GRA04
1990 01 24.51	S	11.1	AC	41	L	4	83					HAL
1990 01 28.51	S	11.3	NP	25.6	L	4	67	2.8	0/			MOR
1990 02 01.52	S	10.5	AC	31.8	L	4	63	5	1			KEE
1990 02 03.50	S	11.5	AC	41	L	4	83					HAL
1990 02 19.27	I	[12.5		41	L	4	83					HAL
1990 02 24.33	I	[13.0		41	L	4	83					HAL

Comet Černis-Kiuchi-Nakamura 1990b

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 13.15	S	8.5:	AA	20.0	T	10	64	5	2			SPR
1990 03 17.12	M	8.4	AC	5.0	B		10		6			HAL
1990 03 18.17	M	8.7	AA	8.0	B		20	3	5			MOR
1990 03 18.18	M	8.5	AA	25.6	L	4	45	3.5	6			MOR
1990 03 18.89	S	8.6	AC	15.2	L	5	44	4.3	3			MOE
1990 03 18.91	S	8.3	S	20.3	T	10	50	2.7	3			GRA04
1990 03 19.82	S	7.7	AC	20.3	T	10	80	3.4	5			DAH
1990 03 19.83				31.6	L	5	130	4	7	0.08	300	MID01
1990 03 19.83	S	8.0	S	5.0	R		8					MID01
1990 03 19.86	S	8.3	S	20.3	T	10	50	3.4	5			GRA04
1990 03 20.15	M	8.2	AC	5.0	B		10					HAL
1990 03 20.89	S	8.9:	AC	15.2	L	5	44	& 2	3			MOE
1990 03 21.16	S	8.3	AA	20.0	T	10	64	5	3			SPR
1990 03 21.77	S	8.3	AC	33	L	4	50	3	4/			BOA
1990 03 21.81	S	8.1	S	3.5	B		7					GRA04
1990 03 21.83				20.3	T	10	50	3.5	5			GRA04
1990 03 21.83				31.6	L	5	130	3	7	0.05	320	MID01
1990 03 21.83	S	7.9	S	5.0	R		8					MID01
1990 03 21.85	S	7.8	AC	20.3	T	10	80	3.1	5			DAH
1990 03 22.01	S	7.8	S	22.9	R	12	96	& 2	4			GRE
1990 03 22.80	S	7.9	AC	15.2	L	5	44	5.5	6	0.4	80	MOE
1990 03 23.17	M	7.9	AA	8.0	B		20	3	7			MOR
1990 03 24.83	S	7.9	AC	20.3	T	10	80	3.8	5/			DAH
1990 03 24.83	S	8.0:	S	8.0	R	11	46	5.2	5			GRA04
1990 03 24.85				31.6	L	5	130	3.6	7			MID01
1990 03 24.85	S	7.8	S	5.0	R		8					MID01
1990 03 24.89	B	8.6	S	10.3	R	7	40	6	6			COL02
1990 03 25.84	S	8.8	S	10.3	R	7	40	3	5			COL02
1990 03 25.94	S	8.4	S	20.3	T	10	80	3.3	4			GRA04
1990 03 26.85	S	8.4	AA	3.4	B		9					PER01
1990 03 26.85	S	8.4	AA	15	L	4	26	5	3			PER01
1990 03 26.86				31.6	L	5	130	3	6	0.06	340	MID01
1990 03 26.86	S	8.0	AC	20.3	T	10	80	3.0	5			DAH
1990 03 26.86	S	8.0	S	5.0	R		8					MID01
1990 03 26.86	S	8.1	AC	20.3	T	10	50	4.7	4/			GRA04
1990 03 27.17	S	8.7	AA	8.0	R	4	19	4	1			SPR
1990 03 27.88	S	8.9	AC	15.2	L	5	44	3	3			MOE
1990 03 28.17	S	8.5	AA	14.0	S	4	28	4	2			SPR
1990 03 28.83	M	8.3	AC	20.3	T	10	50	4.5	4/			GRA04
1990 03 28.88	S	8.4	AC	20.3	T	10	50	4.2	5			GRA04
1990 03 29.17	S	8.6	AA	20.0	T	10	64	3.5	2			SPR
1990 03 29.81	S	9.9	AC	15.2	L	5	44	2.5	2			MOE
1990 03 29.83	S	8.6	S	31.6	L	5	130	3.5	6	0.05	335	MID01
1990 03 30.17	S	8.7	AA	20.0	T	10	64	3.5	2			SPR
1990 03 30.88	S	8.8	S	31.6	L	5	130	3	5			MID01
1990 03 30.91	S	8.6	AC	20.3	T	10	80	3.6	4/			GRA04
1990 03 31.82	S	9.7	AC	15.2	L	5	44	2.4	2			MOE
1990 04 04.91	S	9.5	AC	20.3	T	10	80	3.0	3			GRA04

Comet Austin 1989c1

DATE (UT)		MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1989 12 17.45		S	10.7	SC	25.4	L	4	71		2	5			SEA
1989 12 17.46		S	10.6	SC	8.0	B		15						SEA
1989 12 17.54		S	11.0	VN	20	L	4	45		1.5	3/			PEA
1989 12 18.46		S	10.6	L	25.4	L	4	71						SEA
1989 12 18.54		S	10.9	VN	20	L	4	45		1.8	4			PEA
1989 12 19.56		S	10.9	VN	20	L	4	45						PEA
1989 12 20.43		S	11.0	VN	31.7	L	5	86		1.3	1			JON
1989 12 20.58		S	10.8	VN	20	L	4	45		2.0	3/			PEA
1989 12 21.60		S	11.0	VN	31.7	L	5	86			1			JON
1989 12 22.46		S	9.7	L	8.0	B		15						SEA
1989 12 22.46		S	9.7	L	25.4	L	4	71		4	5			SEA
1989 12 23.62		S	10.8	VN	20	L	4	45		2.5	4			PEA
1989 12 25.48		S	9.8	AA	25.4	L	4	71						SEA
1989 12 25.61		S	10.6	VN	20	L	4	45		2.0	5			PEA
1989 12 26.46		S	9.3	AA	25.4	L	4	71						SEA
1989 12 26.46		S	9.4	AA	8.0	B		15		4				SEA
1989 12 28.58		S	10.4	VN	20	L	4	45		2.5	5			PEA
1989 12 28.59		S	10.1	VN	8.0	B		20		4				PEA
1989 12 30.46		S	9.4	AA	8.0	B		15						SEA
1989 12 30.56		S	10.3	VN	20	L	4	45		3	5			PEA
1989 12 30.59		S	10.9	AA	25	L	6	70		2	2			CLA
1990 01 01.07	!	S	9.5:	NP	41	L	4	183						HAL
1990 01 02.06	!	S	9.5:	NP	41	L	4	183						HAL
1990 01 03.57		S	10.0	VN	20	L	4	45		2.5	5			PEA
1990 01 03.61		S	10.5	AA	25	L	6	70		2	2			CLA
1990 01 13.41		S	11.0	VN	31.7	L	5	86		1	1			JON
1990 01 14.08	!	M	9.9	NP	41	L	4	83						HAL
1990 01 14.42		S	9.1	AA	31.0	L	6	62		2	3			KOB01
1990 01 16.48		S	8.5	AA	8.0	B		15			5			SEA
1990 01 16.58		S	9.7	AA	25	L	6	70		3	2			CLA
1990 01 18.44		S	10.3	C	31.7	L	5	86		2	3			JON
1990 01 19.43		S	10.6	VN	31.7	L	5	86		2	3			JON
1990 01 20.43		S	10.3	C	31.7	L	5	86		1.5	2			JON
1990 01 21.10		S	8.9	S	25.6	L	4	67		3.3	2			MOR
1990 01 21.42		S	8.8	AA	31.0	L	6	62		2.5	3			KOB01
1990 01 21.42		S	10.1	C	31.7	L	5	86		1.5	5			JON
1990 01 22.05		S	9.0	AC	33.2	L	4	115	&	4	3	0.06	115	PEA01
1990 01 22.08	!	M	8.9	AC	41	L	4	83						HAL
1990 01 22.43		S	10.0	C	31.7	L	5	86		3	3			JON
1990 01 23.42		S	10.3	C	31.7	L	5	86		2	2			JON
1990 01 23.47		S	8.3	AA	8.0	B		15						SEA
1990 01 24.11		S	8.7	S	25.6	L	4	67		3.4	2			MOR
1990 01 24.46		S	10.1	C	31.7	L	5	86						JON
1990 01 26.42		S	8.6	AA	31.0	L	6	62		2	4			KOB01
1990 01 26.44		S	8.0	AA	8.0	B		15						SEA
1990 01 27.04		S	9.2	AC	33.2	L	4	115	&	4	3	0.05	120	PEA01
1990 01 27.42		S	8.5	AA	31.0	L	6	62		3	5	0.05	90	KOB01
1990 01 27.52		S	8.2	S	8.0	B		20	&	7	4			GRE
1990 01 27.58		S	8.0	AA	8.0	B		20	&	9	4			GRE
1990 01 28.09	!	S	8.9	NP	5.0	B		10						HAL
1990 01 28.11		S	8.5	S	25.6	L	4	45		3.3	3			MOR
1990 01 28.98		B	8.4	S	7.0	B		10		8	4	0.27	110	DEA
1990 01 29.54		S	8.7	AA	25	L	6	70		5	3			CLA
1990 01 30.55		S	7.9	AA	8.0	B		20	&	8	3			GRE
1990 01 30.56		S	8.5	AA	25	L	6	70		5	3			CLA
1990 01 31.42		S	9.2	GA	7.8	R	8	30		2.2	5			JON
1990 01 31.44		S	7.5	AA	5.0	B		10		8	5			SEA
1990 02 01.07	!	S	8.4	AA	31.8	L	4	63		4	1			KEE

Comet Austin 1989c1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 02 02.42	S	8.9	GA	7.8	R	8	30	2				JON
1990 02 03.09	! S	8.6	NP	41	L	4	83					HAL
1990 02 03.40	S	9.2	C	31.7	L	5	86					JON
1990 02 03.50	M	9.2	AA	25	L	4	65					CUR01
1990 02 05.40	S	9.2	GA	31.7	L	5	86		3			JON
1990 02 06.54	S	7.8:	AA	8.0	B		20		4			GRE
1990 02 07.74	S	7.4:	AC	8.0	B		20		4			BAR04
1990 02 07.75	S	7.2:	SC	8.0	B		20	6	3/			BOA
1990 02 11.09	! S	8.1	NP	5.0	B		10					HAL
1990 02 16.10	S	7.7	SC	5.0	B		10					HAL
1990 02 16.97	S	7.7	S	7.0	B		10	9	6			DEA
1990 02 17.75	S	6.5:	SC	8.0	B		20	5	5			BOA
1990 02 17.75	S	6.7:	AC	8.0	B		20		4/			BAR04
1990 02 17.96	B	7.6	S	7.0	B		10	9	6			DEA
1990 02 18.95	B	7.5	S	7.0	B		10	9	6			DEA
1990 02 19.10				41	L	4	83			0.33	145	HAL
1990 02 19.10	S	7.4	SC	5.0	B		10					HAL
1990 02 19.39	M	7.3	SC	5.0	B		10					KIL
1990 02 19.39	S	7.9	SC	7.8	R	8	30		3			JON
1990 02 20.37	S	7.9	SC	7.8	R	8	30	3.5	3			JON
1990 02 21.01	B	6.9	S	37	L		52	5	3	&0.08	90	CHE
1990 02 21.38	S	7.8	SC	7.8	R	8	30		4		160	JON
1990 02 21.39	M	7.9	SC	5.0	B		10					KIL
1990 02 22.38	S	7.8	SC	7.8	R	8	30	3	3			JON
1990 02 24.10	S	7.2	SC	5.0	B		10					HAL
1990 02 24.43	M	7.7	SC	5.0	B		10					KIL
1990 02 25.06	S	7.3	SC	7.0	B		10					PEA01
1990 02 25.06	S	7.6	SC	33.2	L	4	62	& 8	5/	0.16	115	PEA01
1990 02 25.37	S	7.8	SC	7.8	R	8	30	3.5	5			JON
1990 02 27.39	M	7.7	SC	5.0	B		10					KIL
1990 02 28.13	S	6.8	AA	8.0	B		20	9	3			MOR
1990 03 01.36	S	6.8	SC	4.5	R	6	13	4				JON
1990 03 03.94	B	6.9	S	7.0	B		10					DEA
1990 03 04.38	M	7.2	SC	5.0	B		10					KIL
1990 03 05.38	M	7.0	S	5.0	B		10					KIL
1990 03 05.76	S	6.5	SC	8.0	B		20	5	2/			BOA
1990 03 05.77	S	6.7	AC	8.0	B		20		3			BAR04
1990 03 05.93	B	6.8	S	7.0	B		10					DEA
1990 03 12.10	S	7.3:	SC	5.0	B		10					HAL
1990 03 15.10	M	6.7	SC	5.0	B		10					HAL
1990 03 18.14	M	6.2	AA	8.0	B		20		7/			MOR
1990 03 19.11	M	6.1	SC	5.0	B		10					HAL
1990 03 23.10	M	6.0	SC	5.0	B		10					HAL
1990 03 23.13	M	5.9	AA	8.0	B		20		8/			MOR
1990 03 26.84	! S	6.1	AA	3.4	B		9					PER01
1990 03 26.84	! S	6.1	AA	15	L	4	26	& 2.5	6			PER01
1990 03 27.82	O	5.0	AA	33.5	L	4	100	3		0.5		RIP
1990 03 30.81	S	5.5	SC	20.3	T	10	80	& 2.0	6/			GRA04
1990 03 30.82	S	5.5:		31.6	L	5	130	2	6	0.3	050	MID01
1990 03 31.82	S	5.2:	SC	7.6	R	13	40	& 2	6			GRA04
1990 03 31.82	S	5.5:		31.6	L	5	130	2	6	0.1	055	MID01
1990 04 04.83				20.3	T	10	80	1.3	7	0.15	045	GRA04
1990 04 04.83				31.6	L	5	130	3	6	0.3	030	MID01
1990 04 04.83	S	5.4	SC	3.5	B		7					GRA04
1990 04 04.83	S	5.5	SC	5.0	R		8					MID01
1990 04 04.84	S	4.7:	SC	20.3	T	10	80	1.7	7	0.12	045	DAH

Comet Skorichenko-George 1989e1

DATE (UT)		MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 20.08		S	9.8	S	15.2	L	3	23	2	2			KEE
1989 12 20.96		S	10.2	AC	31.7	L	6	68	1.5	3			BOR
1989 12 21.73		B	11.3	AC	20.4	L	6	72					JAH
1989 12 21.73		S	10.6	AC	20.4	L	6	72	1.0	2			JAH
1989 12 21.96		S	10.0	AC	31.7	L	6	68	1.6	3/			BOR
1989 12 22.72		S	10.4	AC	40	L	5	66	2	3/			BOA
1989 12 22.98		S	10.1	AC	31.7	L	6	68	1.6	3/			BOR
1989 12 24.74		S	10.0	AC	15.0	L	5	25	6.1	2			MER
1989 12 25.75		S	9.8	AC	20.3	T	10	51	1.2	4			HAS02
1989 12 27.72		S	10.9	AC	40	L	5	66					TOM
1989 12 27.74		S	10.2	AC	40	L	5	66	3	2/			BOA
1989 12 27.74		S	10.5	AC	40	L	5	66					BAR04
1989 12 30.12		M	10.0	AC	25.6	L	4	67	1.9	5			MOR
1989 12 30.76		S	10.0	AC	20	T	10	77	3	3			BOA
1989 12 30.80		S	10.5	AC	20	T	2	77					TOM
1989 12 31.11	!	M	10.2	AC	41	L	4	183					HAL
1989 12 31.12		M	9.9	AC	25.6	L	4	67	1.6	5			MOR
1990 01 01.74		S	9.4	S	20.3	T	10	51	1.1	4			HAS02
1990 01 02.11		M	10.1	AC	41	L	4	83					HAL
1990 01 09.79		S	9.3	AC	15	L	4	26	& 2	6/			PER01
1990 01 12.73		S	10.2	A	25.0	L	6	75	3	6			LOO01
1990 01 12.74		S	10.0	AC	20.4	L	6	72	& 2.0	2			JAH
1990 01 13.72		S	9.7	S	31.6	L	5	130	2.5	5			MID01
1990 01 13.75		S	8.9	S	20.3	T	10	51	0.7	5			HAS02
1990 01 14.11	!	M	10.1	AC	41	L	4	83					HAL
1990 01 15.72		S	9.5	AC	33	L	4	50	4	2/			BOA
1990 01 15.72		S	9.5	AC	33	L	4	50	4	2/			BOA
1990 01 16.43		S	9.8	S	31.0	L	6	62	1	2			KOB01
1990 01 18.12		S	9.6	AA	20	T	10	95	2.2	3			PRY
1990 01 19.13		S	9.5	AA	20	T	10	95	2.5	3			PRY
1990 01 21.10		M	9.6	AA	25.6	L	4	45	2.3	4			MOR
1990 01 21.75		S	9.7	AC	20.3	T	10	80	2.5	4			GRA04
1990 01 22.11	!	M	9.5	AC	41	L	4	83					HAL
1990 01 22.77		S	9.0	S	20.3	T	10	51	1.8	4			HAS02
1990 01 24.12		M	9.6	AA	25.6	L	4	67	2.6	5			MOR
1990 01 24.77		S	9.0	A	12.0	R	4	20	1	7			LOO01
1990 01 26.43		S	9.8	S	31.0	L	6	62	1.5	2			KOB01
1990 01 27.13		M	9.5	AA	25.6	L	4	45	3.6	3/			MOR
1990 01 27.44		S	9.8	S	31.0	L	6	62	2	2			KOB01
1990 01 28.12	!	M	9.8	AC	41	L	4	83					HAL
1990 01 28.13		M	9.5	AA	25.6	L	4	45	1.8	4/			MOR
1990 02 01.09		S	9.8	AA	15.2	L	3	23	3	2			KEE
1990 02 04.75		S	9.4	AA	20.4	L	6	72	1.4	1			JAH
1990 02 06.23		S	8.9	A	12.0	R	4	20	1	8			LOO01
1990 02 11.75		B	9.3	AA	20.4	L	6	72					JAH
1990 02 11.75		S	9.1	AA	20.4	L	6	72	2.2	3			JAH
1990 02 16.13		M	9.6	AC	41	L	4	83					HAL
1990 02 16.76		B	9.5:	AA	20.4	L	6	72					JAH
1990 02 16.76		S	9.1	AA	20.4	L	6	72	& 2.0	5			JAH
1990 02 17.74		S	8.7	AC	8.0	B		20		4			BAR04
1990 02 17.78		S	8.7	AC	8.0	B		20	4	3/			BOA
1990 02 19.13		M	9.6	AC	41	L	4	83					HAL
1990 02 21.02		S	9.1	S	37	L		52	3	4	&0.08	20	CHE
1990 02 21.94		S	9.6	S	31.6	L	5	130	3	6			MID01
1990 02 22.05		S	9.1	S	20.3	T	10	80	3	3			GRA04
1990 02 22.78		B	9.5:	AA	20.4	L	6	72					JAH
1990 02 22.78		S	9.0	AA	20.4	L	6	72	1.8	3			JAH
1990 02 23.79		S	9.1	AA	20.4	L	6	72	& 2.0	2			JAH
1990 02 23.91		S	9.6	S	31.6	L	4	130	3	4			MID01

Comet Skorichenko-George 1989e1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 02 24.14	M	9.7	AC	41	L	4	83					HAL
1990 03 12.78	S	9.3	AC	15.2	L	5	44	2	2			MOE
1990 03 12.80	S	9.0	S	31.6	L	5	130	3	5	0.05	210	MID01
1990 03 12.80	S	9.4	AC	20.3	T	10	50	2.5	4			GRA04
1990 03 13.15	S	9.3	AA	20.0	T	10	64	3	4			SPR
1990 03 13.79	S	9.2	AA	8.0	B		15	3	3			MIK
1990 03 15.12	M	9.5	AC	41	L	4	83					HAL
1990 03 18.84	S	9.2	AA	8.0	B		15	3	3			MIK
1990 03 19.84	S	9.1	S	31.6	L	5	130	2.5	4	0.06	330	MID01
1990 03 19.86	S	9.4	AC	20.3	T	10	80	1.7	4			DAH
1990 03 19.88	M	8.7	S	20.3	T	10	80	2.9	3			GRA04
1990 03 20.12	! M	9.7	AC	41	L	4	83					HAL
1990 03 21.15	S	8.9	AA	20.0	T	10	64	2	5			SPR
1990 03 21.82	S	8.9	S	31.6	L	5	130	3	4			MID01
1990 03 21.82	S	9.3	AC	20.3	T	10	50	3.2	3			GRA04
1990 03 21.88	S	9.1:	AC	20.3	T	10	80	1.4	4			DAH
1990 03 22.81	S	9.6	AC	15.2	L	5	44	2	2			MOE
1990 03 23.15	S	8.8	AA	8.0	B		20	7.5	2/			MOR
1990 03 24.82	S	9.0	S	31.6	L	5	130	4	5	0.05	320	MID01
1990 03 24.85	S	9.5:	AC	20.3	T	10	80	2.7	4			DAH
1990 03 25.94	S	9.5	AC	20.3	T	10	80	2.9	4			GRA04
1990 03 26.84	S	9.2	AC	20.3	T	10	80	3.4	4			DAH
1990 03 26.85	S	8.2	S	31.6	L	5	130	3	4	0.04	325	MID01
1990 03 26.88	S	9.1	AC	20.3	T	10	50	3.0	4			GRA04
1990 03 28.17	S	8.8	AA	20.0	S	4	28	2	4			SPR
1990 03 28.84	S	9.2	AC	20.3	T	10	50	3.1	4			GRA04
1990 03 29.17	S	8.9	AA	20.0	T	10	64	2	3			SPR
1990 03 29.82	S	8.9	S	31.6	L	5	130	3.5	5			MID01
1990 03 29.87	S	9.2	AC	20.3	T	10	80	3.3	4			GRA04
1990 03 30.87	S	9.0	S	31.6	L	5	130	3	5			MID01
1990 03 30.92	S	9.3	AC	20.3	T	10	80	2.8	4			GRA04

Periodic Comet Tuttle-Giacobini-Kresák (1989b1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 31.53	I[	13.5		41	L	4	183					HAL
1990 01 05.81	S	12.7	VN	41	L	4	90	1.8	1			PEA
1990 01 07.53	S[	13.0	AC	41	L	4	183	! 1.0				HAL
1990 01 07.82	S	13.0	VN	41	L	4	200		1			PEA
1990 01 09.53	I[	13.0		41	L	4	183					HAL
1990 01 25.54	S	12.6	AC	41	L	4	83					HAL
1990 01 27.53	S	11.7	AC	25.6	L	4	111	2.1	1			MOR
1990 01 27.85	S	13.1	A	31.0	L	6	62	1.0	1			KOB01
1990 01 28.52	S	11.5	AC	25.6	L	4	67	2.2	0/			MOR
1990 01 28.53	S	11.7	AC	25.6	L	4	111	1.8	0/			MOR
1990 01 29.53	S	12.4	AC	41	L	4	83					HAL
1990 02 03.53	S	12.2	AC	41	L	4	83					HAL
1990 02 04.72	S	11.6	GA	25.4	L	4	71					SEA
1990 02 21.52	I[	12.5		41	L	4	183					HAL
1990 02 23.52	I[	13.0		41	L	4	183					HAL

Periodic Comet Schwassmann-Wachmann 3 (1989d1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 02 04.52	I[	13.5		41	L	4	183					HAL
1990 02 23.48	I[	13.5		41	L	4	183					HAL
1990 03 03.35	I[	13.0		41	L	4	183					HAL
1990 03 19.34	M	12.9	AC	41	L	4	83	& 1				HAL
1990 03 23.12	S	11.6	VB	20.3	T	10	80	1.5	3/			GRA04

Periodic Comet Schwassmann-Wachmann 3 (1989d1) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 25.15	! S	11.5:	AC	20.3	T	10	80	& 1.0				GRA04
1990 03 26.12	S	11.2	VB	20.3	T	10	80	1.6	4			GRA04
1990 03 31.09	S	10.6	VB	20.3	T	10	80	1.9	4			GRA04

Periodic Comet Borrelly (1987 XXXIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 01 07.00	B	8.9	AA	5.0	B		10	&15	2			ROB03

Periodic Comet Gunn

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 05 07.23	S	12.1	AC	44.5	L	4	154	& 0.66	3			PEA01
1989 07 09.14	S	12.8	AC	44.5	L	4	154	& 1	1			PEA01
1989 07 24.50	S	12.9	SM	20	L	7	56	1	6			CAM03
1989 07 25.50	S	12.9	SM	20	L	7	56	1	6			CAM03
1989 07 27.40	S	12.9	SM	20	L	7	56	1	6			CAM03

Periodic Comet Wild 4 (1990a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 25.26	M	12.8	AC	41	L	4	183					HAL
1990 01 27.51	M	12.8	NP	25.6	L	4	111	0.7	3	0.03	330	MOR
1990 01 27.61	S	12.9	A	31.0	L	6	120	1.0	3			KOB01
1990 01 28.49	M	12.8	NP	25.6	L	4	111	0.7	3/	0.03		MOR
1990 01 29.51	M	12.5	AC	41	L	4	83					HAL
1990 01 31.21	M	12.7	AC	31.8	L	4	150	0.8	2			KEE
1990 02 04.50	S	12.8:	AC	41	L	4	183					HAL
1990 02 09.79	S	13.1	AC	20	T	10	77	0.6	7/			BOA
1990 02 09.79	S	13.2	AC	20	T	10	77		8			BAR04
1990 02 17.27	M	12.4	AC	41	L	4	83					HAL
1990 02 21.97	S	12.0	S	31.6	L	5	130	1.5	5			MID01
1990 02 21.99	S	11.9	AC	20.3	T	10	80	1.3	4			GRA04
1990 02 22.97	S	12.4	AC	20.4	L	6	72	0.7	4			JAH
1990 02 23.85	S	12.4	AC	20.4	L	6	72	0.9	1			JAH
1990 02 23.98	S	12.1	S	31.6	L	4	130	2	5			MID01
1990 02 24.24	M	12.1	CA	41	L	4	83					HAL
1990 02 28.01	S	12.3	AC	20.3	T	10	123	0.9	4			GRA04
1990 02 28.96	S	12.1	AC	20.3	T	10	80	1.1				GRA04
1990 03 01.90	S	12.1	AC	20.3	T	10	80	0.9	4			GRA04
1990 03 03.33	M	12.5	CA	41	L	4	83					HAL
1990 03 12.81	S	12.3	AC	20.3	T	10	80	1.3				GRA04
1990 03 15.18	M	12.5	CA	41	L	4	83					HAL
1990 03 19.86	S	11.2	S	31.6	L	5	130	0.8	4			MID01
1990 03 19.87	S	12.1	AC	20.3	T	10	80	1.2	3			GRA04
1990 03 19.90	S	12.3:	AC	20.3	T	10	80	& 1.0	3			DAH
1990 03 20.26	M	12.4	CA	41	L	4	83					HAL
1990 03 21.85	S	12.1	AC	20.3	T	10	80	1.1	3			GRA04
1990 03 21.86	S	11.0	S	31.6	L	5	130	1.3	6			MID01
1990 03 21.90	S	12.3	AC	20.3	T	10	133	0.6	4			DAH
1990 03 22.82	S	12.1	AC	20.3	T	10	80	1.1	4			GRA04
1990 03 24.85	S	10.6	S	31.6	L	5	130	1.3	6			MID01
1990 03 24.86	S	12.1	AC	20.3	T	10	80	0.9	3			DAH
1990 03 24.86	S	12.1:	AC	20.3	T	10	80	& 1.0				GRA04
1990 03 25.89	S	12.0	AC	20.3	T	10	80	1.1	4			GRA04
1990 03 26.89	S	12.0	AC	20.3	T	10	80	1.0	4			GRA04
1990 03 26.89	S	12.9:	AC	20.3	T	10	133	0.5				DAH
1990 03 26.91	S	10.9	S	31.6	L	5	130	0.9	4			MID01
1990 03 28.85	S	12.2	AC	20.3	T	10	80	0.9				GRA04

Periodic Comet Wild 4 (1990a) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 29.90	S	10.9	S	31.6	L	5	130	1.6	3			MID01
1990 03 29.94	S	12.2	AC	20.3	T	10	80	1.1				GRA04
1990 03 30.92	S	10.7	S	31.6	L	5	130	1.8	4			GRA04
1990 03 30.92	S	11.8	AC	20.3	T	10	80	1.4	3/			GRA04
1990 03 30.97	S	12.5	AC	20.3	T	10	133	0.7	4			DAH

Periodic Comet Gehrels 2 (1989n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 31.18	I	[13.0		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 01 29.48	I	[13.5		41	L	4	183					HAL
1990 02 23.50	I	[13.5		41	L	4	183					HAL

Periodic Comet Brorsen-Metcalf (1989o)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 07 09.99	S	10.9:	A	28.5	T	10	114	& 4	0/			COM
1989 07 11.01	S	10.8	A	28.5	T	10	114	& 4	1			COM
1989 07 11.32	S	9.1	MP	8.0	B		20	5	2			BOR
1989 07 11.32	S	9.2	MP	31.7	L	6	68	4.5	2			BOR
1989 07 12.31	S	9.0	MP	8.0	B		20	4.5	2			BOR
1989 07 12.31	S	9.1	MP	31.7	L	6	68	3.9	2/			BOR
1989 07 13.32	S	8.1	MP	5.0	B		10	10	1			BOR
1989 07 13.32	S	8.5	MP	8.0	B		20	7	3			BOR
1989 07 13.32	S	8.8	MP	31.7	L	6	68	4.5	3			BOR
1989 07 13.95	B	8.5:	AA	20	L	4	27	8	1			VAS
1989 07 14.91	B	8.4	AA	11.0	B	4	20	8	3			CHE03
1989 07 15.31	S	8.2	MP	8.0	B		20	6	3			BOR
1989 07 15.33	M	10.2	AA	20.1	L	8	57	4.0	1			MOD
1989 07 15.93	B	8.2	AA	11.0	B	4	20	10	3			CHE03
1989 07 16.96	S	7.5	SC	5.0	B		7	6	5			DAN01
1989 07 17.02	S	8.3	A	20.0	T	10	80	5	1			COM
1989 07 17.95	B	8.3	AA	11.0	B	4	20	10	3			CHE03
1989 07 25.90	S	7.2	AA	8.0	B		20	4	4			DAN01
1989 07 26.90	S	7.5	AA	8.0	B		20	4	3			DAN01
1989 07 26.95	B	8.0	AA	11.0	B	4	20	12	3			CHE03
1989 07 27.95	B	7.8	AA	11.0	B	4	20	15	3	0.1	275	CHE03
1989 07 27.97	S	8.7	AC	20.3	T	10	133	1.7	3			DAH
1989 07 29.00	B	7.6	AA	8.0	B	4	10	6	2			VEZ
1989 07 29.32				31.7	L	6	55	6.1	5	?	300	BOR
1989 07 29.32	S	7.0	HR	5.0	B		10	9	4			BOR
1989 07 29.96	B	7.4	AA	11.0	B	4	20	12	3			CHE03
1989 07 30.79	S	7.5	SM	8.0	B		20	5	4	0.25	250	CAM03
1989 07 31.78	S	6.9	SM	8.0	B		20	6	5	0.25	250	CAM03
1989 08 01.02	B	7.5	AA	8.0	B	4	10	8	3			VEZ
1989 08 01.29	B	7.3	S	7.0	B		10	7	3			DEA
1989 08 01.62	B	7.4	S	5.0	R	4	10	10	5			KRY01
1989 08 01.95	B	7.2	AA	8.0	B	4	10	15	3			KUC
1989 08 01.99	S	7.0:	SC	3.5	B		7	&10				GRA04
1989 08 02.32	S	6.8	HR	5.0	B		10	10	5			BOR
1989 08 02.94	B	7.3	AA	8.0	B	4	10	7	2			VEZ
1989 08 03.00	S	7.0	SC	5.0	B		7					WAR01
1989 08 03.00	S	7.0	SC	20.3	T	10	50	8	3			GRA04
1989 08 03.01	B	7.5	S	8.0	B		15					SCH04
1989 08 03.01	S	7.5	A	8.0	B		15	9	6			SCH04

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 03.02				15.0	L	7	140	& 5	2			MID01
1989 08 03.05	S	6.8	S	5.0	B		10	3	2/			ROO
1989 08 03.05	S	7.0	S	5.0	B		10	15	3			ZAN01
1989 08 03.79	M	6.8	A	5.0	B		10	8	4			GAR01
1989 08 03.96	B	7.3	AA	8.0	B	4	10	12	4			VAS
1989 08 04.00	S	6.6	SC	3.5	B		7	12	3			GRA04
1989 08 04.04	S	6.8	S	5.0	B		10	20	3			ZAN01
1989 08 04.08	S	6.7	S	5.0	B		10	3	2/			ROO
1989 08 04.32	B	7.1	S	7.0	B		10	18.4	4			DEA
1989 08 05.02	S	6.7	S	5.0	B		10	15	6			ZAN01
1989 08 05.07	S	7.2	SC	8.0	B		11	& 8	1			FIE
1989 08 05.08	S	6.7	S	5.0	B		10	3	5			ROO
1989 08 05.75	B	7.0	S	5.0	R	4	10	10	6			KRY01
1989 08 05.79	M	6.5	A	5.0	B		10	7	5			GAR01
1989 08 06.00	S	6.6	SC	3.5	B		7	&10	3			GRA04
1989 08 06.20	M	7.5:	AA	20.0	L	5	35	& 5	4			MOD
1989 08 06.99				20.3	T	10	50		5			GRA04
1989 08 06.99	S	6.7:	SC	3.5	B		7	&10				GRA04
1989 08 07.00				15.0	L	7	140	& 5	4			MID01
1989 08 07.05	S	6.2	S	5.0	B		10					ROO
1989 08 07.34	B	7.3	S	7.0	B		10		4			DEA
1989 08 07.90	S	6.5	AA	8.0	B		20	30	3			DAN01
1989 08 07.96	S	7.0	SC	13.8	S	4	28					WAR01
1989 08 07.98	B	7.0:	AA	6.0	B	4	20	2	4			SEL
1989 08 08.06	B	7.7	S	5.0	B	2	10		3			AND03
1989 08 08.06	B	7.7	S	5.0	B	2	10		3			RAD01
1989 08 08.07	S	6.5	SC	8.0	B		11	10.8	0			FIE
1989 08 08.34	S	6.6	HR	5.0	B		10	11	5/			BOR
1989 08 08.95	S	6.5	SC	5.0	B		7					EKL
1989 08 09.02	B	7.3	S	5.0	B	2	10		3			AND03
1989 08 09.04	S	6.5	S	5.0	B		10			&1		ROO
1989 08 09.07	S	6.7	SC	8.0	B		11	9.6	0			FIE
1989 08 09.32	M	6.9	AA	20.0	L	5	35	& 5	4			MOD
1989 08 09.32	S	6.4	AA	5.0	B		10					MOD
1989 08 09.35				31.7	L	6	55	6.1	5	0.6	275	BOR
1989 08 09.35	B	6.7	HR	5.0	B		10					BOR
1989 08 09.35	S	6.6	HR	5.0	B		10	10	5/			BOR
1989 08 09.73	B	6.7	S	5.0	R	4	10	10	5			KRY01
1989 08 09.91	S	7.0	SC	5.0	B		7					WAR01
1989 08 09.98	S	6.3	SC	3.5	B		7	13	5			GRA04
1989 08 10.03	S	6.6	S	5.0	B		10	6	6			ZAN01
1989 08 10.07	S	6.1	SC	8.0	B		11	9.6	1			FIE
1989 08 10.10	S	5.8	S	8.0	B		15					BRI01
1989 08 10.35				31.7	L	6	55	5.0	6	0.5	275	BOR
1989 08 10.35	B	6.6	HR	5.0	B		10					BOR
1989 08 10.35	S	6.5	HR	5.0	B		10	9	6/			BOR
1989 08 11.94	B	6.5	AA	6.0	B	4	20	2	4			SEL
1989 08 12.07	S	6.5	SC	8.0	B		11	& 7.1	2			FIE
1989 08 12.08	B	7.2	S	5.0	B	2	10		3			AND03
1989 08 12.38				40	L	7	50	& 5	4	&0.16	270	MOD
1989 08 12.38	S	6.4	AA	5.0	B		10					MOD
1989 08 12.75	B	6.7	S	5.0	R	4	10	10	5			KRY01
1989 08 12.91	S	7.0	SC	5.0	R		8					MID01
1989 08 12.93	S	6.8	SC	5.0	B		7	10				WAR01
1989 08 12.94	M	6.2	SC	3.5	B		7	12	5			GRA04
1989 08 12.96				20.3	T	10	80	5	5	0.17	285	DAH
1989 08 13.00	S	6.8	SC	20.0	L	4	33	7.5				YDE
1989 08 13.01				31.6	L	5	130	5	7			MID01
1989 08 13.01	B	6.7	S	5.0	B	2	10		3			AND03

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 13.01	S	5.8	S	8.0	B		15					BRI01
1989 08 13.01	S	6.8	AC	5.0	R		8	&10	7			MID01
1989 08 13.02	B	6.8	S	5.0	B	2	10		3			RAD01
1989 08 13.03				20.3	T	10	50	6.7	5	0.17	280	GRA04
1989 08 13.05	S	6.1	SC	12.7	S	10	35	5	5	&0.5		DAN01
1989 08 13.05	S	6.5	S	5.0	B		10	10	6			ZAN01
1989 08 13.07	S	6.5	SC	8.0	B		11		1			FIE
1989 08 13.33	B	6.4	S	7.0	B		10		4			DEA
1989 08 13.73	B	6.5	S	5.0	R	4	10	10	4	0.5	320	KRY01
1989 08 13.96	B	7.1	AA	5.0	B	4	7	1	3			KUC
1989 08 13.99	M	6.4	SC	3.5	B		7	10	5			GRA04
1989 08 14.00	S	6.5	SC	5.0	B		7	10				EKL
1989 08 14.04	B	6.9	S	5.0	B	2	10		4			AND03
1989 08 14.04	B	6.9	S	5.0	B	2	10		4			RAD01
1989 08 14.76	B	6.5	S	5.0	R	4	10	10	4			KRY01
1989 08 15.07	B	6.6:	S	7.0	C	14	120					KAC
1989 08 15.08	S	6.2	SC	8.0	B		11	10.9	1			FIE
1989 08 17.08	B	6.3:	S	7.0	C	14	120					KAC
1989 08 17.10	S	5.5	S	8.0	B		15	10	5			SCH04
1989 08 17.12	S	6.1	AA	5.0	B		10	3	7			LOO01
1989 08 17.89				31.6	L	5	130			0.1	310	MID01
1989 08 18.00	S	6.5	SC	3.5	B		7	6	6			GRA04
1989 08 18.99	S	6.4	SC	3.5	B		7	7				GRA04
1989 08 19.00				20.3	T	10	50	4.5	6			GRA04
1989 08 19.00	E	6.2	S	6.7	L	8	33					FIL02
1989 08 19.03	B	6.2	S	8.0	B		8	3.5				FIL02
1989 08 19.05	E	6.2	S	8.0	B		8		4			FIL02
1989 08 19.12	S	5.4	S	4.0	R	6	9	8	3			BUS01
1989 08 20.05	B	6.4	AA	6.0	B	4	20	5	5	0.2		CHE03
1989 08 20.99	B	6.2	AA	6.0	B	4	20	4.5	4	0.2		CHE03
1989 08 21.96				31.6	L	5	130	4	5	0.07		MID01
1989 08 21.96	S	6.4	SC	5.0	R		8					MID01
1989 08 22.02	E	6.2	S	11.0	L	7	32	3.8	5	1.0	330	FIL02
1989 08 22.03	S	6.0	SC	3.5	B		7	7				GRA04
1989 08 22.04				20.3	T	10	50	4.8	6	0.12	300	GRA04
1989 08 22.35	B	6.2	HR	8.0	B		20					BOR
1989 08 22.35	S	6.0	HR	5.0	B		10	4	7			BOR
1989 08 22.35	S	6.1	HR	8.0	B		20	4	6/			BOR
1989 08 22.99	S	5.8	SC	3.5	B		7	7	7			GRA04
1989 08 23.01				20.3	T	10	50	4.8	8	0.32	310	GRA04
1989 08 23.07	S	5.5	AA	5.0	B		10	4.5	7/			LOO01
1989 08 23.95	S	6.0:	SC	3.5	B		7	& 5.0				GRA04
1989 08 24.34	B	6.1	HR	5.0	B		10	5	7			BOR
1989 08 25.35				8.0	B		20	3.5	7	0.7	297	BOR
1989 08 25.35	B	5.8	HR	5.0	B		10					BOR
1989 08 25.35	S	5.7	HR	5.0	B		10	5	7/			BOR
1989 08 25.92	B	5.7	AA	12.0	R	5	27.	4	5	0.1		SEL
1989 08 26.01				31.6	L	5	130	6	5	0.2	300	MID01
1989 08 26.01	S	5.9		5.0	R		8					MID01
1989 08 26.02	S	5.3	SC	25.4	L	6	30	& 4.5	5	0.5		DAN01
1989 08 26.02	S	5.7	SC	3.5	B		7	5.0	7			GRA04
1989 08 26.04				20.3	T	10	50	4.5	7	0.28	305	GRA04
1989 08 26.06				20.3	T	10	80	3	8	0.25	295	DAH
1989 08 26.06	S	5.7	SC	5.0	B		7					DAH
1989 08 26.12	S	5.2	S	8.0	B		15	10	6	0.3	290	SCH04
1989 08 26.35	B	6.0	HR	5.0	B		10	3.5	7/	?		BOR
1989 08 27.01	S	5.5	SC	25.4	L	6	35	& 4.5	5	&0.75		DAN01
1989 08 27.03	B	5.9	AA	11.0	B	4	20	2	5	0.6	303	CHE03
1989 08 27.03	E	6.4	S	11.0	L	7	32		6			FIL02

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 27.05				20.3	T	10	50	4.0	8	0.43	310	GRA04
1989 08 27.05	M	6.4	S	11.0	L	7	32	2.0		0.4	305	FIL02
1989 08 27.06	S	5.6	SC	3.5	B		7	6				GRA04
1989 08 27.35	B	6.0	HR	5.0	B		10	4	7/	1.2	306	BOR
1989 08 27.35	M	6.0:	AA	20.0	L	5	35	& 5	6			MOD
1989 08 28.05	B	5.9	AA	6.0	B	4	20	2	5	0.6		CHE03
1989 08 28.05	S	5.5	SC	9.0	M	11	56	6	5	0.7	307	WES02
1989 08 28.11	S	5.2	S	8.0	B		15	7	6	1.0	303	SCH04
1989 08 28.12	S	5.5	AA	5.0	B		10	4	8	0.5	303	LOO01
1989 08 28.78	B	5.8	S	5.0	R	4	10	6	6			KRY01
1989 08 29.03	S	5.4	SC	3.5	B		7	4	7			GRA04
1989 08 29.09	S	5.9	SC	5.0	B		7	5	7			DAH
1989 08 29.12	S	5.4	S	5.0	B		10	& 2	7	&4		COM
1989 08 30.12	S	6.1	SC	8.0	B		11	4.5	5			FIE
1989 08 31.02	S	5.5	SC	9.0	M	11	80	3	5	0.2	303	WES02
1989 08 31.05	E	6.4	S	11.0	L	7	32	2.5	7			FIL02
1989 08 31.06	B	5.9	S	5.0	B	2	10		7			AND03
1989 08 31.06	E	6.2	S	11.0	L	7	54					FIL02
1989 08 31.10	S	5.4	SC	8.0	B		11	4.4	4			FIE
1989 08 31.12	S	5.5	S	5.0	B		10	& 2	8	&5		COM
1989 08 31.37	B	5.8	HR	5.0	B		10	3.5	7/	1.5	312	BOR
1989 08 31.78	B	5.8	S	5.0	R	4	10	6	7			KRY01
1989 09 01.06	B	5.8	S	5.0	B	2	10		6			AND03
1989 09 01.12	S	5.8	S	5.0	B		10	& 3	7	&4		COM
1989 09 01.37	B	5.8	HR	8.0	B		20	3.0	7/	1.3	308	BOR
1989 09 01.37	B	5.9	HR	5.0	B		10					BOR
1989 09 01.37	S	5.8	HR	5.0	B		10	3.5	7/	1.3	308	BOR
1989 09 02.06	B	5.8	S	5.0	B	2	10		7			AND03
1989 09 03.04	S	5.5	SC	3.5	B		7	5	7			GRA04
1989 09 03.06	B	5.8	S	5.0	B	2	10		8			AND03
1989 09 03.11				20.3	T	10	80	1.5	8	0.20	310	DAH
1989 09 03.11	S	5.4	S	8.0	B		20	5	7	0.8	310	SCH04
1989 09 03.11	S	5.8	SC	5.0	B		7					DAH
1989 09 03.12	S	5.9	S	5.0	B		10	& 2	8	&4		COM
1989 09 03.37	B	5.8	HR	5.0	B		10	5	7/	1.2	304	BOR
1989 09 03.37	B	5.9	HR	8.0	B		20	3.7	7/	1.4	304	BOR
1989 09 03.37	I	5.9	HR	5.0	B		10					BOR
1989 09 04.07				31.6	L	5	130	3	8	0.5	321	MID01
1989 09 04.07	S	6.3	SC	5.0	R		8					MID01
1989 09 04.09				20.3	T	10	80	2.1	5	0.3		ANO
1989 09 04.09	S	5.9	SC	3.5	B		7					ANO
1989 09 04.10	S	5.8	S	8.0	B		15	5	7	1.0	310	SCH04
1989 09 04.10	S	6.1	SC	20.3	T	10	50	2.4	8	0.80	313	GRA04
1989 09 04.12	S	5.9	S	5.0	B		10	2	7	&4		COM
1989 09 04.38	B	5.9	HR	5.0	B		10	4	7/	2.3	306	BOR
1989 09 04.40	M	6.0	AA	5.0	B		10		7	3.0	300	MOD
1989 09 04.40	M	6.5	AA	20.0	L	5	35	& 4	7	&0.75	300	MOD
1989 09 06.09	B	5.6	S	5.0	B	2	10		7			RAD01
1989 09 06.09	B	5.7	S	5.0	B	2	10		7			AND03
1989 09 06.37	B	5.9	HR	5.0	B		10	3	7/	1.0	307	BOR
1989 09 06.37	I	5.9	HR	5.0	B		10					BOR
1989 09 06.78	B	5.7	S	5.0	R	4	10	5	7			KRY01
1989 09 08.46	B	5.5	AA	5.0	B		10	& 5	8	1.5		ROB03
1989 09 08.79	B	5.8	S	5.0	R	4	10	6	6			KRY01
1989 09 09.06	B	6.0	AA	6.0	B	4	20	2.5	6	1.5	304	CHE03
1989 09 09.10				20.3	T	10	80	2.0	8	0.55	306	GRA04
1989 09 09.10	S	6.1	SC	3.5	B		7	3				GRA04
1989 09 10.08	S	5.7	SC	5.0	B		7	3		0.55	311	DAH
1989 09 10.08	S	5.9	SC	3.5	B		7	4				GRA04

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 10.10				20.3	T	10	44	& 2	8	0.42	306	GRA04
1989 09 10.10				20.3	T	10	80	1.5	8	0.33	304	DAH
1989 09 10.11	S	6.4	SC	20.3	T	10	44	1.2	7/	0.3	305	SKJ
1989 09 12.07	B	6.1	AA	6.0	B	4	20	2	6	0.6		CHE03
1989 09 12.12				31.6	L	5	130	2	8	0.2	325	MID01
1989 09 12.12	S	6.7	SC	5.0	R		8					MID01
1989 09 12.41				20.0	L	5	35	& 2.5	8	&0.25		MOD
1989 09 12.41	M	6.5	AA	5.0	B		10		8			MOD
1989 09 13.81	B	5.8	S	5.0	R	4	10	6	6			KRY01
1989 09 19.48	M	7.0	S	15.2	L	3	16					KEE
1989 12 30.79	S[	13.5	VN	41	L	4	200					PEA
1990 01 05.82	S[	14.0	VN	41	L	4	200					PEA

Periodic Comet Schwassmann-Wachmannn 1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 04.82	p	12.8		14.0	A	2		1.2				HAS02
1989 10 05.84	S	12.6	AC	40.0	L	5	170	1.1	3			MER
1989 10 20.15	S	13.6	AC	31.8	L	4	150	0.8	2			KEE
1989 10 22.54	S	12.8	SM	20	L	7	56	& 2	2			CAM03
1989 10 23.14	S	12.3	AC	31.8	L	4	63	1.5	1			KEE
1989 10 23.78	p	13.0		14.0	A	2						HAS02
1989 12 25.84	p	13.5		14.0	A	2						HAS02
1989 12 31.13	I[	13.0		41	L	4	183					HAL
1989 12 31.22	S[	13.3	NP	25.6	L	4	156					MOR
1990 01 15.10	S[	13.5	AC	41	L	4	183	! 1.0				HAL
1990 01 21.14	S[	13.0	NP	25.6	L	4	156					MOR
1990 01 22.12	I[	13.5		41	L	4	183					HAL
1990 01 28.13	I[	13.0		41	L	4	183					HAL
1990 01 28.15	S[	13.5	NP	50.8	L	4	78					MOR
1990 02 17.10	I[	13.0		41	L	4	183					HAL

Periodic Comet Lovas 1 (1989p)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 12 02.15	S	13.4	AC	50.0	L	5	157	0.7	1			BOR
1989 12 29.22	M	12.6	AC	41	L	4	83					HAL
1990 01 01.42	S	12.8	AC	41	L	4	83					HAL
1990 01 07.51	S	13.1	AC	41	L	4	183					HAL
1990 01 15.17	I[	13.0		41	L	4	183					HAL
1990 01 30.22	I[	13.5		41	L	4	183					HAL

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The complete set of Keys to abbreviations used in the ICQ Tabulation of Observations is available for US$4.00 postpaid from the Editor; please make check or money order (drawn on a U.S. bank) payable to "International Comet Quarterly".

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