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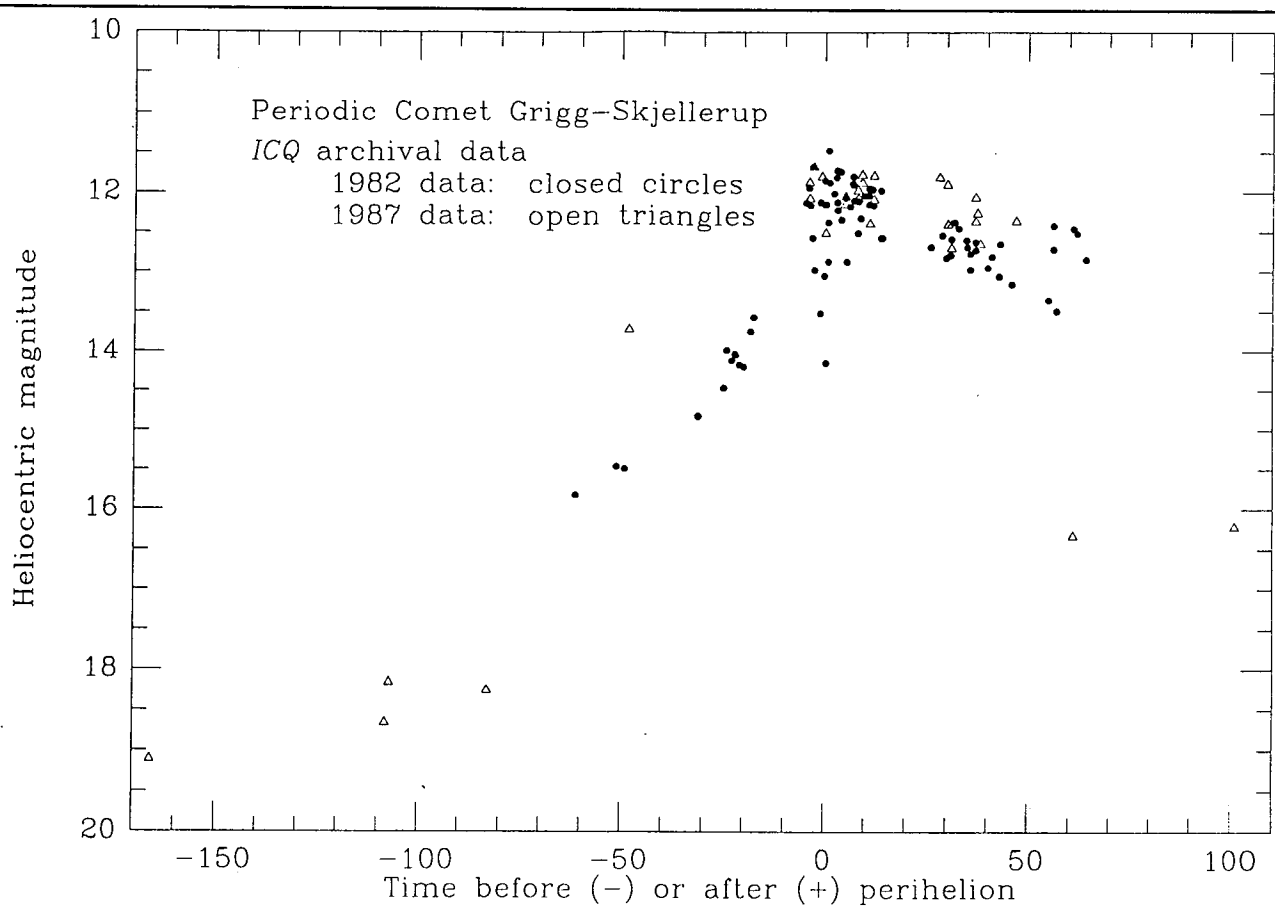

Visual light curve of P/Grigg-Skjellerup; see discussion on pages 91-92.

SMITHSONIAN ASTROPHYSICAL OBSERVATORY
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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 in the first half of the year as a special fifth issue. An index to each volume normally is published in every other January issue (even-numbered years); the *ICQ* is also indexed in *Astronomy and Astrophysics Abstracts* and in *Science Abstracts Section A*.

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Manuscripts will be reviewed for possible publication (if possible, send via computer networks; or, send typed, double-spaced copy to the Editor at the Cambridge address above); authors should first obtain a copy of "Information and Guidelines for Authors" from the Editor. Cometary observations also should be sent to the Editor in Cambridge; all data intended for publication in the *ICQ* that is not sent via computer electronic mail should be sent on standard *ICQ* observation report forms, which can be obtained upon request from the Editor. Those who can send manuscripts and observational data in machine-readable form are encouraged to do so [especially through e-mail via the computer networks *BITNET* (GREEN@CFA) or *SPAN* (CFAPS2::GREEN), or via floppy disks that can be read on an IBM PC], and should contact the Editor for further information.

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Comet Levy 1990c

.O. Hainaut, European Southern Observatory, La Silla; and R. M. West, ESO, Garching, report: "We have obtained the following photoelectric magnitudes of comet 1990c with the ESO 0.50-m telescope at La Silla, the different diaphragms being carefully centered on the central condensation: Feb. 24.25 UT, 10″, V = 12.28, V–R = +0.41, V–I = +0.81; 15″, 11.89, +0.41, +0.80; 21″, 11.54, +0.39, +0.80; 30″, 11.14, +0.40, +0.79; 40″, 10.80, +0.37, +0.79; 80″, 10.09, +0.35, +0.76. On Feb. 26.17, we obtained 10″, 12.47, +0.46, +0.87; 15″, 11.99, +0.42, +0.81; 21″, 11.62, +0.42, +0.82; 30″, 11.20, +0.39, +0.79; 40″, 10.87, +0.38, +0.78; 80″, 10.09, +0.32, +0.74."

Φ Φ Φ

— CORRIGENDA —

- In the October 1990 issue, pp. 134 and 135, the observations by RAD01 on 1990 04 29.08 and 1990 05 03.07 were made with a 6.0L (*not* 6.0I).
- In the April 1991 issue, p. 69, sixth paragraph, line 4, *for* ($-65° < \delta < -74°$ during *read* ($-65° > \delta > -74°$ during
- In the April 1991 issue, p. 86, last paragraph, lines 1-2, *for* in the the Oct. 1984 of *read* in the Oct. 1984 issue of
- In the April 1991 issue, pp. 41-43, the observations of comet 1990c by RAD01 were made using reference SC, *not* SA.

POST-PERIHELION SURVIVAL OF COMETS WITH SMALL q

John E. Bortle
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Abstract. The absolute magnitudes (H_{10}) of 85 comets with perihelion distances (q) less than 0.51 AU were examined, along with their observational histories. From these data, a formula is derived for the prediction of post-perihelion survival/non-survival of intrinsically faint comets with small values of q.

Those who have carefully studied the observational histories of comets with regard to their so-called absolute magnitudes *vs.* their perihelion distances will likely be aware that there are virtually no examples of long-period comets with absolute magnitudes fainter than 7.5 and perihelion distances less than 0.25 AU that have been observed after perihelion. Clearly, there is a limit to the absolute magnitude required for perihelion survival when the value of q is relatively small.

Utilizing knowledge of this, on several recent occasions the author has expressed published doubts as to perihelion survival of some newly discovered long-period comets. These prognostications came as somewhat a surprise to various colleagues, particularly when the demise of the comets in question were borne out observationally.

More recently the author has endeavored to determine a more definitive relationship between the absolute magnitude of a comet and the odds of its post-perihelion survival. In the process an examination was made of published photometric parameters for all comets observed between 1800 and 1989 whose perihelia carried them relatively close to the Sun. Initially, only comets with q values of 0.3 AU or less were considered, but the study was later expanded to include all objects having perihelia less than 0.51 AU. This upper limit for q was somewhat arbitrarily chosen to reduce the otherwise huge number of cometary apparitions that would need to be examined. However, beyond this value of q, nearly all cases of sudden cometary disappearance are related to violent photometric outbursts rather than to heliocentric proximity.

Since instrument size, magnification, and method used to determine a comet's total magnitude are usually omitted from pre-1950 accounts of cometary apparitions, the bulk of the published magnitude parameters do not take them into account. For this reason, no aperture corrections were applied when calculating the photometric parameters of the recent comets. Likewise, to provide as homogeneous a body of data as possible, the simplest photometric solution was chosen to represent each comet's lightcurve. This assumed that the comet's brightness varied as the inverse 4th power of its heliocentric distance (H_{10}) and generally represented the observations fairly well.

For pre-1955 comets the H_{10} parameters from the extensive listing by S. K. Vsekhsvyatskii were used as a starting point. For comets fainter than $H_{10} = 6.0$, only those were included that had orbital circumstances allowing them to be searched for after passing perihelion, thereby eliminating any whose post-T activity was unknown. After compiling a working list of well-observed comets, reference was made to descriptions of each object's apparition included in the Vsekhsvyatskii catalog. From this it was determined whether an individual comet had passed through T relatively unchanged, showed pronounced brightness changes relative to H_{10}, or totally vanished.

(Continued on next page...)

Table 1. *Fates of 23 long-period comets with absolute magnitudes (H_{10}) at or below the non-survival line. Comets 1979 VII and 1967 II are 'class 2A' Oort Cloud comets; 1961 V is a 'class 2B' comet not from the Oort Cloud (cf. Marsden and Roemer 1982, in Comets, ed. by L. L. Wilkening, U. of Ariz. Press, pp. 718ff).*

No Survival			Unstable Survival			Survived Unchanged		
	q	H_{10}		q	H_{10}		q	H_{10}
1801	0.256	9.3	1859	0.201	7-9½	1988 r	0.428	12.5
1816	0.485	9	1880 I	0.005	7.1			
1870 IV	0.389	11.1	1906 I	0.216	8-5-9			
1872 I	0.045	11.0	1926 III	0.322	7-13			
1887 I	0.005	?	1961 V	0.040	7.5			
1890 I	0.270	8.8	1967 II	0.419	9½-10½			
1902 I	0.451	11.7						
1945 VII	0.008	10.8						
1954 II	0.072	11.1						
1959 VI	0.166	8.8						
1970 I	0.066	9.0						
1978 XVIII	.432	12.0						
1979 VII	0.413	10.5						
1985 e	0.106	9.4						
1987 d_1	0.200	10.0						
1988 j	0.165	8.0						

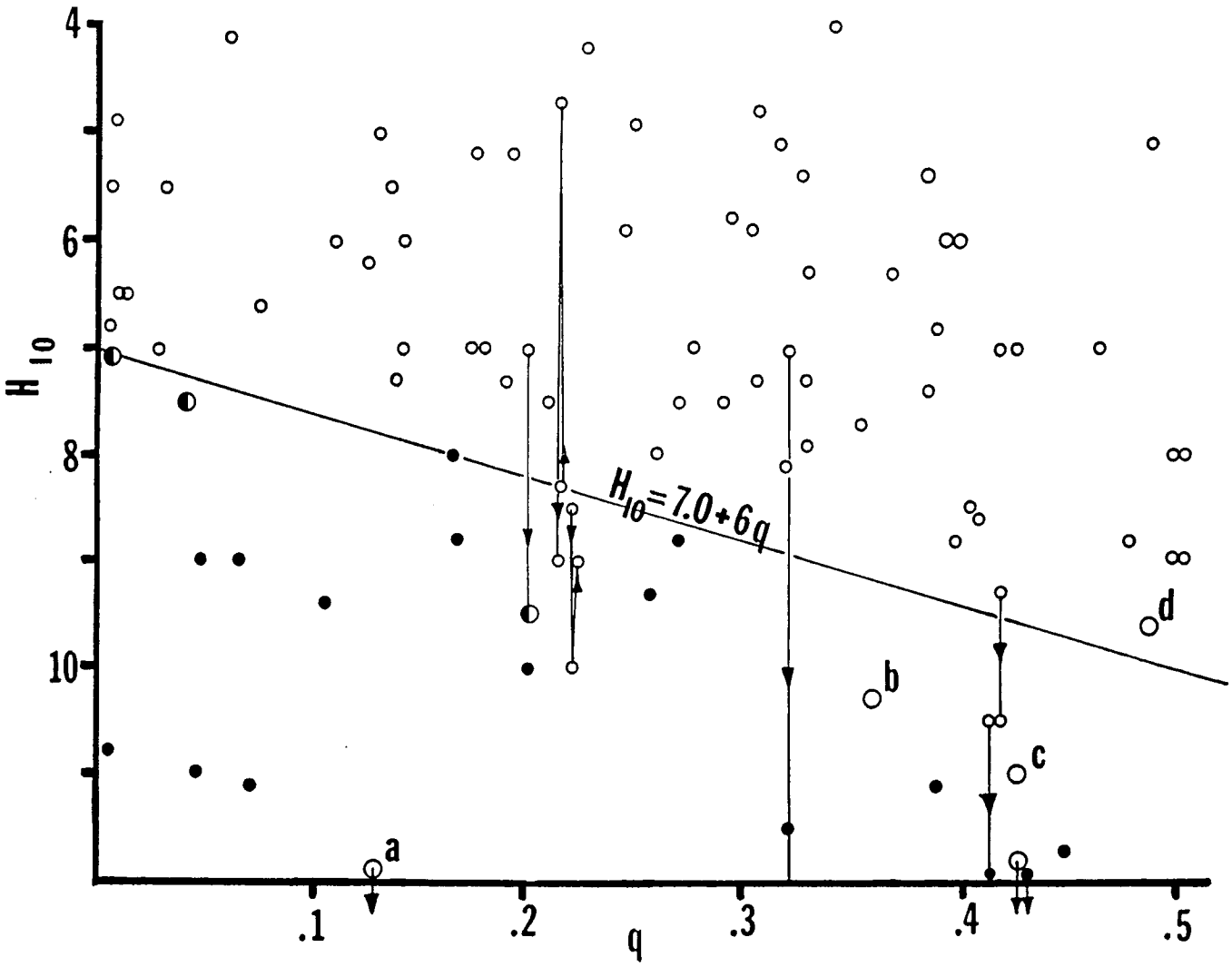

Figure 1. *The absolute magnitudes (H_{10}) of 85 comets are plotted relative to their perihelion distance (q). Open circles indicate post-perihelion survival, half-filled circles a very rapid decrease in brightness following perihelion, and filled circles non-survival. Several cases of dramatic brightness fluctuations are also indicated. The data points marked* **a**, **b**, **c**, *and* **d** *represent periodic comets Machholz, Encke, Bradfield 2, and Brorsen-Metcalf, respectively.*

(text continued from page 89)

Following this, for each comet with an absolute magnitude fainter than $H_{10} = 6.0$ (q = 0.01-0.30 AU) or $H_{10} = 7.5$ (q = 0.31-0.51 AU), magnitude predictions were calculated covering the object's entire apparition and these were compared with the reported observations. Where necessary, corrections were made to Vsekhsvyatskii's values to bring them into better accord with the observations. To simplify the job of plotting Figure 1, a significant number of comets brighter than $H_{10} = 6.0$ and with q in the range $0.31 < q < 0.51$ AU were omitted.

For post-1955 comets, several descriptive sources were consulted, including *IAU Circulars*, the *ICQ*, and personal observations. Approximate H_{10} values were derived for each object. The comets were then categorized in the same manner as for pre-1955 objects. Whenever it was necessary to generate an ephemeris for a given comet, the orbital elements listed in the *Catalogue of Cometary Orbits* (5th edition) were used.

The final working list included 81 long-period comets and 4 of short-period. The 13 minor sungrazing comets discovered by the *SMM* and *SOLWIND* satellites were not included since they were not observed visually. Of the 85 comets, 16 unquestionably failed to survive their perihelion passages (see Table 1). The data for all 85 objects are plotted in Figure 1, showing the distribution of comets which survived perihelion passage as a function of H_{10} and r. Examination of the plotted data indicates a distinct cutoff, below which the likelihood of a comet surviving perihelion passage becomes drastically reduced.

The formula $H_{10} = 7.0 + 6(q)$, where q is the comet's perihelion distance in AU, is a good approximation of the survival cutoff for comets with perihelia of less than 0.5 AU based on the data examined. For comets whose absolute (H_{10}) magnitudes are fainter than those given by the formula, there is historically a 70-percent chance of non-survival. However, in a closer examination of the distribution of the data, it may be inferred that the actual non-survival

rate is much higher since there are significantly fewer datapoints below the line than above. It is possible that, since they would not be expected typically to be very bright when at large solar elongation, a significant percentage of these objects escape detection when approaching the sun.

It is interesting to compare the fate of faint short-period comets with that of long-period objects of similar brightness. Examination of Figure 1 clearly indicates that the formula does not represent activities of periodic comets. Taking each short-period comet in turn, we can see that P/Encke is situated well within the zone of non-survival but has been under regular observation for about two centures. P/Machholz, one of the intrinsically faintest comets, survived its 1986 perihelion passage and remained under observation with large telescopes out to its aphelion. Intrinsically faint P/Bradfield 2 survived its perihelion passage, while P/Brorsen-Metcalf, which has been seen at three apparitions now, has an absolute magnitude that falls just barely above the non-survival line. One possible explanation for the perihelion survival of these four objects is that they evolved from much larger, brighter comets. Brian Marsden notes that, while one cannot be certain (due to poor orbits), one can suggest that most nonsurvival cases were either long-period Oort cloud comets or Kreutz sungrazers.

The foregoing study results in three significant determinations regarding the objects under discussion. It is demonstrated that, in the majority of cases, long-period comets of fainter than average absolute magnitude do not maintain significant continued outgassing post-perihelion if their value of q is much less than 0.5 AU. It is also shown that short-period comets differ from those of long-period in their ability to maintain a continued state of high activity in spite of faint H_{10} values and close approaches to the sun. Finally, the empirical formula presented herein allows observers to predict the perihelion survivability of future intrinsically faint long-period comets of small q with fair reliability.

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RECENT NEWS AND RESEARCH CONCERNING COMETS

After 8 new comet discoveries in the first three months of 1991, there have been only two new discoveries as of this writing: P/Levy 1991q and Helin-Alu 1991r. David H. Levy of Tucson, Arizona, found the twelfth comet to carry his name on the morning of June 14. This was his seventh visual discovery, found using his 16-inch $f/5$ reflector some 81 hours and 32 minutes of hunting time after his last visual discovery (comet 1990c). Comet Levy 1991q was estimated at $m_1 \sim 8$ with coma diameter 3′ upon discovery, when it was moving northeastward near the Aries/Pisces border. It was soon realized that the comet was of short period, orbiting the sun in about 50 years, and there are indications that P/Levy may be identical with the comet of 1499.

Periodic comets Giacobini-Zinner, Faye, Chernykh, Shoemaker 1, and Wirtanen have been recovered as comets 1991m, 1991n, 1991o, 1991p, and 1991s by Karen Meech and W. Weller (*IAUC* 5225), by T. Seki (*IAUC* 5246), by James Scotti (*IAUC* 5285), by Alan Gilmore and Pamela Kilmartin (*IAUC* 5286), and by Seki (*IAUC* 5303), respectively. Comets 1991o and 1991p are making their first observed returns to perihelion after their discovery apparitions, and the time of perihelion in their predicted orbits needs to be corrected by $\Delta T = -2.4$ and -0.6 days, respectively. P/Chernykh appears fainter than expected, reported as $m_2 = 20.3$ by Scotti on June 8.4 UT. Only P/Giacobini-Zinner appeared stellar at recovery (at magnitude $V \sim 23$), the other three objects all showing some coma. P/Wirtanen was estimated at $m_1 = 17$ by Seki on photographs obtained July 8 and 9.

T. V. Kryachko (Majdanak, USSR) found a comet of $m_1 \sim 11$ moving northeastward in Pisces which Syuichi Nakano and Brian Marsden showed (cf. *IAUC* 5304) was actually P/Hartley 2, some −5.6 days off of the predicted time of perihelion (several degrees on the sky). Most visual observers have made the comet's brightness closer to $m_1 = 10$.

P/Van Biesbroeck ($1989h_1$) has been observed visually during the past month or so, being 1-2 mag brighter than expected; discovered in 1954, this is the first time that this comet has been seen visually by amateur observers.

Calculations by A. Carusi and G. B. Valsecchi in Italy and L. Kresák and M. Kresáková in Czechoslovakia show that a comet observed by La Hire in 1678 is the earliest known apparition of P/d'Arrest, discovered in 1851 (cf. *IAUC* 5283).

P/Grigg-Skjellerup

At the request of scientists at the European Space Operations Centre, who are preparing for the flyby of P/Grigg-Skjellerup next year by the P/Halley probe known as *Giotto*, I looked closely at the brightness behavior of this comet at each of its 14 returns from 1922 to 1987, for which I used the *ICQ* archive for P/Grigg-Skjellerup's 1947, 1952, 1977, 1982, and 1987 returns, and the raw data in Kamél's *CLICC/A* (see below) for the other returns. There is a noticeable dearth of reliable magnitude data prior to the comet's 1982 return to perihelion, even though it was well observed photographically at several returns.

The visual m_1 light curve for the 1982 and 1987 returns is depicted on the cover of this issue, and shows the asymmetry of the comet's brightness behavior with respect to perihelion. When the problems with the earlier data are realized (very rough guesses to actual brightness, photographic data, use of very large telescopes, lack of proper reference stars, improper methodology, lack of experience, etc.), the following derived power-law formulae can be shown to consistently describe the comet's brightness during the past 70 years over the specified ranges in heliocentric distance (r, given in AU; Δ is the comet's geocentric distance):

pre-perihelion:	$m_1 = 12.0 + 5 \log \Delta + 40 \log r$	$(1.5 > r > 0.9)$
post-perihelion:	$m_1 = 12.5 + 5 \log \Delta + 10 \log r$	$(0.9 < r < 1.7)$

This means that a correction is needed to the m_1 values in the *1992 Comet Handbook* (p. H36), as follows: 1992 May 8, 19.1; May 18, 18.0; May 28, 16.9; June 7, 15.8; June 17, 14.7; June 27, 13.8; July 7, 13.1; July 17, 12.7; July 27, 13.2; Aug. 6, 13.2; Aug. 16, 13.4; Aug. 26, 13.6; Sept. 5, 13.9; Sept. 15, 14.3; Sept. 25, 14.7; Oct. 5, 15.1; Oct. 15, 15.5; Oct. 25, 15.9; Nov. 4, 16.3. Any predictions of brightness on dates outside of this range are necessarily uncertain due to lack of data at the corresponding heliocentric distances. In fact, there are indications that the comet begins to drop off much more rapidly in brightness after perihelion when $r \sim 1.6$ AU. No aperture correction was deemed useful here, as there simply are not enough good data to work with (see my discussion of aperture effect, below).

The Comet Light Curve Catalogue/Atlas

Lars Kamél (Astronomiska Observatoriet, Box 515, S-751 20 Uppsala, Sweden) has kindly sent me a copy of the above title (abbreviated *CLICC/A*), which represents his 1991 Ph.D. thesis from Uppsala University. He writes that the 493-page paperbound book is available from him for 400 SEK (about US$65.20 at May 1991 rates); it is also available on floppy disk and magnetic tape. Kamél's *CLICC/A* contains data on short-period comets only, for which he includes tables of raw magnitude data as well as graphs of reduced data. The main catalogue consists of 300 pages of tabulated magnitude data, taken from the *ICQ* archive and from the literature for the period 1899-1989. He includes total magnitudes (m_1) as well as so-called nuclear magnitudes (m_2), and photographic and electronic as well as visual values. The tabulation includes date and time (UT), magnitude and type of magnitude, instrumentation, observer, and reference from whence the data were extracted. Magnitude methods are given, but sources for comparison stars are not. Charles S. Morris contributed to the following remarks concerning *CLICC/A*.

The majority of the 26,500 magnitude estimates in *CLICC/A* are from the *ICQ* archive, and though Kamél did do much work to extract further old data from the literature, he apparently did miss some sources (such as Bobrovnikoff's long list of data in 1941 in *Contrib. from the Perkins Observatory* No. 15). Kamél made no effort to edit out questionable estimates; in fact, he included all of the available data, regardless of quality. Many of the estimates are simply 'ballpark guesstimates' at the comet's actual brightness — many having uncertainties of as much as ± 4 magnitudes! *ICQ* readers and contributors of the past 5-10 years know that many (if not most) short-period comets that were only observed photographically with large instruments in the past — and considered never to get brighter than mag ~ 15-17 — actually reach mag ~ 11-14, so that they can be seen visually in relatively small telescopes; facts such as this need to be addressed in any study of comet magnitudes.

Unfortunately, Kamél has some questionable methods for reducing the raw data — including ill-advised automatic conversions from non-visual to visual systems and correction for the disputed 'Delta effect' — before plotting them in 60 pages of graphs. Interestingly, Kamél claims that all comets closer to Earth than $\Delta = 0.4$ AU must be corrected for the 'Delta effect', which says that a comet's apparent brightness does not vary according to inverse-square geocentric distance but rather that the geocentric term in the standard power-law equation, $m_1 = H + 5 \log \Delta + 2.5n \log r$ (where H is the so-called 'absolute magnitude'), drops out altogether! That a physical law simply stops functioning at a specified distance is an incredible assumption. Also, the 0.4-AU limit is conveniently just inside the closest geocentric approach point of P/Halley in 1986, and the plentiful good data of that comet show no 'Delta effect'. Proponents of the 'Delta effect' have not explained why this effect was not explicitly evident in comet IRAS-Araki-Alcock in 1983, which came closer to the earth than any other known comet in some 200 years; my detailed look at the data on this comet shows that its brightness remained very close to $m_1 = 9.2 + 5 \log \Delta + 8 \log r$, for Δ ranging from 0.22 to 0.03 to 1.15 AU. Charles Morris is finishing his work of several years on the 'Delta effect', and we hope to publish this in the October *ICQ*.

Another enigmatic procedure concerns Kamél's standard 'color' corrections to derive visual or V magnitudes, wherein he subtracts 0.6 or 0.7 magnitude from all magnitudes listed as photographic, and for all magnitudes in which the wavelength was not specified by the observer he makes no correction (even when it's quite obvious that the data are photographic). Of course, many photographic emulsions give magnitudes that are closer to V or m_v than to B or m_{pg}, and if the magnitude's wavelength is not known, *it should not be used at all.*

The most shocking correction performed by Kamél on the *CLICC/A* data is that of 'allowing' for sky brightness and altitude (distance above the horizon); this is such a dangerous procedure because so many complicated local conditions make this really impossible to judge, and many observers have already made corrections for atmospheric extinction. Actually, Kamél uses the comet's elongation for this calculation, which has only an approximate correlation with the comet's altitude, as it depends on the observer's latitude (which isn't generally available, anyway). In addition, he fails to account for the observer's longitude (which also isn't generally available) and the time of observation, so that his correlation really has little to do with a direct estimate of the comet's true altitude or the sky brightness. Kamél states that typical values of this correction are 2-3 mag, with some values reaching 6-7 mag! (What is he really correcting here?!) It has been my experience that, unless there is a tremendous amount of really good data — and only P/Halley in 1985-1986 fits this bill — data analysts cannot even begin to work on atmospheric problems: we are dependent upon the observers making proper corrections for extinction at the time of observation, an issue that we hope to address soon in more detail in the *ICQ*. It should also be noted that, unlike many long-period comets, short-period comets are very often observed chiefly at higher altitudes, when the comets are closer to opposition (due to their intrinsic faintness), so such atmospheric corrections become less important (though exceptions such as P/Encke are notable). Kamél even denies that a comet can have instrinsic variations in brightness: "any apparent variation of [absolute magnitude] between [a comet's] adjacent apparitions, without any change in the comet's orbit, [is] due to variations in observational and geometrical conditions (e.g., sky brightness, telescope, altitude)"!

In order to determine the various corrections, Kamél assumes that the comet's intrinsic brightness, at a given heliocentric distance, does not vary from apparition to apparition — a questionable assumption for some periodic comets. He then determines an overall correction, Φ, for each observation and then analyzes this correction term to determine the relative contribution from each "error" source (*i.e.*, color, 'Delta effect', telescope aperture, sky brightness, and altitude). The exact methodology used to sort out the various contributions to this error term is not clear. Furthermore, Kamél has failed to present any data plots or formal error analysis that supports his conclusions concerning the various correction terms. We are left with statements like "However, I have found that a delta effect undoubtly exists", with nothing to support such a conclusion. For his work and conclusions to be taken seriously, he needs to demonstrate that the correction terms, which he calculates, are statistically significant and not the by-product of an overanalysis of data (including a lot of data that are of questionable quality).

Kamél then lumps all the data for one comet together — good and bad, photographic and visual, total and nuclear — into a single plot of 'corrected magnitude' *vs.* either time (Julian date) or distance [$\pm \log (r/q)$], resulting in (as one might imagine) cluttered, confusing, and rather useless graphs. Although he does depict each 'nuclear' magnitude with the letter 'N' on the plots, I must point out that, while single observers employing a uniform manner for obtaining m_2 estimates may get scientifically useful data (a good example being Elizabeth Roemer), it is virtually impossible to intercompare m_2 results made by different observers; instrumentation, exposure time, wavelength, and procedure all play important roles in making m_2 a highly undefined quantity [see the discussion by Green, Rokoske, and Morris (1986), in *20th ESLAB Symposium on the Exploration of Halley's Comet*, European Space Agency SP-250, **III**, 249].

I must applaud Kamél's efforts to seek out aperture effects for different comets, whereby he concludes that rarely are enough data available to do a proper job, that aperture effects vary from comet to comet, that magnification appears to be a major contributor to 'aperture effect', and that it is "*very dangerous to use standard corrections*" (a common procedure utilized by those unfamiliar with reduction of cometary magnitudes). That comets appear fainter with larger apertures is an observation that has been known for well over a hundred years [*e.g.*, see the observations of P/Pons-Brooks by H. C. Wilson (1884), *Sidereal Messenger* **3**, 137]. A large instrument will show a smaller coma than will a smaller instrument, and this decrease in size translates into an apparent decrease in brightness.

Morris and I again note — as we did in the specific case of P/Halley; cf. Green and Morris (1987), *Astron. Astrophys.* **187**, 560 — that aperture correction is much less necessary nowadays than it was 20 or more years ago, as there has been a natural evolution toward use of short-focus reflectors and binoculars, and with more published discussion of standardized methods, observers are consistently using smaller apertures whereby any potential aperture effect is minimized. And, as has been stated previously (*e.g.*, see Morris 1973, *P.A.S.P.* **85**, 470), any aperture effect will also be dependent upon the morphology of the comet being observed — the degree of condensation, in particular, and also the coma diameter, affect the final image brightness as viewed visually through an eyepiece (or as imaged on a photograph or via CCD). And there are certainly effects caused by differing *f*/-ratios and magnifications, which may be more important in many cases than the instrument's actual aperture. In reality, many instrumentation effects are likely lost in the 'noise' of the scatter in m_1 estimates caused by improper methodology employed by individual observers. To pursue this problem of methodology, I am in the final stages of preparing the '*ICQ* Deep-Sky Magnitude Survey', which will ask observers to make total visual magnitude estimates of 10 deep-sky objects (galaxies, nebulae, etc.) that reasonably resemble the appearance of comets; more on this in the October issue.

The graphs in *CLICC/A* do not seem really to have helped Kamél's thesis in any way, and I also doubt that these 60 pages of plots will aid anybody else's research. But there is value in the collection of raw, unreduced data, and this collection will help ensure that most good magnitudes of '20th-century comets' are included in the *ICQ* archive. However, users of such data who are not intimately familiar with the problems of data selection and utilizing non-standard data must be cautioned in using these observations when seeking to extract meaningful results. Kamél evidently did not gain access to Bobrovnikoff's very detailed work on comet brightness in the early 1940s (*Contrib. Perkins Obs.* Nos. 15, 16, and 19), a reading of which might be considered essential to anyone studying comet magnitudes. It is unfortunate that so many people feel the need to 're-invent the wheel' when it comes to cometary magnitudes; what is needed is work that launches off of previous research, so as to learn more about the physical processes that govern the brightness behavior of comets. By continuing to build a database of reasonably accurate photometric data on comets, the *ICQ* serves to spur further research in this area.

The printed volume containing *The Comet Light Curve Catalogue/Atlas* ends with several papers authored or co-authored by Kamél, including the centerpiece paper for his thesis entitled "The evolution of P/Encke's light curve: No secular fading, a vanishing perihelion asymmetry". The P/Encke paper, which reportedly is to be published soon in *Icarus*, brings out the interesting idea that what has been interpreted by others as a secular fading of the comet's brightness over the last two centuries may actually be a result of changing nongravitational forces. The light curve's asymmetry with respect to perihelion has been changing, such that the maximum brightness that had occurred three weeks prior to perihelion in the 1840s now occurs a few days after perihelion. He notes that the "lessened perihelion asymmetry [of the light curve] seems well correlated" with the well-known decrease of the nongravitational forces during the same period. Kamél concludes that "P/Encke has not faded noticeably in the period 1832-1987; it has remained more or less constant." Such a brightness/nongravitational-force correlation may well be present in other comets.

CRAF

In the first week of June, the U.S. House of Representatives voted to continue funding the Space Station, at the probable expense of space science. This means that such projects as the *Comet Rendezvous/Asteroid Flyby (CRAF)* may be deleted entirely, or at least delayed. Delays have already caused *CRAF* to be re-targeted from P/Kopff to P/Tempel 2 during 2003-2005. Zdenek Sekanina has just published a "Comprehensive Model" for P/Tempel's nucleus and activity in the *Astronomical Journal* (**102**, 350); he remarks that "it should not be overlooked that the comet's return

[to perihelion] of 2005 is so utterly unfavorable [for ground-based observers] that, from the standpoint of ground-based supporting studies that used to be recognized in the past as critical for any dedicated mission's success, the choice of P/Tempel 2 at its 2005 return as the CRAF's target may be regrettable." Perhaps a convenient delay of a year or so will cause a better candidate to be chosen. Indeed, at the Asteroids, Comets, Meteors 1991 meeting at Flagstaff in late June, Paul Weismann (of NASA's Jet Propulsion Laboratory) stated his expectation of a 1-year delay in the launching of *CRAF* (due budgetary changes following the House vote in early June), which would change the target back to P/Kopff.

Equinoxes B1950.0 and J2000.0

As noted in the *1992 Comet Handbook*, the positions, orbits, and ephemerides of comets and minor planets will officially use the new equinox J2000.0 starting at the end of 1991. Because J2000 atlases and catalogues are not yet as readily available as are B1950.0 material, we will continue publishing both B1950.0 and J2000.0 data in the *Comet Handbook* for several years. Because nearly all catalogues of non-solar-system objects are listed for equinox B1950.0, astronomers studying those types of objects will continue using the old equinox for the foreseeable future (including for reports on the *IAU Circulars*), and a check of major astronomical journals over the past eight months shows that 80 to 90 percent of all papers still use equinox B1950.0!

— *Daniel W. E. Green (1991 July 20)*

Φ Φ Φ

TABULATION OF COMET OBSERVATIONS

In this issue, we complete publication of data reported by observers to the Comets Section of the Association of Lunar and Planetary Observers (A.L.P.O.) during 1957-1979, with the exception of data involving comet Bradfield 1974b and some descriptive information by John E. Bortle, which will all be published in future issues. Part of the delay was due to a need to compute or re-compute many magnitudes from data supplied by the observers, in which field stars had to be identified on atlases and then in stellar magnitude catalogues; this laborious process was performed because of the dearth of data on many comets prior to 1980. Colons (:) designating approximate estimates have sometimes been added by the *ICQ* Editor where it was rather definite that the observer had not taken proper procedures to gain a reliable brightness estimate. Of course, there are many more approximate observations among the older data that are not accompanied by colons, because we did not want to "de-value" observations whose uncertainties are not obvious. For modern observations, we expect observers to provide a colon with magnitude estimates whose uncertainties are of the order of ± 0.5 mag or more. The process of publishing the A.L.P.O. data has spanned the past 13 years, and we hope now to publish all of the unpublished data from the Comet Section files of the British Astronomical Association.

A new reference added amongst the observations in this issues is BC = Boss Catalogue. The fifth edition of the *ICQ* Archive of photometric observations on 9-track magnetic tape is in preparation, and we will announce details in the October issue.

Descriptive Information (to complement the Tabulated Data):

◇ *Comet Bradfield 1987 XXIX [all observations by MEY; MM = S]* ⟹ 1987 Dec. 12.73: in 8×30 B, m_1 = 6.0, 15′ coma, DC = 5, 2° tail in p.a. 60°. Dec. 13.73: in 8×30 B, m_1 = 6.2, 15′ coma, DC = 5, 1° tail in p.a. 60°. Dec. 15.75: in 8×30 B, m_1 = 6.3, 15′ coma, DC = 6, 1° tail in p.a. 60°. 1988 Jan. 9.74: in 10×50 B, m_1 = 8.0, 10′ coma, DC = 5. Jan. 10.74: in 10×50 B, m_1 = 8.2, DC = 4, 0°.8 tail in p.a. 55°. Jan. 12.74: in 10×50 B, m_1 = 8.3, DC = 4. Jan. 13.75: in 10×50 B, m_1 = 8.5, DC = 3.

◇ *Comet Liller 1988 V [all observations by MEY w/ 10×50 B; MM = S]* ⟹ 1988 Apr. 10.80: m_1 = 6.5, coma dia. 3′, DC = 8, 0°.3 tail in p.a. 2°. Apr. 11.81: m_1 = 6.8, coma dia. 2′, DC = 7, 0°.1 tail in p.a. 0°. Apr. 13.80: m_1 = 6.7, coma dia. 3′, DC = 7, 0°.1 tail in p.a. 0°. Apr. 14.82: m_1 = 6.8, coma dia. 3′, DC = 8, 0°.3 tail in p.a. 1°. Apr. 15.82: m_1 = 6.9, coma dia. 4′, DC = 8, 0°.4 tail in p.a. 3°. Apr. 16.82: m_1 = 6.8, coma dia. 4′, DC = 7, 0°.5 tail in p.a. 351°. Apr. 17.83: m_1 = 6.8, coma dia. 4′, DC = 7, 0°.5 tail in p.a. 352°. Apr. 18.83: m_1 = 6.9, coma dia. 3′, DC = 7, 0°.4 tail in p.a. 350°. Apr. 26.83: m_1 = 7.0, coma dia. 4′, DC = 5. May 3.85: m_1 = 7.1, coma dia. 3′, DC = 8, 0°.5 tail in p.a. 358°. May 9.85: m_1 = 7.3, coma dia. 3′, DC = 7, 0°.3 tail in p.a. 350°.

◇ *Comet Austin 1989c$_1$ [all observations by MEY w/ 10×50 B]* ⟹ 1990 May 2.06: m_1 = 5.3 (MM: S), 3′ coma, DC = 8, 0°.1 tail in p.a. 292°. May 3.07: m_1 = 5.3 (MM: S), 3′.5 coma, DC = 8, 0°.8 tail in p.a. 289°. May 4.06: m_1 = 5.5 (MM: S), 3′.5 coma, DC = 8, 0°.8 tail in p.a. 290°. May 14.00: m_1 = 5.3 (MM: S), 6′ coma, DC = 5.

◇ *Comet Levy 1990c* ⟹ 1990 July 13.94: central cond. of mag ~ 12 [JAH]. July 20.91 and 22.98: central cond. of mag ~ 11 [JAH]. July 22.98: additional 0°.16 tail in p.a. 239° [JAH]. July 24.94: "greenish?" [JAH]. July 26.93: additional 0°.70 tail in p.a. 198° [JAH]. July 26.93: "greenish!" [JAH]. July 27.91: in 5.0-cm *f*/10 R (56×), 6′.8 coma, DC = 3 [JAH]. July 27.93: central cond. of mag ~ 10 [JAH]. Aug. 2.98: additional 0°.30 tail in p.a. 155° [JAH]. Aug. 3.01: additional tails 0°.30 and 0°.20 long in p.a. 279° and 258°; central cond. of mag ~ 10 [JAH]. Aug. 10.87: additional tails of length ~ 0°.20 and 0°.01 in p.a. 185° and 145°; central cond. of mag ~ 8 [JAH]. *(Continued...)*

(Continued from previous page) Aug. 12.88: additional tails 0°.60 and 0°.50 long in p.a. 220° and 25° [JAH]. Aug. 17.89: additional 1°.20 tail in p.a. 160° [JAH]. Aug. 20.89: central cond. mag ~ 7; several other short tails [JAH]. Aug. 23.86: tail spans p.a. 70°-100° [MEY]. Aug. 23.90: additional tail 0°.75 long in p.a. 90° [JAH]. Aug. 24.95: additional tails 0°.70 and 0°.70 long in p.a. 60° and 90° [JAH]. Aug. 25.91: additional tails ~ 0°.30 and 0°.03 long in p.a. 20° and 60° [JAH]. Aug. 25.91 and 26.85: central cond. of mag ~ 7 [JAH]. Aug. 26.84: "tail very weak" [JAH]. Aug. 26.85: additional 1°.5 tail in p.a. 95° [JAH]. Aug. 26.86: central cond. of mag ~ 11 [JAH]. Aug. 26.87: tail spans p.a. 65°-105° [MEY]. Aug. 27.85: additional (gas) tail at p.a. 90° [LUE]. Aug. 27.86: tail spans p.a. 65°-85° [MEY]. Aug. 27.89: additional 1°.6 tail in p.a. 84° [JAH].

1991 Jan. 14.64: in 20×80 B, m_1 = 7-8, short tail [CAM03]. Feb. 5.56: also 15′ tail in p.a. 350° [CAM03]. Feb. 6.35: "in 41-cm L, a broad tail toward p.a. ~ 330° was observed" [HAL]. Feb. 6.51: 1°.5 tail in p.a. 180°, traces of tail in p.a. 305° [CAM03]. Feb. 9.24: in 35.9-cm L (214×), almost stellar central cond. of dia. ~ 3″, $m_2 = 11.5 \pm 0.5$ [MOD]. Feb. 14.46: "in 41-cm L, a broad, relatively faint main tail toward p.a. 170° and a stubby, brighter second tail toward p.a. 0° were observed" [HAL]. Feb. 15.37: "in 41-cm L, a bright tail was seen toward p.a. 0°, then curving toward p.a. 345°; a second tail toward p.a. 160° was quite faint" [HAL]. Feb. 16.79: in 20×80 B, coma dia. 3′, DC = 5, short tail [CAM03]. Feb. 21.31: at 88×, stellar central cond. of $m_2 = 12.0 \pm 0.2$ [MOD]. Feb. 22.34: in 20-cm L (88×), stellar central cond. of $m_2 = 11.8 \pm 0.2$ [MOD]. Feb. 22.42: "two distinct tails observed in 41-cm L — the brighter tail, 15′ long in p.a. 40°, was fairly narrow; the second, > 20′ long in p.a. 105°, was broader" [HAL]. Mar. 9.09: in 35.9-cm L, stellar central cond. of $m_2 = 12.0 \pm 0.2$; tail subtends ~ 30° [MOD]. Mar. 12.27: in 20-cm L (88×), stellar central cond. of $m_2 = 11.6 \pm 0.2$ [MOD]. Mar. 14.42: "near star; comet less clearly visible using Swan Band filter" [SEA]. Mar. 16.14: in 20-cm L (88×), stellar central cond. of $m_2 = 12.2 \pm 0.2$ [MOD]. Mar. 17.06: in 31.7-cm L, nearly stellar nucleus of mag 12.5 [BOR]. Mar. 17.19: at 88×, stellar central cond. of $m_2 = 12.5 \pm 0.2$ [MOD]. Mar. 17.28: "observation somewhat hampered by nearby bright star; the comet could not positively be seen in 10×50 B; in 41-cm L, the coma appeared somewhat fan-shaped" [HAL]. Mar. 21.14: in 31.7-cm L, tiny cond. at 110× [BOR].

Apr. 3.08: in 31.7-cm L (110×), 0′.2 cond. [BOR]. Apr. 3.14: in 35.9-cm L (85×), stellar central cond. of $m_2 = 13.5 \pm 0.2$; at 214×, stellar central cond. of $m_2 = 14.0 \pm 0.2$ [MOD]. Apr. 3.17: in 20-cm L (167×), stellar central cond. of $m_2 = 13.3 \pm 0.2$ [MOD]. Apr. 7.17: in 35.9-cm L (341×), stellar central cond. of mag ~ 14 suspected [MOD]. Apr. 15.86: with 0.2-m *f*/2 Baker-Schmidt camera + CCD, reduced from two 180-sec co-added unfiltered frames taken consecutively; faint 7′ tail in p.a. 172°, fan ~ 4′ long in p.a. 105°-172° [MIK]. Apr. 16.15: in 35.9-cm L (214×), stellar central cond. of mag ~ 14 [MOD]. Apr. 18.12: in 35.9-cm L (214×), DC = 4 [MOD]. May 2.15: "observation hampered by nearby 10th-mag star" [HAL]. May 12.21: "comet is vague and ill-defined; it is significantly fainter and more diffuse than during previous observations" [HAL]. May 30.16: "the limiting magnitudes for this and the other negative observations were based upon the diffuse appearance the comet exhibited when last observed (May 12)" [HAL]. May 31.18: "poor transparency; possible thin cirrus" [HAL].

◇ *McNaught-Hughes 1990g* ⟹ 1991 Mar. 15.50: "this observation confirms a suspected sighting made the previous morning (Mar. 14.50)" [HAL]. May 12.33: "the comet appears more diffuse than during previous observations" [HAL]. May 19.41: "sky transparency fairly poor; the comet appears quite vague and diffuse" [HAL]. June 7.22: "a very faint candidate was suspected, but was not confirmed" [HAL].

◇ *Tsuchiya-Kiuchi 1990i* ⟹ 1991 Feb. 4.03: "some interference due to 9th-mag star ~ 2′ from comet" [MOD]. Feb. 7.11: "the comet is very vague and diffuse; the observation was hampered by low altitude and possible cirrus" [HAL].

◇ *Arai 1991b* ⟹ 1991 Jan. 14.91: "nucleus not centered, but 1:1.5 great axis" in p.a. 200° [JAH]. Jan. 16.13: central cond. of $m_2 = 12.0$ [LOO01]. Feb. 5.21: "comet very vague and diffuse; a faint star is involved in the coma" [HAL].

◇ *Shoemaker-Levy 1991d* ⟹ 1991 Feb. 15.40: "the comet is small and quite condensed; its appearance is little more than that of a fuzzy star" [HAL]. Apr. 7.85: "90-sec CCD exp.; ref. star of V = 7.7 on the frame; nearly stellar coma; several other frames were also taken for comet identification" [MIK]. Apr. 11.29: "observation hampered by nearby 8th-mag star; the observation was also affected by a faint star the comet passed over" [HAL]. May 2.19: "possibly observed through thin cirrus" [HAL].

◇ *Helin-Lawrence 1991l* ⟹ 1991 Apr. 5.30: "observation hampered by a faint star the comet passed over" [HAL]. May 19.34: "sky transparency fairly poor" [HAL]. June 4.24: "observation somewhat hampered by nearby 10th-mag star; nevertheless, the comet appeared brighter and larger than it did during previous observations" [HAL]. June 17.21: "the comet is quite vague and diffuse, and is considerably more difficult to see than it was on June 4; this observation followed unsuccessful attempts on the previous two evenings" [HAL].

◇ *P/Brorsen-Metcalf (1989 X)* ⟹ 1989 Aug. 6.01: in 10×50 B, m_1 = 7.7 (MM = S), 3′ coma, DC = 6 [MEY]. Aug. 10.01: in 10×50 B, 4′ coma, DC = 4 [MEY].

◇ *P/Halley (1986 III)* ⟹ Observations in 1990 Feb. were taken from West (1990, *IAUC* 5059) and from West, Hainaut, and Smette (1991, *Astron. Astrophys. Let.*, in press). Observations in 1991 by WES01, HAI, and GIR were taken from the paper by West *et al.* (1991), mentioned above, which has slight variations from initial data published on *IAUC* 5189, 5206, 5213, and 5217. The West *et al.* (1991) paper notes that the references stars were taken from HE and SS (without stating which was used when). On 1991 Feb. 15.3, observations were made w/ S. di Serego Alighieri. For Feb. 17.2, GIR gave $V = 21.9$ in 5″ diaphragm on *IAUC* 5213. For Mar. 18.2, *IAUC* 5217 lists $V = 21.8$ in 5″ diaphragm. The observations by MEE utilized a Mould R filter and were extracted from *IAUC* 5196 and 5241 (and private communication). The observations by BUI are from *IAUC* 5202.

◇ *P/Hartley 1 (1991j)* ⟹ 1991 Apr. 18.32: "the comet is very faint and quite diffuse; it is pretty much a threshhold object; two galaxies (UGC 8663 and Zw 45-71) were in the same high-power field; both were brighter than the comet"

(Continued from previous page) [HAL]. Apr. 22.46: "despite a fairly low altitude and the comet's proximity to an 11th-mag star, it appears slightly brighter than it did on Apr. 18; the galaxy Zw 45-29 = Reiz 3510 was in the same high-power field and was somewhat brighter than the comet" [HAL].

◇ *P/Honda-Mrkos-Pajdušáková (1990f)* ⟹ 1990 July 23.03: "very weak, not sure" [JAH].

◇ *P/Kearns-Kwee (1989u)* ⟹ 1991 Feb. 6.28: "rich star field; a very faint candidate was suspected but was not confirmed" [HAL].

◇ *P/Levy (1991q)* ⟹ 1991 June 15.44: "sky transparency only fair; there was some enhancement when viewed with a Lumicon Swan Band filter" [HAL]. June 21.45: "in 41-cm L, a faint fan-shaped extension of the coma toward p.a. ~ 90° was suspected; this was not seen when viewed with a Lumicon Swan Band filter, which did enhance the comet's overall appearance, however" [HAL].

◇ *P/Metcalf-Brewington (1991a)* ⟹ 1991 Jan. 23.12: "some cirrus; 1st quarter moon in sky; the comet appears fainter and more diffuse than before" [HAL]. Jan. 26.04: "comet only suspected" [MOD]. Feb. 3.04: at 164×, stellar central cond. of m_2 = 13 [MOD]. Feb. 5.14: "the coma's interior appears more condensed than before; a possible outburst?" [HAL]. Feb. 14.12: "observed through thin cirrus; the near-condensation observed on Feb. 5 was not seen now" [HAL]. Mar. 4.16: "comet more vague and diffuse than before" [HAL]. Mar. 15.14: "comet is very large and diffuse" [HAL].

◇ *P/Mrkos (1991k)* ⟹ 1991 Mar. 21.41: "the comet appears as a small, star-like condensation enveloped within a faint, fan-shaped coma" [HAL]. Mar. 22.60: "possibly marginally diffuse; not seen using Swan Band filter" [SEA]. Apr. 6.28: "an extremely faint candidate was suspected, but not confirmed" [HAL].

◇ *P/Swift-Gehrels (1991c)* ⟹ 1991 Feb. 5.10: "low altitude, zodiacal light" [HAL]. Feb. 14.10: "low altitude, zodiacal light, also possible thin cirrus" [HAL]. Mar. 4.12: "very faint, diffuse candidate suspected, but not confirmed" [HAL]. Mar. 13.12: "the comet is quite diffuse; there is significant enhancement when viewed with a Lumicon Swan Band filter; the comet had the same appearance when observed on Mar. 17" [HAL]. Apr. 6.14: "low altitude" [HAL].

◇ *P/Takamizawa (1991h)* ⟹ 1991 June 5.23: "sky transparency only fair" [HAL].

◇ *P/Taylor (1990n)* ⟹ 1991 June 15.19: "observation attempted in response to report of a possible outburst; the attempt was hampered by the comet's proximity to a 12th-mag star" [HAL].

◇ *P/Van Biesbroeck (1989h$_1$)* ⟹ 1991 May 23.44: "faint star involved in coma; the observation was not confirmed until the comet was observed the following morning" [HAL]. May 24.45: "comet is small, faint and condensed" [HAL].

◇ *P/Wild 2 (1989t)* ⟹ 1991 Feb. 17.53: "occasional clouds, poor seeing" [HAL]. Mar. 15.42: comet 1′-2′ from 9th-mag star [MOD]. Mar. 17.51: "observation hampered by a faint star, which comet passed over during the course of the observation" [HAL]. Apr. 23.38: at 248×, almost stellar central cond. of m_2 ~ 14 [MOD]. Apr. 25.39: comet ~ 30″ from star of mag 11 or 12 [MOD]. May 12.38: "possible outburst since the previous observation; the coma is small and fairly condensed" [HAL]. May 19.45: "comet is somewhat less condensed than during previous observation" [HAL]. June 5.31: "comet appears moderately condensed" [HAL]. June 15.29: "comet appears fainter than during previous observations, but is still fairly condensed" [HAL].

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OBSERVATIONS OF COMETS

The headings for the tabulated data are as follows: "DATE (UT)" = Date and time to hundredths of a day in Universal Time; "MM" = the method employed for estimating the total visual magnitude [B = Bobrovnikoff, M = Morris, S = Sidgwick/In-out — see October 1980 issue of *ICQ*, pages 69-73 — etc.; also, P stands for photographic magnitude, and photoelectrically-determined values fall under U, L, and V for the standard *U*, *B*, and *V*, respectively]. "MAG." = total visual magnitude estimate; a colon indicates that the observation is only approximate, due to bad weather conditions, *etc.* (A left bracket, [, indicates limiting magnitude, comet not seen.) "RF" = reference for magnitude estimates (see the April 1988 issue, page 34). "AP." = aperture in centimeters of the instrument used for the observations, usually given to tenths. "T" = type of instrument used for the observation (R = refractor, L = Newtonian reflector, B = binoculars, C = Cassegrain reflector, A = camera, T = Schmidt-Cassegrain reflector, S = Schmidt-Newtonian reflector, E = naked eye, *etc.*). "F/" and "PWR" are the focal ratio and power or magnification, respectively, of the instrument used for the observation — given to nearest whole integer (round even).

"COMA" = estimated coma diameter of the comet in minutes of arc. An ampersand (&) indicates an approximate estimate. An exclamation mark (!) precedes a coma diameter when the comet was not seen (*i.e.*, was too faint) and where a limiting magnitude estimate is provided based on an "assumed" coma diameter (a default size of 1′ or 30″ is recommended; cf. *ICQ* 9, 100); a plus mark (+) precedes a coma diameter when a diaphragm was used electronically, thereby specifying the diaphragm size (i.e., the coma is almost always larger than such a specified diaphragm size). "DC" = degree of condensation on a scale where 9 = stellar and 0 = diffuse; a slash (/) indicates a value midway between the given number and the next-higher integer. "TAIL" = estimated tail length in degrees, to 0.01 degree if appropriate; again, an ampersand indicates a rough estimate. "PA" = estimated measured position angle of the tail to nearest whole integer in degrees (north = 0°, east = 90°). "OBS" = the observer who made the observation (given as a 3-letter, 2-digit code). An asterisk between the DATE and MM columns indicates that the observation (Continued...)

(Continued from previous page) is an updated version of one already published in a previous issue of the *ICQ*, *The Comet Quarterly*, or *The Comet*. (An exclamation mark in this same location indicates that the observer has corrected his estimate in some manner for atmospheric extinction.)

A complete list of the Keys to abbrevations used in the *ICQ* is available from the Editor for $4.00 postpaid.

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Key to observers with observations published in this issue, with 2-digit numbers between Observer Code and Observer's Name indicating source [05 = Comets Section, A.L.P.O.; 16 = Yamaneko Group of Comet Observers (c/o Akimasa Nakamura, Aichi, Japan); 28 = German observers (c/o Jost Jahn), 29 = The Eyepiece, "Observing Group Reports", Amateur Astronomers Assn. of New York City, etc.]. Those with asterisks (*) preceding the 5-character code are new additions to the Observer Key:

CODE	S	OBSERVER, LOCATION
ADA02	18	Jacek Adamik, Poland
*AHE	05	John Ahearn, NY, U.S.A.
AKI01	16	Hiroki Akisawa, Japan
AMO		Mauro Amoretti, Italy
AND03		Krasimir Andreev, Bulgaria
AND06	24	Odd Ivar Andersen, Norway
*ANT02	05	Larry Anthenien, CA, U.S.A.
*BAL	05	R. M. Bales, OR, U.S.A.
*BAR05	05	Lewiss Bartha, Hungary
*BER03	29	Ray Berg, IN, U.S.A.
*BIE	05	Steve Bieda, CA, U.S.A.
BOA		Andrea Boattini, Italy
BOE	05	Leo Boethin, The Philippines
BOR		John E. Bortle, NY, U.S.A.
BRE02	24	Per-Jonny Bremseth, Norway
*BUD01	05	Phillip W. Budine, NY, U.S.A.
BUI		C. Buil, France
CAM03	14	Paul Camilleri, Australia
CAP	05	Charles F. Capen, AZ, U.S.A.
*CHA	05	Clark Chapman, NY, U.S.A.
CHO01	18	Franciszek Chodorowski, Poland
COM	05	Georg Comello, The Netherlands
CON	05	Darrell Conger, WV, U.S.A.
CRU	05	Dale P. Cruikshank, U.S.A.
DAH	24	Haakon Dahle, Norway
DEA		Vicente Ferreira de Assis Neto, Brazil
DEL	05	Kenneth J. Delano, MA, U.S.A.
*DEV	30	G. de Vaucouleurs, TX, U.S.A.
EVE	05	E. Everhart, U.S.A.
*FAR	05	Robert Farmer, TX, U.S.A.
*FIT01	05	Tim Fitzgerald, TX, U.S.A.
GIR		E. Giraud, France
GRA04	24	Bjoern Haakon Granslo, Norway
GRE		Daniel W. E. Green, U.S.A.
HAA	05	Walter H. Haas, NM, U.S.A.
HAI		O. Hainaut, Belgium
HAL		Alan Hale, U.S.A.
*HAN03	05	William Haney, CA, U.S.A.
*HAR04	05	William K. Hartmann, PA, U.S.A.
*HEI	05	Jim Heineman, CO, U.S.A.
HER02		Carl Hergenrother, NJ, U.S.A.
HIR01		Kazuyoshi Hirayama, Japan
HOU	05	Walter Scott Houston, CT, U.S.A.
ICH	16	Kazuhiko Ichikawa, Japan
ISH02	16	Akiyoshi Ishikawa, Japan
IWA01	16	Yoshitaka Iwaki, Japan
*JAG	05	Th. Jager, Hungary
JAH	28	Jost Jahn, West Germany
JOH02	05	Craig L. Johnson, CO, U.S.A.
KAI01	05	Mike Kaiser, IA, U.S.A.
KAN	16	Kiyotaka Kanai, Japan
*KEL01	05	Frank J. Kelly, FL, U.S.A.
KID		Mark Kidger, Canary Islands
*KNA	05	Paul Knauth, TX, U.S.A.
*KNO	05	Jeremy H. Knowles, NY, U.S.A.
KOB01	16	Juro Kobayashi, Japan
*KOC02	29	T. Kochakji, NJ, U.S.A.
*KON03	16	Eitoshi Konno, Japan
KOR		Stefan Korth, West Germany
KOR01		Valeriy L. Korneyev, Zelenograd, U.S.S.R.
*KUR01	18	Andrzej Kurpiewski, Poland
LEV		David Levy, AZ, U.S.A.
*LEV01	29	Joel Levine, U.S.A.
LIN03		Chii-Sheng Lin, Taiwan
*LIS	18	Jowita Lis, Poland
LOO01	11	Frans R. van Loo, Belgium
*LOO02	05	Mario Loocks V., Chile
LUE	28	Hartwig Luethen, West Germany
*LUF	29	Herbert A. Luft, NY, U.S.A.
*MAR08	29	Stephen P. Maran, NY, U.S.A.
*MAR09	05	Andre Posso Martins, Brazil
MCC02	05	Alan McClure, CA, U.S.A.
MCC03	05	Michael McCants, TX, U.S.A.
*MCP	05	Johnny McPhaul, U.S.A.
MEE	03	Karen J. Meech, U.S.A.
MEI01	05	David D. Meisel, NY, U.S.A.
*MEY	28	M. Meyer, Germany
MID01	24	Oernulf Midtskogen, Norway
MIK		Herman Mikuz, Yugoslavia
MIL	05	Dennis Milon, MA, U.S.A.
*MIL04	05	Robert W. Miller, FL, U.S.A.
MIT	16	Shigeo Mitsuma, Japan
MOD		Robert J. Modic, OH, U.S.A.
MOE		Michael Moeller, West Germany
*MON01	05	Allen C. Montague, IL, U.S.A.
*MOR05	05	Arthur G. F. Morrisby, S. Rhodesia
NAG04	16	Kazuro Nagashima, Japan
NAK01	16	Akimasa Nakamura, Japan
NAK05	16	Tetsuya Nakamura, Japan
*NAK08	16	Yasushi Nakajima, Japan
NES		Yu. V. Nesterov, U.S.S.R.
*NIE	28	H. Nieschulz, Germany
NII	16	Tsuneo Niijima, Japan
*NOR	05	Rodney A. Norden, VA, U.S.A.
NOW	05	Gary T. Nowak, VT, U.S.A.
*OBU	16	Yasushi Obuchi, Japan
OHT	16	Tadao Ohtsuka, Japan
OKA05	16	Takuma Oka, Japan
OLE	18	Arkadiusz Olech, Poland
*ORA	29	Edward Oravec, NY, U.S.A.
PAU	29	Edgar M. Pautton, NY, U.S.A.
*PAZ	29	John Pazmino, NY, U.S.A.
PEA	14	Andrew R. Pearce, Australia
*PEA02	29	Arthur E. Pearlmutter, NY, U.S.A.
PER01		Alfredo Jose Serra Pereira, Portugal
*PIS01	18	Witold Piskorz, Poland
*PRI01	29	Francis J. Price, NY, U.S.A.
PRY		Jim Pryal, WA, U.S.A.
RAD01		Veselka Radeva, Bulgaria
*RAV	05	Menachem Raviv, Israel
REI01		Johann Reifberger, Austria
*RIP01	05	George W. Rippen, WI, U.S.A.
*RIZ	29	Patrick V. Rizzo, NY, U.S.A.
*ROB04	05	William O. Roberts, CA, U.S.A.
*SAR	05	S. Sarkadi-Nagy, Hungary
SCH04	11	A. H. Scholten, The Netherlands
*SCH10	29	Martin Schulze, NJ, U.S.A.
*SCH11	05	Wilfried Schroeder, Germany
SEA	14	David A. J. Seargent, Australia
SEA01	14	John Seach, Australia
*SHA05	05	Bob Shayler, TX, U.S.A.
*SLU01	18	Michal Slusarczyk, Poland
SMI02	05	J. Russell Smith, TX, U.S.A.
SOL	05	Gordon Solberg, NM, U.S.A.
SOW	16	Toshihide Sowa, Japan
SWI	18	Mariusz Swietnicki, Poland
*SZE01	05	Cs. Szekely, Hungary
*TAK05	16	Kesao Takamizawa, Japan
TAN01	16	Kunihiko Taniguchi, Japan
*THR	05	Jerry Thrasher, U.S.A.
TSU02	16	Mitsunori Tsumura, Japan
WAT01	16	Nobuo Watanabe, Japan
*WEG01	05	Gary Wegner, WA, U.S.A.
WES01		Richard M. West, Chile
*WES05	05	William J. Westbrooke, CA, U.S.A.
*WIL08	05	David Williams, IL, U.S.A.
WOZ	18	Przemyslaw Wozniak, Poland
*WYB	05	Fred Wyburn, CA, U.S.A.
WYN	05	Tim Wyngaard, WI, U.S.A.
YAS	16	Masanori Yasuki, Japan
YOU	05	James W. Young, CA, U.S.A.
ZAN		Mauro Vittorio Zanotta, Italy
ZHU		Sergey Valentinowich Zhuiko, U.S.S.R.

Comet Arend-Roland 1957 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1957 04 23.02		3 :	UX	5.0	B		7	10		3	0	PRI01
1957 04 24.08		3 :		0.0	E		1					BER03
1957 04 25.04		2.3	SP	5.0	B		7	10		1.5	30	PRI01
1957 04 25.04		3.2	Y	5.0	B		7			&4		PEA02
1957 04 26.15		2.5:		0.0	E		1			45		KAI01
1957 04 27.04		3.8	SP	5.0	B		7	10		1.5	20	PRI01
1957 04 28.0		3.6	Y	0.0	E		1					PEA02
1957 04 29.04		3.6	Y	5.0	B		7					PEA02

Comet Arend-Roland 1957 III [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1957 04 29.12		3.2:		15.2	L		86			15		KAI01
1957 04 30.02		5.0	SP	5.0	B		7	1		6	40	RIZ
1957 04 30.04		3.7	Y	5.0	B		7			&4.5		PEA02
1957 04 30.05		4.2		5.0	B		16					MAR08
1957 04 30.06		3.4	Y	5.0	B		7			2	50	PRI01
1957 04 30.1		3.0		0.0	E		1					DEL
1957 04 30.14		2.0:		3.5	B		7			10		WYN
1957 05 01.04		3 :	UX	5.0	B		7			&3.5	345	PAU
1957 05 01.04		3.8	Y	5.0	B		7					PEA02
1957 05 01.04		5.0	Y	5.0	B		7	1		6	35	RIZ
1957 05 01.07	!	4.1	UX	5.0	B		7			1.5	50	PRI01
1957 05 02.04		4.0	Y	5.0	B		7			&3.5		PEA02
1957 05 02.06		4.1	Y	5.0	B		7			1.5	50	PRI01
1957 05 02.06		5.2	Y	5.0	B		7					RIZ
1957 05 02.06		5.3		5.0	B		16					MAR08
1957 05 03.04		4.1	Y	5.0	B		7			3.5		PEA02
1957 05 03.05		4.1	Y	5.0	R		7					PRI01
1957 05 04.04		4.6	Y	5.1	R					2.5		PEA02
1957 05 04.08		4 :		5.0	B		4			&5.5		BER03
1957 05 04.15		3.5:		15.2	L		86			9		KAI01
1957 05 04.15		4.4	UX	5.0	B		7			1	60	PRI01
1957 05 04.33		4.5	Y	0.0	E		1					PEA02
1957 05 07.04		5.1	UX	5.0	B		7			2.5		PEA02
1957 05 07.06		5.1	Y	5.0	B		7	& 6		1	60	PRI01
1957 05 07.06		5.4		5.0	B		16					MAR08
1957 05 08.04		5.4	UX	5.0	B		7			1		PEA02
1957 05 08.09		5.3	Y	5.0	B		7			<1	55	PRI01
1957 05 08.12		4.0:		4.2	R		10					KAI01
1957 05 09.08		5.4	Y	5.0	B		7					PEA02
1957 05 09.1		5.7		5.0	B		7			1.5	60	PRI01
1957 05 10.20		5.6	Y	5.0	B		7					PEA02
1957 05 11.06		6.6		5.0	B		7					RIZ
1957 05 17.08		6.5	US	5.0	B		7			1.5	50	PRI01
1957 05 17.08		7.0	AC	5.0	B		7			1		PEA02
1957 05 24.1		6.5		5.0	B		4			2		BER03
1957 05 25.08		8 :		5.0	B		16					MAR08
1957 05 31.09		8.6	AC	5.0	B		7			0.25		PEA02
1957 06 05.14		9 :		10.2	L		48			&0.4		BER03

Comet Mrkos 1957 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1957 08 18.1		3.0		0.0	E		1					DEL
1957 08 28.06		3.5		0.0	E		1					DEL

Comet Burnham 1958 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1958 03 25.12		9.8:		21.0	R	15	60					CRU
1958 04 09.04		9.5		20.3	L		36					DEL
1958 04 09.04		9.5		20.3	L	6	36	3	3	?		DEL
1958 04 10.06		9.2		20.3	L	6	36	4	6			DEL
1958 06 14.15		11.1						4		0.03	315	MEI01
1958 06 14.15		11.1		20.3	L		80					DEL

Comet Bester-Hoffmeister 1959 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1959 09 06.		P[13		14.0	A							MCC02

Comet Alcock 1959 IV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1959 08 31.18		11 :		31.8	L			& 2.5	4			MEI01
1959 09 02.21		11 :	UM	25.4	L	6	81	& 2.5	3	?	270	BAL
1959 09 04.12		11.2	UX	20.3	L		80	3	7	0.1		MEI01
1959 09 06.17		11.5		20.3	L	7	48			0.1		FIT01
1959 09 07.21		11.5		15.2	L		22	5				MIL
1959 09 07.21		11.5	UM	20.3	L	8	109	5.5		?		FAR
1959 09 21.04		[13.5		20.3	L							MEI01

Comet Alcock 1959 VI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1959 09 04.51	O	5.5	SP	7.0	B		12			&1.75		MCC02
1959 09 05.41		5.5:		15.2	L		40	10		&0.75	275	MEI01
1959 09 06.52		4.7:		7.0	B		12					MCC02

Comet Burnham 1960 II

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1960 01 17.07		11 :		40.6	L		140					SMI02
1960 01 18.16	N	10.5:		25.4	C		184					WEG01
1960 01 19.15		11 :	UM	15.2	L		21	& 8				MIL
1960 01 21.14		11 :	UM	15.2	L		21	& 7				MIL
1960 01 22.08		10.9:		40.6	L	5	213					SMI02
1960 01 22.20		11 :	UM	20.3	L		42	& 6.5				MIL
1960 01 24.1		9.6:		10.2	L		46	& 1.5				JOH02
1960 01 25.1		9.5:		10.2	L		46					JOH02
1960 01 27.09		10.5:		40.6	L		67					SMI02
1960 01 27.14	!	10.5:	UM	15.2	L			7				MIL
1960 01 31.07		10.5:	UM	20.3	L		42	9				KNA
1960 01 31.09		10 :		40.6	L		64					SMI02
1960 02 08.06		9 :		40.6	L							SMI02
1960 02 08.06		10 :	UM	20.3	L		42	3				MIL
1960 02 15.07		9 :	UM	20.3	L		50	4		0.1		MIL
1960 02 15.14	O	9.5	BD	15.2	L	5	60	& 5		&0.21	60	MCC02
1960 03 21.13		4.5:		10.2	L		20					MOR05
1960 04 08.5	O	6.2	BC	7.0	B		12					MCC02
1960 04 10.41	O	3.5	UX	8.0	R	5	12	0.83	7	0.5	220	KEL01
1960 04 19.45		5 :		20.3	L	8	70	6				SHA05
1960 04 19.8		5 :		7.6	R							RAV
1960 04 20.38		4.0	Y	5.0	R		8	22	5	1	280	MEI01
1960 04 20.8		4.8		7.6	R							RAV
1960 04 21.40	O	4.0	UX	8.0	R	5	12	2	3	0.05		KEL01
1960 04 22.5	O	4.8			O		2					MCC02
1960 04 23.37		4.5:		0.0	E		1					CON
1960 04 25.37				10.2	L		46	&27	8			JOH02
1960 04 25.37		3.0	UX	0.0	E		1					JOH02
1960 04 25.92		4.2		10.2	R	5	25				90	SZE01
1960 04 26.46		5.0:		5.0	B		7					BIE
1960 04 26.8		4.4:		7.6	R							RAV
1960 04 27.25		4.5		10.2	L		38					WEG01
1960 04 27.8		4.2:		7.6	R							RAV
1960 04 27.84	W	4.1		20.3	R	15	80			1		BAR05
1960 04 27.89		4.5	UX	5.1	R		33					SCH11
1960 04 28.25		6.0:		5.0	B		7					BIE
1960 04 28.28				15.2	L		21	10		3	111	MIL
1960 04 28.28		5.5	UX	0.0	E		1					MIL
1960 04 28.35	O	4.2	UX	8.0	R	5	12	10	3			KEL01
1960 04 29.12	O	4.8	Y	8.4	R	3	7	21				HAR04
1960 04 29.12	O	5.1	BD	8.4	R	3	7	21				HAR04

Comet Burnham 1960 II [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1960 04 29.16		4.8:		4.8	R			10				CON
1960 04 29.36	O	4.2	BD	8.4	R	3	7	19				HAR04
1960 04 29.36	O	4.4	Y	8.4	R	3	7	19				HAR04
1960 04 29.8		4.5:		7.6	R							RAV
1960 04 29.88		4.6	UX	5.1	R		33			1		SCH11
1960 04 30.15		5 :		4.8	R			10				CON
1960 04 30.17		6.0:		5.0	B		7					BIE
1960 04 30.20		4.8		15.2	L	8	48			2		KNA
1960 04 30.26		4.7	Y	0.0	E		1					MIL
1960 04 30.26		4.8	UX	0.0	E		1					MIL
1960 04 30.33		4.2		5.0	B		7					JOH02
1960 04 30.84	W	4.7		20.3	R	15	80	10			45	BAR05
1960 04 31.12		5.2	UX	15.2	L	8	48					KNA
1960 04 31.94		4.5:	UX	7.6	R							RAV
1960 05 01.06	O	6.0	BD	8.4	R	3	7	&14				HAR04
1960 05 01.06	O	6.3	Y	8.4	R	3	7	&14				HAR04
1960 05 01.2				10.2	L		46	& 6	6/			JOH02
1960 05 01.2		5.5	UX									JOH02
1960 05 01.27		6.2:		5.0	B		7					BIE
1960 05 01.30		5.3		25.4	C		184					WEG01
1960 05 01.77		5 :	UX	7.6	R							RAV
1960 05 02.06	O	5.0	BD	8.4	R	3	7	&17				HAR04
1960 05 02.06	O	5.3	Y	8.4	R	3	7	&17				HAR04
1960 05 02.14	O	5.4	Y	8.4	R	3	7	&13				HAR04
1960 05 02.14	O	5.6	BD	8.4	R	3	7	&13				HAR04
1960 05 02.17		5.2:		4.8	R			8				CON
1960 05 02.18		6.5:		5.0	B		7					BIE
1960 05 02.37	O	5.0	BD	8.4	R	3	7	&13				HAR04
1960 05 02.37	O	5.3	Y	8.4	R	3	7	&13				HAR04
1960 05 02.82	W	4.9		20.3	R	15	80				45	BAR05
1960 05 02.92		5.2:	UX	7.6	R							RAV
1960 05 03.10	O	4.4	BD	8.4	R	3	7	&19				HAR04
1960 05 03.10	O	4.8	Y	8.4	R	3	7	&19				HAR04
1960 05 03.13	P	5.0:			A	4				2	141	BOR
1960 05 03.18		5.2:		4.8	R			& 7.5				CON
1960 05 03.32	O	4.6	UX	8.0	R	5	12	8	4			KEL01
1960 05 03.82	W	5.5		20.3	R	15	80	10				BAR05
1960 05 03.86		5.0		5.1	R		33			1		SCH11
1960 05 03.88		5.2:		7.6	R							RAV
1960 05 04.1	O	5.5	AC	3.0	B		6					KNO
1960 05 04.11		3.8	UX	6.1	R		22	5	3/			BOR
1960 05 04.12	O	5.4	Y	8.4	R	3	7	&17				HAR04
1960 05 04.12	O	5.8	BD	8.4	R	3	7	&17				HAR04
1960 05 04.14		5.8:		4.8	R							CON
1960 05 04.18		6 :		10.2	L		46	&13.5	3			JOH02
1960 05 04.23		5.8	AC									MON01
1960 05 04.90		5.5:		7.6	R							RAV
1960 05 05.08		4.2	UM	6.1	R		22	5	3/			BOR
1960 05 05.1	O	5.7	AC	3.0	B		6					KNO
1960 05 05.11	O	5.6	Y	8.4	R	3	7	12				HAR04
1960 05 05.11	O	6.0	BD	8.4	R	3	7	12				HAR04
1960 05 05.3	O	5.8	Y	8.4	R	3	7	8.4				HAR04
1960 05 05.34	O	6.2	BD	8.4	R	3	7	8.4				HAR04
1960 05 05.85		6 :		7.6	R							RAV
1960 05 06.15	O	6.0	Y	8.4	R	3	7	7.2				HAR04
1960 05 06.15	O	6.4	BD	8.4	R	3	7	7.2				HAR04
1960 05 07.08		4.8	UM	6.1	R		22	3	3			BOR
1960 05 13.16		7.5:		10.2	L		46	& 3.5				JOH02
1960 05 17.81		9.2:	UM	7.6	R							RAV
1960 05 18.86		10.0:	UM	7.6	R							RAV

Comet Candy 1961 II

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1961 01 07.12		7.8:		25.4	L		50	5				HEI
1961 01 07.12	O	8.5:	US	10.2	L		46	& 4	2			JOH02
1961 01 08.06		7.5		10.2	L		30	& 5				MCP
1961 01 08.12		7.8:		25.4	L		50	5				HEI
1961 01 09.03	O	8.7:	AC	15.2	L		25	& 4				MON01
1961 01 10.07		8 :	UM	15.2	L		21	8		0.25	38	MIL
1961 01 11.13		8 :		15.2	L		62	4.5				ANT02
1961 01 12.09	O	7.5:	US	10.2	L		46	& 5	2			JOH02
1961 01 12.76	W	6.9	UX	20.3	R							BAR05
1961 01 13.75	W	7.0	UX	20.3	R							BAR05
1961 01 15.13		8.8:		15.2	L		62	& 4.8				ANT02
1961 01 15.77		7.3:		20.3	R							BAR05
1961 01 16.0		8.0		10.2	R		50			0.03		KEL01
1961 01 16.1		8.5:	UX									MIL04
1961 01 16.14		10 :		15.2	L		62	4.5				ANT02
1961 01 16.76	W	7.7	UX	20.3	R							BAR05
1961 01 17.23		8.5:	UM	5.0	R		7					MIL
1961 01 18.11		10.3:		15.2	L		62	4.5				ANT02
1961 01 18.73	W	7.6	UX	20.3	R							BAR05
1961 01 19.13		10.2:		15.2	L		62	& 4.2				ANT02
1961 01 20.14		10.3:		15.2	L		62	2.5				ANT02

Comet Wilson-Hubbard 1961 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1961 07 25.47		3.2:	SP		O					&1.5	140	MCC02
1961 07 25.47		4.0:	SP	7.0	B		12			23	304	MCC02
1961 07 26.42		4.7:		5.0	B		7			10		JOH02
1961 07 26.43				0.0	E		1			20	297	MIL
1961 07 27.43		3.5		5.0	B		7			5		FAR
1961 07 28.36		4.0:		5.0	B		7	&20		>3		CHA
1961 08 09.38		7 :	UM	15.2	L					4	295	MIL
1961 08 10.35		6.8:		0.0	E		1			4	301	MIL
1961 08 13.4	P				A	4				8	297	MIL

Comet Seki 1961 VIII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1961 10 28.39		5.6:		15.2	L		48					ANT02
1961 10 29.39		5.2:		15.2	L		48			0.07		ANT02
1961 11 08.42		5.0	SP	5.0	R		8	7		?	280	MEI01
1961 11 08.42		5.5		5.0	R		8					SCH10
1961 11 10.48		5 :		15.2	L		53					RIP01
1961 11 11.39		5.0	SP	5.0	B		7	25	2/	?	275	MEI01
1961 11 11.4		5 :		2.4	B		6	&30				LUF
1961 11 11.40	O	5.0		5.0	B		7					PRI01
1961 11 11.42		4.8:		5.0	R		8					SCH10
1961 11 11.46		5.5	SP	0.0	E		1					CHA
1961 11 11.46	O	5.7	SP	5.0	B		7	&17.5				CHA
1961 11 11.48		5 :		15.2	L		53					RIP01
1961 11 11.50		4.5		0.0	E		1					ANT02
1961 11 12.43		4.5:		0.0	E		1					DEL

Comet Seki-Lines 1962 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1962 02 10.18				15.2	L		21	6		0.25		MIL
1962 02 10.18	O	6.5		5.0	B		7					MIL
1962 02 24.08		5.5		3.0	B		6					MIL

Comet Seki-Lines 1962 III [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1962 02 26.19		5.5	SP	7.0	B		12			&1.33	62	MCC02
1962 03 03.1		5 :		20.3	L		42			0.75		MIL
1962 03 05.08		5 :		15.2						1		MIL
1962 03 06.08		5 :		15.2						1		MIL
1962 03 10.15		4.3		15.2	L		48	7				ANT02
1962 03 12.1		4.7	UX	5.0	R		8					MIL
1962 03 12.14		5.3		15.2	L		48	8		0.75		ANT02
1962 03 13.14		5.5		15.2	L		48					ANT02
1962 03 19.00	O	5.4:	UX	15.2	L		55					SCH10
1962 03 22.08		3.2:		15.2	L		37	& 4				SOL
1962 04 06.0		2.5		3.0	B		6					SHA05
1962 04 07.04		4.5	UX	5.0	R		8			&1		MEI01
1962 04 07.06		4.6	UX	5.0	B		10			&7.5		MEI01
1962 04 07.09		2.0:	UX	15.2	L		70	5		8		SOL
1962 04 08.0		3.5		3.0	B		6					SHA05
1962 04 08.04		4.6	SP	5.0	B		10			&5.5		MEI01
1962 04 08.07		2.5		0.0	E		1			13		MIL
1962 04 08.11		2.3:		15.2	L		70	& 4.5		&5		SOL
1962 04 08.15		2.5:	US	5.0	B		7			15		HAN03
1962 04 08.16		2 :		0.0	E		1			12		ANT02
1962 04 08.2		0.5		0.0	E		1			12		WYB
1962 04 08.76		3.5		0.0	E		1					JAG
1962 04 08.77		3.0	UX	10.2	R			5		4		BAR05
1962 04 09.08		3 :		0.0	E		1			10		MIL
1962 04 09.17	N	2.5	UX	0.0	E		1			9		ROB04
1962 04 09.18		1.0		0.0	E		1			11		WYB
1962 04 09.2		2.8:	US	5.0	B		7			11		HAN03
1962 04 10.04		3.0:	UX	6.1	R	15	40			11		BUD01
1962 04 10.05		3.8	Y	0.0	E		1			&7.5		MEI01
1962 04 10.05		3.9	UX	0.0	E		1			&7.5		MEI01
1962 04 10.05		4.7	SP	5.0	R		8			&5.5		MEI01
1962 04 10.12		3.5:	UX	15.2	L		70	4		&9		SOL
1962 04 10.16		3.8:		15.2	L		48			15		ANT02
1962 04 10.19		1.0		0.0	E		1			10		WYB
1962 04 11.0	N	3.5:		4.0	B		12	15		2.5		ORA
1962 04 11.01	O	3.0	UX	15.2	L					3		SCH10
1962 04 11.04		2.2:		5.0	B		7			12		LEV01
1962 04 11.04	!	2.5	UX	0.0	E		1			1.5		DEL
1962 04 11.05		3.5:		0.0	E		1			14		BUD01
1962 04 11.11		3.4:		15.2	L		70	4		&9		SOL
1962 04 11.16		4 :		15.2	L		48			11		ANT02
1962 04 11.17	N	4 :	UX	12.7			20					ROB04
1962 04 12.08		4.0:	UX	15.2	L		53			&0.93		RIP01
1962 04 12.11	O	3.2:		15.2	L		70	4		&9		SOL
1962 04 12.18		4.2:		15.2	L		48					ANT02
1962 04 13.12		3.5:	UX	15.2	L		70	3		&8		SOL
1962 04 14.0		3.4		10.8	L		40	3		0.08	308	NOR
1962 04 14.1		2.8	UX									MON01
1962 04 14.12		2.9:	UX	15.2	L		70	3.5		&5		SOL
1962 04 15.0		2.5		4.0	B		12	10		&2		ORA
1962 04 15.0		3.7		10.8	L		40	6		0.9	288	NOR
1962 04 15.00		3 :		7.6	L			14		3	70	PAZ
1962 04 15.02		3.2		6.1	R					3		KOC02
1962 04 15.02	O	3.5	UX	15.2	L					1.5		SCH10
1962 04 15.04		2.9		3.5	B		7					AHE
1962 04 15.08		3 :	UX	5.0	R		8			2.5		MIL
1962 04 15.1		3.2										MON01
1962 04 15.10		4 :		15.2	L		53					RIP01
1962 04 15.19		2.5	UX	0.0	E		1					ROB04

Comet Seki-Lines 1962 III [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1962 04 15.19	O	3.5	UX	6.1	R	15	36			1		ROB04
1962 04 16.08	P	3.0		1.3	A	3						WIL08
1962 04 16.09		4.5:		15.2	L		53			&0.5		RIP01
1962 04 16.17		3 :	UX	0.0	E		1					ROB04
1962 04 16.17	O	4 :	UX	6.1	R	15	36			&1.5		ROB04
1962 04 17.0		3.7		3.0	B		6					SHA05
1962 04 17.0		4.0		10.8	L		40	5		0.5	288	NOR
1962 04 17.01	O	3.5	Y	5.0	B		7			&3		PEA02
1962 04 17.02		4.3		6.1	R					2		KOC02
1962 04 17.02	O	4.8	UX	15.2	L					1		SCH10
1962 04 17.06		4.6		5.1	R							THR
1962 04 17.07		5 :		15.2	L		94	& 3		&0.3	60	HAA
1962 04 17.08		3.5		5.0	R		8					MIL
1962 04 17.08		3.7	UX	5.0	B		7			&3		MEI01
1962 04 17.12		4.0:	UX	15.2	L		70	& 3		&2		SOL
1962 04 18.0		3.6		5.0	B		7					SHA05
1962 04 18.0		5.4		10.8	L		40	4		0.4	275	NOR
1962 04 18.02		3.5:		4.0	B		12					ORA
1962 04 18.02	O	4.0	Y	5.0	B		7			4		PEA02
1962 04 18.02	O	5.3	UX	15.2	L					0.67		SCH10
1962 04 18.07		5.5:		15.2	L		94	& 4.5		&0.2	50	HAA
1962 04 18.1		4.2		15.2	L		50					MON01
1962 04 18.2		4.4:	US	5.0	B		7					HAN03
1962 04 19.02	O	5.0	Y	5.0	B		7			1		PEA02
1962 04 19.04		3.5:		7.6	L			10		3		PAZ
1962 04 19.12				4.5	R		5			&4.5		JOH02
1962 04 19.2		4.7:	US	5.0	B		7			&3		HAN03
1962 04 20.0		4.5:		4.0	B		12			2		ORA
1962 04 20.0	O	5.6	Y	5.0	B		7			1		PEA02
1962 04 20.02	O	5.5	UX	15.2	L					0.5		SCH10
1962 04 20.04		4 :	UX	3.5	B		7	10		2	80	PAZ
1962 04 20.04	I	5 :		5.0	B		7					RIZ
1962 04 20.04	O	5.7:	Y	5.0	B		7			?		PEA02
1962 04 20.09		5.5:		15.2	L		53			&0.5		RIP01
1962 04 20.18		4.5		15.2	L		48					ANT02
1962 04 20.81		5.7		10.2	R			2				BAR05
1962 04 21.08		5 :		5.0	R		8					MIL
1962 04 21.09		5.6:		15.2	L		53			&0.47		RIP01
1962 04 21.17		5.3		15.2	L		48	0.75				ANT02
1962 04 21.78		5.5		10.2	R			2				BAR05
1962 04 22.0		5.0		4.0	B		12			&2		ORA
1962 04 22.02		5.4		6.1	R					1		KOC02
1962 04 22.02	O	5.5	UX	15.2	L							SCH10
1962 04 22.04	I	5 :		5.0	B		7					RIZ
1962 04 22.06		4.5		5.0	R		8			&2.5		MEI01
1962 04 22.07		4.2:		5.0	B		7			7		LEV01
1962 04 22.17		6.0		15.2	L		48	3				ANT02
1962 04 22.18		5.5	UX	10.2	R		97	0.17		0.5	85	WYB
1962 04 22.18	O	5.5	UX	5.0	B		7			0.75		ROB04
1962 04 22.78	W	5.6		20.3	R			1.4				BAR05
1962 04 23.0		5.0:		4.0	B		12					ORA
1962 04 23.02	O	5.6	UX	15.2	L							SCH10
1962 04 23.04	I	5 :		5.0	B		7					RIZ
1962 04 23.15				4.5	R		5			&4		JOH02
1962 04 23.18		5.5		5.0	B		7			0.25		ROB04
1962 04 23.79	W	5.7		20.3	R			2.0				BAR05
1962 04 24.0		4.5:		4.0	B		12			&2		ORA
1962 04 24.02	O	5.7	UX	15.2	L					1.5		SCH10
1962 04 24.04	I	5.5:		5.0	B		7					RIZ

Comet Seki-Lines 1962 III [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1962 04 24.06		5.8	SP	5.0	R		8			&1		MEI01
1962 04 24.10		6.5:		15.2	L		53			0.43		RIP01
1962 04 24.10	P	5.2		1.3	A	3						WIL08
1962 04 25.0		4.8:		4.0	B		12			&2		ORA
1962 04 25.02	O	5.8	UX	15.2	L							SCH10
1962 04 25.1		4.3	UX	15.2	L		50					MON01
1962 04 25.10		6.8:		15.2	L		53			&0.4		RIP01
1962 04 25.17		6.1		15.2	L		48	3.5				ANT02
1962 04 25.19	O	5.7	SP	5.0	B		7			0.17		ROB04
1962 04 25.82		6.0		10.2	R							BAR05
1962 04 26.02	O	5.8	UX	15.2	L							SCH10
1962 04 26.10		6.9:		15.2	L		53			&0.29		RIP01
1962 04 26.14		5.0	SP	15.2	L		70	3		&0.6		SOL
1962 04 26.19		6.0	SP	5.0	B		7			<0.17		ROB04
1962 04 26.80		6.3		10.2	R							BAR05
1962 04 27.10		7.0:		15.2	L		53					RIP01
1962 04 28.10		7.2:		15.2	L		53					RIP01
1962 04 28.81		7.0		10.2	R							SAR
1962 04 28.81	W	6.8		20.3	R			3.0				BAR05
1962 04 29.17		6.0:	SP	12.7			20	4				ROB04
1962 04 29.81	W	6.8		20.3	R			2.5				BAR05
1962 04 29.82		7.1		10.2	R							SAR
1962 04 30.20		7 :	SP	12.7			20	3				ROB04
1962 05 01.80	W	7.2		20.3	R			3.0				BAR05
1962 05 01.81		6.8		10.2	R							BAR05
1962 05 02.13				15.2	L		70	& 3.5		&0.33		SOL
1962 05 02.80		7.2		10.2	R			2				BAR05
1962 05 05.10		7.2		5.0	B		7					WIL08
1962 05 06.	W	8.0		20.3	R			1.8				BAR05
1962 05 06.10		7 :		3.0	B		6			1		MIL
1962 05 06.18		7 :		12.7			20					ROB04
1962 05 08.06		7 :	UM	20.3	L	6	36			&0.07		DEL
1962 05 12.06		8.5:	UM	20.3	L	6	36			&0.07		DEL

Comet Humason 1962 VIII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1961 12 26.08		11.2:		40.6	L	6	65					SMI02
1962 01 04.06		11.5:		40.6	L	6	213					SMI02
1962 07 01.48		9.2		15.2	L		48	2.5				ANT02
1962 07 02.48		8.9		15.2	L		48	4		?	320	ANT02
1962 07 09.45		8.7		15.2	L		48				51	ANT02
1962 07 27.40		6.8	UX	3.0	B		6					MIL
1962 07 29.20	O	7.5		5.0	B		7	20				CON
1962 07 29.24		6.6:	S	20.3	L		32	25	8	&1	305	MEI01
1962 07 29.24		6.8	BD	20.3	L		32	25		&1	305	MEI01
1962 08 02.24		7.9	BD	20.3	L		32				270	MEI01
1962 08 02.27		7.2	SP	5.1	R		8	45				MEI01
1962 08 02.28		7.4:	S	5.0	B		8	&45				MEI01
1962 08 07.28		6.8		15.2	L		153	&22.5				RIP01
1962 08 10.3		7 :		15.2	L		153					RIP01
1962 08 11.35		7.7		15.2	L		48					ANT02
1962 08 19.08	O	6.3		5.0	B		7	15		?		CON
1962 08 20.10	O	6.3		5.0	B		7	15		0.5		CON
1962 08 21.12	O	6.4		5.0	B		7	15		0.5		CON
1962 08 23.11	O	5.5	UX	5.6	B		7	20	6	1	25	BOR
1962 08 23.15	O	6.0		5.0	B		7	15		2		CON
1962 08 23.25		4.9	UX	0.0	E		1					MIL
1962 08 24.17	O	6.3		5.0	B		7	15		1.5		CON

Comet Humason 1962 VIII [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1962 08 24.29		5.3	UX	0.0	E		1					MIL
1962 08 24.29	N	9 :		20.3	L		45			1	15	MIL
1962 08 25.14	O	6.3		5.0	B		7	15		2		CON
1962 08 26.13		7.5:		15.2	L		51					RIP01
1962 08 26.15	O	6.0		5.0	B		7	15		2		CON
1962 08 27.16		7.0:		15.2	L		53			&0.5		RIP01
1962 08 27.38		5.8	Y	3.0	B		8					SOL
1962 08 27.4				12.0	R		20			2.5		SOL
1962 08 28.15		6.8:		15.2	L		51			&0.67		RIP01
1962 08 28.15	O	6.0		5.0	B		7	15		2		CON
1962 08 29.15	O	6.0		5.0	B		7	15		2		CON
1962 08 30.15	O	6.2		5.0	B		7	15		1.5		CON
1962 08 31.14	O	6.2		5.0	B		7	15				CON
1962 09 01.09	O	6.2		5.0	B		7	15		1.5		CON
1962 09 03.14	O	6.6		5.0	B		7	15		2		CON
1962 09 03.25		8.2	S	15.2	L		70	& 3.5				SOL
1962 09 05.12		7 :		15.2	L		51					RIP01
1962 09 07.08	O	6.8		5.0	B		7	12				CON
1962 09 18.06	O	7.3		5.0	B		7	10		2.5		CON
1962 09 19.06	O	7.0		5.0	B		7	10		2		CON
1962 09 21.06	O	6.7		5.0	B		7	10		2		CON
1962 09 22.08	O	7.2		5.0	B		7	10		1.5		CON
1962 09 24.16	O	7.3		5.0	B		7	12		1.5		CON
1962 09 30.16	O	7.3		5.0	B		7	10		0.5		CON
1962 10 01.12	O	7.2		5.0	B		7	8		1		CON
1962 10 15.00	O	7.2:		5.0	B		7	8				CON
1962 10 18.04	O	7.2		5.0	B		7	8		0.5		CON

Comet Ikeya 1963 I

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1963 01 27.44		7.5		3.0	B		6					MIL
1963 02 17.06		3.3	SP	0.0	E		1					MAR09
1963 02 18.06		3.4	SP	0.0	E		1					MAR09
1963 02 19.09	O	4.2	UX	3.0	B		8					SOL
1963 02 20.09	O	3.7	UX	3.0	B		8	10				SOL
1963 02 21.08		3.9		3.0	B		8	15				SOL
1963 02 21.98		4.0		5.0	R		8					SCH10
1963 02 22.12		4.4		15.2	L		10	15				ANT02
1963 02 23.01		4.5	UX	5.0	R		8					MEI01
1963 02 23.98		4.0		5.0	R		8					SCH10
1963 02 24.11		3.6	UX	3.0	B		8	15		3		SOL
1963 02 25.09		3.6	UX	3.0	B		8	15		4		SOL
1963 02 26.10		3.6	UX	3.0	B		8	12		7		SOL
1963 02 26.75		4.0:	UX	5.0	B		10					MON01
1963 02 26.98		3.7		5.0	R		8					SCH10
1963 02 27.08		3.5	SP	0.0	E		1					MIL
1963 02 27.98		3.8		5.0	R		8					SCH10
1963 02 28.98		4.1		5.0	R		8					SCH10
1963 03 02.19		4.6		15.2	L		10	14				ANT02
1963 03 02.33		4.4	UX	0.0	E		1					MIL
1963 03 04.00		4.0:		5.0	B		7					RIZ
1963 03 04.00		4.2		5.0	R		8					SCH10
1963 03 04.02		4.0	SP	5.0	R		8			8		MEI01
1963 03 07.00		4.4		5.0	R		8					SCH10
1963 03 08.00		4.0:		5.0	B		7					RIZ
1963 03 09.01		4.4		5.0	R		8					SCH10
1963 03 11.00		4.5		3.5	B		7	10				PAZ
1963 03 11.01		4.1		5.0	B		7					AHE

Comet Ikeya 1963 I [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1963 03 11.01		4.5		5.0	R		8					SCH10
1963 03 11.02		4.5	UX	5.0	R		8		8			MEI01
1963 03 12.10		4.2	UX	3.0	B		8			4		SOL
1963 03 13.02		4.8	UX	5.0	R		8	& 3				MEI01
1963 03 13.09		4.4	UX	3.0	B		8	4		4.5		SOL
1963 03 13.15		4.5		15.2	L		10	8				ANT02
1963 03 13.33		4.4		0.0	E		1					MIL
1963 03 14.11		4.6	UX	3.0	B		8	3		5.5		SOL
1963 03 14.75		4.5:	UX	5.0	B		10					MON01
1963 03 15.00		4.5		5.0	B		8	15		0.25		PAZ
1963 03 15.01		4.3		5.0	R		8					SCH10
1963 03 15.11		4.7	UX	3.0	B		8			4.5		SOL
1963 03 16.01		4.3		5.0	R		8					SCH10
1963 03 18.04		4.4	UX	5.0	R		8					MEI01
1963 03 19.01		4.5		5.0	R		8					SCH10
1963 03 20.01		4.6		5.0	R		8					SCH10
1963 03 20.10		4.5	UX	3.0	B		8			6		SOL
1963 03 21.33		4.4	UX									MIL
1963 03 23.75		5.0:	UX	5.0	B		10					MON01
1963 06 20.31		8.5		5.0	R		8					MIL
1963 06 23.39		8.8:	S	15.2	L		70	& 4				SOL

Comet Alcock 1963 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1963 03 21.48		7.2:		12.7	L		20	9				ROB04
1963 03 23.40		8.7:	UX	5.0	R		8	8				MIL
1963 03 23.48		8 :		12.7	L		20					ROB04
1963 03 24.34		8.9	UX	20.3			40	5				MEI01
1963 03 29.41		8.2	S	20.3			40	& 3		?	225	MEI01
1963 04 05.5		7.8:		40.6	C					0.04		CAP
1963 04 06.24		8.3:	S	25.4	L		50					CHA
1963 04 21.19		8.0		15.2	L		53	&12.5				RIP01
1963 05 07.12		7.3		15.2	L		53					RIP01
1963 05 15.5		7 :		40.6	C					&1		CAP
1963 05 16.15		6.4		15.2	L		53					RIP01
1963 05 18.17		6.2		15.2	L		53	13				RIP01
1963 05 18.5		6.4:		0.0	E		1					CAP
1963 05 19.13		7.6		5.0	B		20					LOO02
1963 05 19.16		6.2		15.2	L		53	&11				RIP01
1963 05 20.16		7.8		5.0	B		20					LOO02
1963 05 23.14		7.8		5.0	B		20					LOO02
1963 05 24.12		7.9		5.0	B		20					LOO02
1963 05 25.09		7.5		5.0	B		20					LOO02
1963 05 26.10		7.8		5.0	B		20					LOO02
1963 05 29.08		6.8		5.0	B		20					LOO02
1963 06 01.10		6.9		5.0	B		20					LOO02
1963 06 01.21	O	4.2	Y	3.0	B		6	& 9				WES05
1963 06 02.09		6.6		5.0	B		20					LOO02
1963 06 02.21	O	5.5:	Y	3.0	B		6	&14				WES05
1963 06 11.18		6.5	SP	5.0	R		8			0.5		MIL
1963 06 12.09		7.2	AC	5.1	R							NOR
1963 06 14.11		7.3	AC	5.1	R							NOR
1963 06 14.16		5.7	Y	3.0	B		8	7				SOL
1963 06 16.28		5.8	Y	3.0	B		8					SOL
1963 06 17.13		6.2	Y	12.0	R		20	4		2		SOL
1963 06 18.07		7.7	AC	20.3	L		50					NOR
1963 06 21.17		6.1	S	3.0	B		8					SOL

Comet Pereyra 1963 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1963 09 20.46		6.5		3.0	B		6			&8		MIL
1963 09 20.51		5.8								15.5		CAP
1963 09 21.51	P	6 :								18		CAP
1963 09 22.51	P	6 :								18		CAP
1963 09 24.41		7.2									230	MEI01
1963 09 24.48	O	6.0	HD		B			15		&7.5		DEV
1963 10 01.87		8 :		7.6	R			10				BOE

Comet Tomita-Gerber-Honda 1964 VI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1964 06 14.4		5.5		6.0	B		10					MCC02
1964 06 14.44	O	5.4	SP	3.5	B		7					MIL
1964 06 16.46	O	5.3	SP	3.5	B		7					MIL
1964 06 18.46	O	4.8	SP	3.5	B		7			0.75		MIL
1964 07 01.12		4.5		3.0	B		6			2		MCC03
1964 07 04.17		4.9		3.5	B		7					MIL
1964 07 05.13		5.4	UX	5.0	R		8	< 5		&0.25		MEI01
1964 07 07.12		4.7	UX	5.0	B		10			1.5		MEI01
1964 07 13.20	O	6.0:	UX	12.7	R		24	2		0.08		ROB04
1964 07 19.21		7 :		12.7	R		24					MCC03

Comet Ikeya 1964 VIII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1964 07 12.46		7.8	UX	17.8	R	7	40					MIL
1964 07 16.47		7.3	UX	17.8	R	7	40					MIL
1964 07 19.		4.0		0.0	E		1					YOU
1964 07 27.46		5.5		3.5	B		7			&2		MIL
1964 08 02.43	O	4.4	SP	3.0	B		8	&10				SOL
1964 08 04.4		4.3	SP	3.0	B		8	&20				SOL
1964 09 01.06	O	6.2		5.0	B		7					CON

Comet Everhart 1964 IX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1964 08 07.1		9 :		12.7	R	8	40					EVE
1964 08 09.1		7.4		12.7	R	5	20	30				HOU
1964 08 09.10	O	8.5	UM	12.7	R	5	20	12	2/			BOR
1964 08 28.04	O	7.7	AC	15.2	L	8	50	> 7	4			BOR
1964 09 02.03	O	8.3	AC	15.2	L	8	50	& 5	2/			BOR
1964 09 02.17		8.5:		3.5	B		7					MIL
1964 09 03.07	O	8.3	AC	15.2	L	8	50	5	2/			BOR
1964 09 06.06		[12.8		15.2	L	8	50					BOR
1964 09 08.02		[11		15.2	L	8	50					BOR
1964 10 01.52		9.5		6.0	B		20	&25				BOE
1964 10 02.48		9.5		6.0	B		20	&25				BOE
1964 10 03.49		9.5		6.0	B		20	&25				BOE
1964 10 04.07		9.5	UM	31.8	L	8	96	8	4			DEL
1964 10 11.04		10.5	UM	31.8	L	8	96					DEL
1964 10 12.00		10.5	UM	31.8	L	8	96	& 1.5	4			DEL
1964 10 13.00		10.5		31.8	L	8	96	2.5				DEL
1964 11 08.02		12.8:		30.5		10						EVE

Comet Bradfield 1979 X

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 02 03.10	S	5.4	Y	8.0	B		20					GRE

Comet Meier 1980 XII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 04.38	B	10.5	NP	15	L	6	28	3				KAN
1980 12 13.38	B	10.0	S	15	L	6	50					KAN
1980 12 26.86	B	10.0	S	15	L	6	50	& 3				KAN
1980 12 27.85	B	10.0	S	15	L	6	28	& 2				KAN
1980 12 29.87	B	10.0	S	10	L	10	56	2.5				ICH
1980 12 30.84	B	10.0	AC	15	L	6	50	2				KAN
1980 12 30.86	B	10.0	S	10	L	10	56	3				ICH
1980 12 31.84	B	10.0	AC	15	L	6	50					KAN
1981 01 01.85	B	9.8	S	10	L	10	63	2.5				ICH
1981 01 02.85	B	10.2	AC	10	L	10	56					ICH
1981 01 02.85	B	10.3	AC	15	L	6	50	2.5				KAN
1981 01 03.84	B	10.4	AC	15	L	6	50					KAN
1981 01 03.85	B	10.1	AC	10	L	10	56	3				ICH
1981 01 04.84	B	9.9	AC	15	L	6	28	3				KAN
1981 01 06.85	B	9.7	AC	15	L	6	28	4				KAN
1981 01 07.82	B	10.0	AC	15	L	6	28	3				KAN
1981 01 07.84	S	9.6	AC	15	L	6	75	2.5	3			NAK01
1981 01 07.84	S	9.8	AC	15	L	6	75	1.5	4			TAN01
1981 01 08.83	B	10.0	AC	15	L	6	28	4				KAN
1981 01 08.83	S	9.5	AC	15	L	6	75	2.5	3			NAK01
1981 01 08.85	S	10.1	AC	15	L	6	75	1.5	4			TAN01
1981 01 09.85	B	10.1	AC	15	L	6	28	4				KAN
1981 01 11.82	S	9.6	AC	15	L	6	28	4				KAN
1981 01 11.82	S	9.6	AC	15	L	6	75	2.5	3			NAK01
1981 01 13.83	B	10.1	AC	15	L	6	28	4				KAN
1981 01 13.84	S	9.5	AC	15	L	6	75	3.5	3			NAK01
1981 01 13.84	S	9.7	AC	15	L	6	75	2	2			TAN01
1981 01 14.83	B	10.0	AC	15	L	6	28	5				KAN
1981 01 16.82	S	9.4	AC	15	L	6	75	3	2			NAK01
1981 01 16.82	S	9.9	AC	15	L	6	75	2	2			TAN01
1981 01 16.84	B	9.9	AC	15	L	6	28	5				KAN
1981 01 17.86	S	9.5	AC	15	L	6	28	5				KAN
1981 01 22.81	S	9.8	AC	15	L	6	50	3.5	3			NAK01
1981 01 22.83	B	10.2	AC	15	L	6	50	3.5				ICH
1981 01 22.86	S	9.6	AC	15	L	6	28	3				KAN
1981 01 26.80	S	9.5	AC	15	L	6	50	4	2			NAK01
1981 01 26.84	B	10.2	AC	15	L	6	50	4.5				ICH
1981 01 28.84	S	9.5	AC	15	L	6	28	5				KAN
1981 01 29.82	S	9.5	AC	15	L	6	50	4.5	3			NAK01
1981 01 29.82	S	9.8	AC	15	L	6	50	3	2			TAN01
1981 01 29.85	B	9.9	AC	15	L	6	50	6				ICH
1981 02 01.82	S	9.6	AC	15	L	6	28	5				KAN
1981 02 01.83	B	9.8	AC	20	L	6	38	6	4			ISH02
1981 02 03.82	S	9.4	AC	15	L	6	28	8				KAN
1981 02 03.83	B	9.8	AC	20	L	6	38	6	2			ISH02
1981 02 04.80	S	10.1	AC	15	L	6	50	3	2			TAN01
1981 02 04.81	S	9.6	AC	15	L	6	50	3	3/			NAK01
1981 02 04.83	B	9.8	AC	20	L	6	38	4	2			ISH02
1981 02 04.83	B	10.0	AC	15	L	6	50	5.5				ICH
1981 02 05.83	S	9.6	AC	20	L	6	38	5	2			ISH02
1981 02 07.79	S	9.5	AC	15	L	6	50	4	3			NAK01
1981 02 07.80	B	9.8	S	8.0	B		15	3				ICH
1981 02 07.84	B	10.2	NP	16	L	6	31	4.0	2			MIT
1981 02 11.79	S	9.6	AC	15	L	6	28	5				KAN
1981 02 11.80	S	9.7	AC	15	L	6	50	3.5	2			NAK01
1981 02 12.82	S	9.7	AC	20	L	6	38	4	3			ISH02
1981 02 21.85	S	9.8	AC	15	L	6	28	3				KAN
1981 02 24.83	S	9.8	AC	15	L	6	28	3				KAN
1981 02 27.76	S	9.9	AC	15	L	6	50	3.5	2			NAK01

Comet Meier 1980 XII [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 02 27.84	S	9.8	AC	15	L	6	28	6				KAN
1981 03 02.80	S	9.9	AC	15	L	6	50	5	1			NAK01
1981 03 02.83	B	10.5	AC	15	L	6	50	5				ICH
1981 03 02.85	S	9.8	AC	15	L	6	28	3				KAN
1981 03 04.84	S	9.8	AC	15	L	6	28	6				KAN
1981 03 05.78	S	9.9	AC	15	L	6	28	5				KAN
1981 03 05.81	S	9.8	AC	15	L	6	50	4.5	2			NAK01
1981 03 05.83	B	10.6	AC	15	L	6	50	5.5				ICH
1981 03 06.80	S	9.9	AC	15	L	6	28	7				KAN
1981 03 07.72	S	10.0	AC	20	L	6	38	6	2			ISH02
1981 03 07.78	S	9.9	AC	15	L	6	28	6				KAN
1981 03 07.83	B	10.5	AC	10	L	10	56	3	5			ICH
1981 03 12.83	S	10.1	AC	15	L	6	28	6				KAN
1981 03 15.74	B	10.4	AC	15	L	6	50	6	5			ICH
1981 03 15.74	S	10.2	AC	15	L	6	50	4.5	1/			NAK01
1981 03 31.81	B	10.6	AC	15	L	6	50	4	2			ICH
1981 04 02.67	S	10.5	AC	15	L	6	50	4	2			NAK01
1981 04 02.68	S	10.5	AC	15	L	6	28	& 4				KAN
1981 04 06.60	S	11.5	AC	15	L	6	50	3				KAN
1981 04 07.64	S	11.4	AC	15	L	6	50	& 5				KAN

Comet Panther 1981 II

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 30.86	B	8.9	S	15	L	6	28	3				KAN
1980 12 31.85	B	9.1	S	15	L	6	28	2				KAN
1980 12 31.86	B	8.9	S	10	L	10	56	3				ICH
1981 01 01.39	B	9.2	S	10	L	10	40	3				ICH
1981 01 02.37	B	9.3	S	20	L	6	61	4	5			ISH02
1981 01 02.86	B	9.1	S	15	L	6	28	2				KAN
1981 01 02.86	B	9.2	S	10	L	10	56	3				ICH
1981 01 03.39	B	9.0	S	10	L	10	25					ICH
1981 01 03.86	B	9.0	S	15	L	6	28	2.5				KAN
1981 01 04.86	B	9.0	S	15	L	6	28	2.5				KAN
1981 01 05.86	B	9.0	S	15	L	6	28	3				KAN
1981 01 06.85	B	9.5	AC	16	L	6	31	4.2	5			MIT
1981 01 06.86	B	8.9	S	15	L	6	28	3				KAN
1981 01 07.81	S	9.3	AC	15	L	6	75	1.5	3			TAN01
1981 01 07.82	S	9.2	AC	15	L	6	75	2.5	4			NAK01
1981 01 07.86	B	9.1	S	15	L	6	28					KAN
1981 01 08.80	S	9.4	AC	15	L	6	75	2.5	3			TAN01
1981 01 08.82	S	9.2	AC	15	L	6	75	2	5			NAK01
1981 01 08.86	B	9.3	S	15	L	6	28	2.5				KAN
1981 01 09.86	B	9.3	S	15	L	6	28					KAN
1981 01 10.84	B	9.5	S	20	L	6	61	4	4			ISH02
1981 01 10.85	B	9.3	S	15	L	6	28	2				KAN
1981 01 11.79	S	8.9	AC	15	L	6	75	2	5			NAK01
1981 01 12.85	B	9.0	S	20	L	6	38	4	5			ISH02
1981 01 13.78	S	9.3	AC	15	L	6	75	2.5	3			TAN01
1981 01 13.80	S	8.9	AC	15	L	6	75	3	5			NAK01
1981 01 13.84	S	9.0	S	20	L	6	38	5	5			ISH02
1981 01 13.85	B	9.3	S	15	L	6	28	3				KAN
1981 01 14.85	B	9.1	S	15	L	6	28	2.5				KAN
1981 01 14.86	B	9.1	S	20	L	6	38	4	6			ISH02
1981 01 16.79	S	9.0	AC	15	L	6	75	2	3			TAN01
1981 01 16.80	S	8.8	AC	15	L	6	75	3	5			NAK01
1981 01 16.84	B	8.9	S	20	L	6	38	6	6	0.17		ISH02
1981 01 16.86	B	9.0	S	15	L	6	28	3				KAN
1981 01 17.84	B	8.9	S	15	L	6	28	& 3				KAN

Comet Panther 1981 II [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 01 18.86	B	8.8	S	15	L	6	28	3				KAN
1981 01 20.87	S	9.0	S	15	L	6	50	2				KAN
1981 01 21.86	B	8.9	S	15	L	6	28	2.5				KAN
1981 01 22.78	S	8.8	AC	15	L	6	50	3	5			NAK01
1981 01 22.84	B	9.0	S	15	L	6	50	3				ICH
1981 01 22.84	B	9.0	S	20	L	6	61	4	4			ISH02
1981 01 23.84	B	9.0	S	20	L	6	38	4	5			ISH02
1981 01 24.86	B	9.0	S	15	L	6	28	3				KAN
1981 01 26.78	S	8.5	AC	15	L	6	50	4	5			NAK01
1981 01 26.84	B	8.8	AC	15	L	6	50	5				ICH
1981 01 27.79	S	8.8	AC	15	L	6	50	4	3			TAN01
1981 01 27.80	S	8.7	AC	15	L	6	50	3.5	5			NAK01
1981 01 27.84	S	8.8	AC	15	L	6	28	3				KAN
1981 01 29.78	S	8.9	AC	15	L	6	50	4	3	0.08		TAN01
1981 01 29.79	S	8.4	AC	15	L	6	50	4	5	0.07	330	NAK01
1981 01 29.81	B	8.7	AC	15	L	6	50	5				ICH
1981 01 29.84	B	8.8	S	20	L	6	38	5.5	6			ISH02
1981 01 29.86	B	8.8	AC	15	L	6	28					KAN
1981 01 30.82	B	8.5	AC	16	L	6	31	3.4	4/			MIT
1981 01 30.84	B	8.9	S	8.0	B		15					KAN
1981 02 01.85	B	8.8	S	15	L	6	28	5				KAN
1981 02 01.85	B	8.8	S	20	L	6	38	4	6	0.17		ISH02
1981 02 03.80	B	9.0	S	15	L	6	28	3				KAN
1981 02 03.86	S	8.8	S	20	L	6	38	5	6	0.25		ISH02
1981 02 04.78	S	8.7	AC	15	L	6	50	4	4			TAN01
1981 02 04.79	S	8.6	AC	15	L	6	50	4	5	0.08	350	NAK01
1981 02 04.84	B	8.8	S	15	L	6	50	5		0.2		ICH
1981 02 04.85	B	8.7	S	20	L	6	38	5	6	0.25		ISH02
1981 02 05.83	S	9.0	S	15	L	6	28	3				KAN
1981 02 06.84	B	8.7	S	20	L	6	38	4	7			ISH02
1981 02 07.77	S	8.6	AC	15	L	6	50	3.5	5			NAK01
1981 02 07.81	B	8.7	S	8.0	B		15					ICH
1981 02 07.83	B	8.8	NP	16	L	6	31	4.5	5			MIT
1981 02 11.67	B	8.8	S	16	L	6	31	3.9	4			MIT
1981 02 11.78	S	8.6	AC	15	L	6	50	4	5			NAK01
1981 02 11.83	B	8.7	S	15	L	6	28	4		0.08		KAN
1981 02 12.84	B	8.7	S	15	L	6	28	4				KAN
1981 02 17.84	S	8.7	S	15	L	6	28	3				KAN
1981 02 19.85	S	8.6	S	15	L	6	28	2				KAN
1981 02 20.86	S	8.9	NP	15	L	6	28	2				KAN
1981 02 21.82	B	9.2	S	15	L	6	28	2.5				KAN
1981 02 24.85	B	8.9	S	15	L	6	28	3				KAN
1981 02 25.84	B	9.0	S	15	L	6	28	& 4				KAN
1981 02 26.78	S	8.8	AC	15	L	6	50	3	5/		330	NAK01
1981 02 26.79	S	9.2	AC	15	L	6	50	3	4			TAN01
1981 02 26.80	B	9.1	S	15	L	6	50	2				ICH
1981 02 27.47	S	9.3	AC	15	L	6	50	3	4			TAN01
1981 02 27.48	B	9.2	S	15	L	6	50	2.5		0.13		ICH
1981 02 27.77	S	8.8	AC	15	L	6	50	3.5	4/			NAK01
1981 02 27.79	B	8.9	S	15	L	6	28	5				KAN
1981 03 02.77	S	9.0	AC	15	L	6	50	3.5	5			NAK01
1981 03 02.79	B	9.3	S	15	L	6	50	4.5				ICH
1981 03 02.82	S	9.0	NP	15	L	6	28	3				KAN
1981 03 04.77	S	9.2	NP	15	L	6	28	3.5				KAN
1981 03 05.77	S	8.7	AC	15	L	6	50	4	5	0.1	300	NAK01
1981 03 05.80	E	8.6	S	15	L	6	50	5	6	0.12		ICH
1981 03 05.83	S	9.2	NP	15	L	6	28	3				KAN
1981 03 06.84	S	9.2	NP	15	L	6	28	& 3				KAN
1981 03 07.45	S	9.0	NP	15	L	6	50	4	4			NAK01

Comet Panther 1981 II [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 0? 07.82	B	9.3	AC	10	L	10	56	2	4			ICH
1981 0 07.83	S	9.2	NP	15	L	6	28	4				KAN
1981 03 10.75	S	9.5	NP	15	L	6	50	3	3			TAN01
1981 03 10.76	S	8.7	NP	15	L	6	50	4.5	5			NAK01
1981 03 10.83	B	9.1	NP	15	L	6	28	& 4				KAN
1981 03 11.75	S	8.9	NP	15	L	6	50	4	5			NAK01
1981 03 11.81	S	9.2	NP	15	L	6	28	3.5				KAN
1981 03 12.80	B	9.2	NP	15	L	6	28	3.5				KAN
1981 03 15.66	S	9.0	NP	15	L	6	50	3.5	5/			NAK01
1981 03 15.72	B	9.5	AC	15	L	6	50	2.5	6			ICH
1981 03 16.80	B	9.4	A	15	L	6	28	4				KAN
1981 03 17.82	B	9.2	S	15	L	6	28	3.5				KAN
1981 03 22.50	B	9.4	S	15	L	6	50	& 3				KAN
1981 03 23.48	B	9.1	S	15	L	6	28	4.5				KAN
1981 03 23.67	S	9.2	AC	15	L	6	50	3	4			NAK01
1981 03 23.68	B	9.5	AC	15	L	6	50	& 3				ICH
1981 03 26.52	S	9.2	A	15	L	6	28	4				KAN
1981 03 31.71	B	9.6	AC	15	L	6	50	1.7				ICH
1981 04 02.50	S	9.7	AC	15	L	6	28	3.5				KAN
1981 04 02.60	S	9.4	AC	15	L	6	50	3	4			NAK01
1981 04 06.48	B	9.4	S	15	L	6	28	4				KAN
1981 04 07.51	S	9.5	AC	15	L	6	50	3.5	4			NAK01
1981 04 07.53	S	9.6	AC	15	L	6	50	2	3			TAN01
1981 04 07.59	B	9.3	S	15	L	6	28	4				KAN
1981 04 20.46	S	10.0	S	15	L	6	50	2				KAN
1981 04 21.47	S	9.5	AC	15	L	6	28	5				KAN
1981 04 21.47	S	9.8	AC	15	L	6	50	3	4			NAK01
1981 04 26.56	B	10.0	AC	15	L	6	50	2	6			ICH
1981 04 26.57	S	10.0	AC	15	L	6	50	2	3			TAN01
1981 04 26.57	S	10.0	AC	15	L	6	50	2.5				NAK01
1981 04 26.57	S	10.6	AC	15	L	6	28	2				KAN
1981 04 30.57	S	10.9	AC	15	L	6	28	2				KAN
1981 05 01.51	S	11.1	AC	15	L	6	50	2				KAN

Comet Bowell 1982 I

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 03 06.75	S	12.8	AC	15	L	6	100					KAN
1981 03 15.71	B	12.8	AC	15	L	6	50	0.6				ICH
1981 03 26.65	S	12.2	AC	20	R	12	96	0.7	5			NAK01
1981 03 27.66	S	12.3	AC	31	L	6	72	1				KAN
1981 03 31.69	B	12.4	AC	15	L	6	50	0.7				ICH
1981 04 02.63	S	12.6	AC	15	L	6	72	0.5				KAN
1981 04 06.64	S	12.6	AC	15	L	6	72	0.5				KAN
1981 04 07.54	S	12.2	AC	15	L	6	50	0.5				NAK01
1981 04 07.56	S	11.9	AC	15	L	6	50	0.6				TAN01
1981 04 25.64	B	12.0	AC	15	L	6	50	1.0				ICH
1982 01 30.85	S	12.5	AC	15	L	6	180	0.8				KAN
1982 02 25.82	S	12.5	AC	15	L	6	100	0.6				KAN
1982 03 31.79	S	11.9	AC	15	L	6	50	1.4	3/			NAK01
1982 05 01.70	S	11.9	AC	15	L	6	50	0.9				NAK01
1982 06 14.66	S	11.2	AC	31	L	6	98	1.3				NII
1982 06 15.73	S	11.4	AC	15	L	6	100	0.8				KAN
1982 08 20.57	S	12.0	AC	20	L	6	96	0.6	3			NAK01

Comet Shoemaker 1987 IV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 04 09.29	S	13.8	AC	154.9	L	13	654	1	3	?0.03	310	LEV

Comet Bradfield 1987 XXIX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 01 03.39	B	7.6	S	10	L	10	50	2.8	3			NAK05
1988 01 03.43	S	6.9	AA	31	L	6	62	7	5	0.25	60	KOB01
1988 01 06.40	S	6.8	AA	31	L	6	62	12	5	0.93	60	KOB01
1988 01 06.44	B	7.5	S	10	L	10	50	2.8	4			NAK05
1988 01 09.39	B	8.0	AC	10	L	10	40	3.3	3			NAK05
1988 01 11.44	S	7.4	S	31	L	6	62	11	4	1.0	70	KOB01
1988 01 12.40	S	8.5	S	10	L	10	40	2.4	4			NAK05
1988 01 13.49	S	7.4	AA	31	L	6	62	10	4	0.75	80	KOB01
1988 01 16.39	S	7.8	S	25	L	5	46	3.6	4	0.08		NAK05
1988 01 20.45	S	7.5	AA	31	L	6	62	8	4	0.42	40	KOB01
1988 01 20.47	B	8.2	AC	14	S	4	36	10	3/			OBU
1988 01 23.49	B	9.0	S	25	L	5	46	3.2	3			NAK05
1988 02 06.46	B	9.4	S	25	L	5	46	3	5			NAK05
1988 02 07.41	S	9.3	S	25	L	5	46	3.5	4			NAK05
1988 02 10.45	S	9.5	S	31	L	6	62	5	3	0.08	65	KOB01
1988 03 09.45	S	10.1	S	31	L	6	62	3	2			KOB01
1988 04 09.17	S	13.1	AC	154.9	L	13	654					LEV

Comet Levy 1987 XXX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 03 19.50	S	9.5	AC	40.6	L	5	101					LEV
1988 03 20.50	S	9.6	AC	40.6	L	5	101					LEV
1988 03 21.49	S	9.5	AC	40.6	L	5	101					LEV
1988 03 24.49	S	11.4	AC	40.6	L	5	101	1	0	0.02	240	LEV
1988 03 25.50	S	11.3	AC	40.6	L	5	101	1.5	3	0.03	240	LEV
1988 03 26.49	S	11.4	AC	40.6	L	5	101	1.5	3	0.05	240	LEV
1988 03 29.49	S	11.4	AC	40.6	L	5	101	2	2	0.05	240	LEV
1988 04 09.46	S	12.3	AC	154.9	L	13	654	2	4	0.05	220	LEV
1988 04 20.46	S	12.7	AC	40.6	L	5	101	2	2			LEV

Comet McNaught 1987 XXXII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1987 12 31.87	B	7.1	S	20	L	6	30	6	3	0.4	310	NAG04
1988 01 10.87	S	7.4	S	31	L	6	62	6	6	0.2	325	KOB01
1988 01 12.87	S	7.2	S	31	L	6	62	5	6	0.37	330	KOB01
1988 01 13.86	S	6.6	AA	7.0	B		10	3.5	6			YAS
1988 01 14.84	S	7.0	AC	25	L	5	46	4.5	7			NAK05
1988 01 16.85	S	7.1	S	25	L	5	57	3.8	8	0.12	350	NAK05
1988 01 19.85	S	6.8	AA	7.0	B		10	3.5	6	0.17	315	YAS
1988 01 19.87	S	7.4	S	31	L	6	62	5	6	0.75	320	KOB01
1988 01 23.84	S	7.6	S	25	L	5	46	3.4	6	0.08	330	NAK05
1988 01 29.86	S	7.6	S	31	L	6	62	5.7	6	0.92	320	KOB01
1988 02 10.84	S	8.7	AA	25	L	5	46	3.5	5		350	NAK05
1988 02 21.83	M	8.5	AA	31	L	5	52	5	6	0.12	310	TSU02

Comet Shoemaker-Holt 1988 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 05 19.45	S	11.9:	AC	40.6	L	5	101	2	3			LEV
1988 05 20.45	S	11.9:	AC	40.6	L	5	101	2	3			LEV

Comet Liller 1988 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 01 20.42	S	9.5	S	31	L	6	62	4	4	0.07	50	KOB01
1988 02 06.42	S	8.8	S	31	L	6	62	6	4			KOB01
1988 02 10.42	S	8.7	S	31	L	6	62	6	4	0.07	30	KOB01

Comet Liller 1988 V [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 03 04.43	S	8.2	AA	31	L	6	62	4.5	4	0.1	90	KOB01
1988 03 09.44	S	8.3	AA	31	L	6	62	4.5	5	0.08	30	KOB01
1988 04 09.44	B	7.5	AC	14	S	4	36	4	4			OBU
1988 04 15.80	S	6.0	AA	7.0	B		10	10	5	1.0	345	KOB01
1988 04 21.47	S	4.7	AC	15	L	4		4	6	3	20	LEV
1988 04 22.16	S	4.8	AC	15	L	4		4	6	2.5	20	LEV
1988 04 24.47	S	4.7	AC	0.0	E		1					LEV
1988 04 24.80	S	5.4	AA	7.0	B		10	10	5	1.5	355	KOB01
1988 05 06.47	S	6.0	AA	7.0	B		10	10	5	3.5	10	KOB01
1988 05 07.51	S	6.1	AA	7.0	B		10	7	5	2.0	20	KOB01
1988 05 08.48	B	6.5	AC	5	R		7				45	AKI01
1988 05 08.48	B	6.8	AC	14	S	4	12	6	6	0.2	15	NAK05
1988 05 12.49	S	6.3	AA	7.0	B		10	9	4	2.5	40	KOB01
1988 05 12.90	S	6.4	AA	3.0	B		9	4	7	1.5	0	LUE
1988 05 13.51	B	7.2	AC	14	S	4	12	5	5		30	NAK05
1988 05 13.61	B	6.5	AC	5.0	B		7	8	6	0.33	350	AKI01
1988 05 13.88	S	6.3	AA	3.0	B		9	4	7	1	340	LUE
1988 05 13.89	S	6.4	AA	5.0	B		7	4	5	1	340	LUE
1988 05 14.87	S	6.4	AA	3.0	B		9	4	7		340	LUE
1988 05 15.89	S	6.7	AA	4.0	B		10	2	4			LUE
1988 05 16.52	S	7.4	S	8.0	B		11	8	5			HIR01
1988 05 19.49	B	7.0	AC	8	R	8	25	6	5/	>0.17		OBU
1988 05 21.54	B	6.9	AC	10.0	B		25	7	4/	>0.5		OBU
1988 05 22.80	S	6.8	AA	3.0	B		9	3	7			LUE
1988 05 22.80	S	7.2	AA	5.0	B		10	3	7			LUE
1988 05 23.47	B	7.4	AA	8.0	B		11		6			HIR01
1988 05 23.91	S	7.0	AA	3.0	B		9	2	7			LUE
1988 05 23.93	S	7.0	AA	5.0	B		7	3	5			LUE
1988 05 23.96	S	7.2	AA	5.0	B		10	3	6			LUE
1988 05 24.52	B	7.4	AC	8	R	8	25	7	4/	0.17		OBU
1988 05 24.90	S	7.3	AA	5.0	B		10	2	5			LUE
1988 05 26.50	B	7.2	S	10	L	10	40	4.5	5			NAK05
1988 06 05.49	S	7.9	S	10	L	10	40	4	3	0.1	75	NAK05
1988 06 05.51	S	7.6	AA	12.0	B		20	6	5	0.25	80	KOB01
1988 06 06.49	S	7.7	AA	31	L	6	62	6	5	0.33	70	KOB01
1988 06 09.54	B	8.9	AC	14	S	4	33		2/			OBU
1988 06 11.50	B	7.9	AC	20	T	10	50	8	3/			OBU
1988 06 12.58	B	8.0	AC	14	S	4	33		3/			OBU
1988 06 12.90	S	8.6:	AA	7.0	B		10	3	6			LUE
1988 06 13.49	S	8.3	AA	12.5	B		25	7	4	0.42	100	KOB01
1988 06 13.90	S	8.6:	AA	7.0	B		10	3	6			LUE
1988 06 14.60	B	8.4	AC	14	S	4	33		3/			OBU
1988 06 15.54	B	8.5	AC	14	S	4	33	10	3/			OBU
1988 06 18.96	S	8.3	AA	8.0	R	8	32	2.5	5			LUE
1988 06 18.98	S	8.4	AA	7.0	B		10	3	3			LUE
1988 06 19.89	S	8.5	AA	7.0	B		10	3	3			LUE
1988 06 20.54	B	8.9	AC	14	S	4	33		2/			OBU
1988 06 21.63	B	9.3	AC	14	S	4	33		2/			OBU
1988 06 22.52	B	9.2	AC	14	S	4	33		2/			OBU
1988 07 01.49	S	9.3	S	31	L	6	62	6	3	0.1	90	KOB01
1988 07 05.52	S	9.5	S	31	L	6	62	5	3	0.07	90	KOB01
1988 07 06.52	S	9.5	S	31	L	6	62	5	2			KOB01
1988 07 11.50	S	9.7	S	31	L	6	62	4	2			KOB01
1988 07 13.49	S	9.8	S	31	L	6	62	1.5	2			KOB01

Comet Machholz 1988 XV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 08 07.49	S	8.7	AC	40.6	L	5	101	3	2	?	270	LEV

Comet Machholz 1988 XV [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 08 08.47	S	8.6	AC	40.6	L	5	101	5	3	0.25	270	LEV
1988 08 09.47	S	8.4	AC	40.6	L	5	101	6	3	0.25	270	LEV
1988 08 09.76	S	8.9	AA	31	L	6	62	7.5	3		270	KOB01
1988 08 11.47	S	8.4	AC	40.6	L	5	101	3.5	3	0.25	260	LEV
1988 08 13.78	S	8.6	AA	31	L	6	62	8.0	3		270	KOB01
1988 08 18.79	S	8.1	AA	31	L	6	62	5.0	4	0.13	270	KOB01
1988 08 19.80	S	7.9	AA	31	L	6	62	6.0	4	0.13	270	KOB01
1988 08 24.81	S	7.2	AA	31	L	6	62	5.5	4	0.13	270	KOB01
1988 08 25.80	S	6.8	AA	12.0	B		20	4.5	4	0.20	270	KOB01
1988 08 27.80	S	6.6	Y	10	L	10	50	4	7			NAK05
1988 08 30.82	S	6.5	AA	31	L	6	62	3.5	4	0.07	270	KOB01

Comet Yanaka 1988 XX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 01 14.84	S	10.9	AC	31	L	6	62	6.5	2			KOB01
1989 02 03.85	S	11.9	AC	31	L	6	62	4	1			KOB01
1989 02 04.67	S	11.5	AC	25	L	5	126	2.5	4			NAK05
1989 02 04.83	S	12.1	AC	31	L	6	62	3	1			KOB01

Comet Shoemaker 1988 XXI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 03 13.25	S	15.0	AC	154.9	L	13	654	0.3	4			LEV

Comet Yanaka 1988 XXIV

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 12 30.55	S	8.6	AC	40.6	L	5	101	2	6	0.12	290	LEV
1989 01 04.87	M	9.0	S	31	L	4	42	3	5			TSU02
1989 01 15.79	S	10.1	AA	25	L	5	46	2.5	3			NAK05

Comet Shoemaker 1989 III

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 03 13.21	S	13.6	AC	154.9	L	13	654	1	6	0.03	300	LEV

Comet Shoemaker-Holt-Rodriquez 1989 V

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 07 12.20	S	14.0:	AC	154.9	L	13	654	1	6			LEV

Comet McKenzie-Russell 1989 XVIII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 24.30	S	15.0	AC	154.9	L	13	654	1	0			LEV

Comet Okazaki-Levy-Rudenko 1989 XIX

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 25.21	S	10.5	AC	40.6	L	5	101					LEV
1989 08 26.16	S	10.5	AC	40.6	L	5	101					LEV
1989 08 27.20	S	10.4	AC	40.6	L	5	101	2.5	2			LEV
1989 09 03.48	S	10.2	AA	31	L	6	62	5	3			KOB01
1989 09 20.45	M	8.4	S	31	L	4	40	4	3			TSU02
1989 09 20.46	B	8.8	S	8	R	8	30		3/			OBU
1989 09 23.46	B	8.5	S	8	R	8	30	4	3/			OBU
1989 09 25.50	B	8.3	S	8	R	8	30		3/			OBU
1989 09 26.43	M	8.3	S	31	L	4	40	3	4			TSU02

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 30.44	B	8.5	S	8	R	8	30		4/			OBU
1989 10 01.41	S	7.6	AA	25	L	5	43	5.5	4			NAK05
1989 10 01.42	S	7.8	AA	31	L	6	62	10	4	0.13	60	KOB01
1989 10 01.45	M	8.0	S	16	W	4	49	5	4			TSU02
1989 10 02.42	S	7.7	AA	31	L	6	62	8	4			KOB01
1989 10 02.44	B	8.4	S	8	R	8	30		4/			OBU
1989 10 04.42	S	7.5	AA	31	L	6	62	8	4			KOB01
1989 10 04.44	S	8.0	S	15.0	B		25	4		0.08		TAK05
1989 10 08.40	B	7.9	S	8	R	8	30		4/			OBU
1989 10 08.43	S	7.3	AA	31	L	6	62	7	4	0.15	60	KOB01
1989 10 09.40	B	8.0	S	8	R	8	30		4/			OBU
1989 10 09.40	S	7.5	S	15.0	B		25	3		0.08		TAK05
1989 10 10.40	B	8.0	S	8	R	8	30		4/			OBU
1989 10 14.42	S	6.8	AA	31	L	6	62	5	5			KOB01
1989 10 17.42	S	6.8	AA	7.0	B		10	5	4	1.0	20	KOB01
1989 10 20.38	B	7.4	S	8	R	8	30		4/			OBU
1989 10 20.42	S	6.3	AA	7.0	B		10	7	5			KOB01
1989 10 21.38	B	7.3	S	8	R	8	30	4	4/			OBU
1989 10 21.40	M	6.2	AA	31	L	4	41	2.5	5			TSU02
1989 10 23.41	S	6.2	AA	7.0	B		10	7	5			KOB01
1989 10 24.38	B	7.4	AA	8	R	8	30	5	4/			OBU
1989 10 28.85	S	6.4	AA	7.0	B		10	5	4	1.0	350	KOB01
1989 11 02.83	M	6.3	S	3.5	B		7	5.5				TSU02
1989 11 03.84	S	6.3	AA	7.0	B		10	8	5	1.2	335	KOB01
1989 11 04.84	S	6.3	AA	7.0	B		10	8	5	1.2	335	KOB01
1989 11 09.83	S	6.3	AA	7.0	B		10	8	6	4.0	330	KOB01
1989 11 10.82	M	6.3	S	8.0	B		11	4.5				TSU02
1989 11 10.83	B	6.2	AA	25	L	5	47	3	7			NAK05
1989 11 10.83	S	6.2	AA	7.0	B		10	8	6	4.0	330	KOB01
1989 11 14.86	S	6.2	AA	7.0	B		10	7	6			KOB01
1989 11 16.86	S	6.1	AA	7.0	B		10	5	6	3.5	325	KOB01
1989 11 17.84	B	6.1	AA	13	H	3	50	4.5	4			NAK05
1989 11 17.84	S	6.0	AA	7.0	B		10	7	6	2.0	325	KOB01
1989 11 19.84	S	6.0	AA	7.0	B		10	7	7	3.0	325	KOB01
1989 11 20.85	S	5.9	AA	7.0	B		10	8	7	2.5	325	KOB01
1989 11 22.84	B	4.9	S	8	R	8	30		4/	0.5	270	OBU
1989 11 24.83	S	6.2	AA	20	H	4	32	8	4			NAK05
1989 11 24.84	B	5.1	AA	8	R	8	30		4/	>0.25	270	OBU
1989 11 24.84	M	5.8	AA	3.5	B		7	6				TSU02
1989 11 25.83	S	5.9	AA	25	L	5	47	8	4	1	300	NAK05
1989 11 25.84	B	5.0	AA	8	R	8	30		4/	>0.5	270	OBU
1989 11 25.84	S	5.7	AA	15.0	B		25	6	7	3.5	295	KOB01
1989 11 26.84	S	6.0	S	15.0	B		25	10	7	>2		TAK05
1989 11 26.85	S	5.7	AA	5	R		7	6	7	1.5	300	KOB01
1989 11 28.49				15	L	4	20	4	4	3	310	LEV
1989 11 28.50	S	5.4	AC	0.0	E		1					LEV
1989 11 30.83	S	5.7	AA	7.0	B		10	5	7	0.5	300	KOB01
1989 12 02.85	S	5.8	AA	7.0	B		10	5	7	0.5	285	KOB01
1989 12 05.88	S	6.2	AA	5.0	B		7	3	3			KOB01

Comet Helin-Roman-Alu 1989 XXI

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 24.29	S	13.5:	AC	154.9	L	13	654	0.5	2			LEV

Comet Aarseth-Brewington 1989 XXII

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 19.40	S	9.0	AA	31	L	6	62	3	4		0	KOB01

Comet Aarseth-Brewington 1989 XXII [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 11 20.39	S	8.9	AA	31	L	6	62	3.5	2	0.13	0	KOB01
1989 11 21.38	S	8.0	S	15.0	B		25	3	3	0.07		TAK05
1989 11 24.39	S	8.1	AA	31	L	6	62	3.5	3			KOB01
1989 11 25.39	S	7.8	AA	25	L	5	47	2	4			NAK05
1989 11 25.87	S	7.9	AA	15.0	B		25	4	3			KOB01
1989 12 02.34	S	8.0	S	15.0	B		25	4				TAK05
1989 12 02.86	S	7.0	AA	31	L	6	62	4	5	0.67	350	KOB01
1989 12 05.87	S	5.8	AA	31	L	6	62	3	5	0.67	0	KOB01
1989 12 10.86	B	5.8	AA	12	L	6	45	3				NAK08
1989 12 10.86	M	5.6	AA	3.5	B		7	3.5	6			TSU02
1989 12 10.87	S	5.2	AA	31	L	6	62	3	8	0.5	330	KOB01
1989 12 15.83	B	4.0	AA	12	L	6	45	4	7	1		NAK08
1989 12 18.87	S	4.1	AA	7.0	B		10	3	8	3.0	320	KOB01
1989 12 19.85	B	3.5	AA	12	L	6	45	5	7	3		NAK08
1989 12 19.88	S	3.8	AA	7.0	B		10	4	9	4.7	290	KOB01
1989 12 20.85	B	3.5	AA	12	L	6	45	4	6	2		NAK08

Comet Austin 1989c1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 13.40	S	9.8	AA	20	L	6	58	2				NAK01
1990 01 20.40	S	8.8	S	20	L	6	58	3	2/			NAK01
1990 01 21.39	S	8.6	S	20	L	6	58	3	4			NAK01
1990 01 27.40	S	8.3	AA	20	L	6	58	4	3/			NAK01
1990 02 17.41	M	8.1	S	31	L	4	40	1.2	5			TSU02
1990 02 17.41	S	7.8	S	20	L	6	46	4.5	4/			NAK01
1990 02 24.41	S	7.4	S	20	L	6	46	4.5	5			NAK01
1990 03 13.42	S	5.8	S	20	L	6	46	4	6/			NAK01
1990 03 13.42	S	6.0	AA	31	L	4	40	2	4			TSU02
1990 03 13.42	S	6.3	S	15.0	B		25	3	7			TAK05
1990 03 19.42	S	5.7	S	15.0	B		25	4				TAK05
1990 03 19.42	S	5.7	S	20	L	6	46	2	7			NAK01
1990 03 19.43	P	5.6	AA	16	W	4		2.5		0.60	97	TSU02
1990 03 21.42	S	5.5	S	15.0	B		25	4	7			TAK05
1990 03 26.43	P	5.1	AA	16	W	4		3		1.50	85	TSU02
1990 04 01.80	S	5.3	S	20.3	T	10	50	6	7	0.75	50	LUE
1990 04 05.81	S	5.0	S	9.0	M	6	56	3	7	0.25	40	LUE
1990 04 06.81	S	5.1	S	9.0	M	6	56	1	6			LUE
1990 04 09.81	S	4.0:	S	20.3	T	10	80	2	8	0.25	20	LUE
1990 04 15.82	S	4.6	S	9.0	M	6	20	1	8	0.03	10	LUE
1990 04 16.82	S	4.7	S	9.0	M	6	20	1	7			LUE
1990 04 23.79	M	5.1	S	6.5	R	8	16	5	7/	1.4	310	NAK01
1990 04 24.79	M	4.5	AA	3.5	B		7	8				TSU02
1990 04 26.06	S	5.3	S	8.0	B		15	2	8	2.0	310	LUE
1990 04 27.76	M	5.1	S	6.5	R	8	16	7	7	1.1	310	NAK01
1990 04 27.79	B	4.9	AA	7.0	B		11	7	7			NAK05
1990 04 27.98	S	5.2	SC	3.5	B		7					AND06
1990 04 28.06	B	5.3	S	5.0	B		10	2.5	7	0.6	310	LUE
1990 04 28.06	S	5.2	S	5.0	B		10					LUE
1990 04 29.08	B	3.6	SC	5.0	B		10		6			RAD01
1990 04 29.74	M	5.1	S	6.5	R	8	16	6.5	7	1.8	305	NAK01
1990 04 29.75	B	5.1	S	5.6	B		8					OKA05
1990 04 29.76	S	4.0	S	15.0	B		25	5		>3		TAK05
1990 04 29.78	B	5.1	AA	25	L	5	40	6	6	1	315	NAK05
1990 04 30.75	B	5.0	S	5.6	B		8					OKA05
1990 04 30.79	M	5.2	AA	3.5	B		7	13				TSU02
1990 05 01.00	B	5.3	HD	5	R		20	6.5	4			NES
1990 05 02.06	S	5.3	S	5.0	B		10	6.5	7	1.0	330	LUE
1990 05 03.00	B	5.3	HD	8	R	10	28	6	4	0.5		NES

Comet Austin 1989c1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 03.05	S	5.0	S	0.6	E		1		9			LUE
1990 05 03.05	S	5.3	S	5.0	B		10	7.5	7	2.0	290	LUE
1990 05 03.06	M	5.4	S	20.3	T	10	50	7.5	7	1.0	290	LUE
1990 05 03.07	B	5.7	SC	5.0	B		10		3			RAD01
1990 05 03.08	M	5.9	SC	5.0	B		10		2	0.3		AND03
1990 05 04.06	B	5.3	S	5.0	B		10	7.5	6	1.0	290	LUE
1990 05 04.06	S	5.2	S	5.0	B		10					LUE
1990 05 05.00	B	5.3	HD	5	R		20	6	5			NES
1990 05 05.08	M	5.6	SC	5.0	B		10		3	0.4		AND03
1990 05 05.73	M	5.6	S	6.5	R	8	16	14	6			NAK01
1990 05 06.03	B	5.6	S	5.0	B		10	10.0	5	0.5	280	LUE
1990 05 06.03	S	5.3	S	5.0	B		10					LUE
1990 05 06.03	S	5.4:	S	9.0	M	6	20	8	6	0.5	285	LUE
1990 05 06.96	B	5.5:	HD	5	R		20	6.5	5			NES
1990 05 09.00	B	5.3	HD	5	R		20	5	5			NES
1990 05 11.00	B	5.5	HD	5	R		20	5	5			NES
1990 05 13.99	B	5.5	HD	8	R	10	28	5	5	0.2		NES
1990 05 16.98	S	5.5	S	9.0	M	6	20	17.5	2			LUE
1990 05 16.98	S	5.6	S	5.0	B		10	17.5	2			LUE
1990 05 17.07	B	6.1	SC	5.0	B		10		3			AND03
1990 05 18.05	B	6.3	SC	5.0	B		10		4			RAD01
1990 05 18.13	B	6.3	SC	5.0	B		10		4			AND03
1990 05 19.00	S	5.7	S	5.0	B		10	15.0	3			LUE
1990 05 19.00	S	5.7	S	9.0	M	6	20	10.0	4			LUE
1990 05 19.98	B	5.7	HD	5	R		20	7	6			NES
1990 05 20.94	B	6.4	SC	5.0	B		10		4			AND03
1990 05 22.03	B	6.4	SC	5.0	B		10		3			AND03
1990 05 23.02	S	5.5	S	9.0	M	6	20	15.0	2			LUE
1990 05 23.02	S	5.6	S	5.0	B		10	15.0	2			LUE
1990 05 24.94	S	5.7	S	9.0	M	6	20	17.0	1			LUE
1990 05 24.95	S	5.4	S	5.0	B		10	22.0	1			LUE
1990 05 24.99	B	6.3	HD	5	R		20	8	7			NES
1990 05 25.67	M	5.8	S	6.5	R	8	16	16	4/			NAK01
1990 05 25.67	S	5.9	S	20	L	6	46	9	5			NAK01
1990 05 25.92	B	5.4	S	0.6	E		1	20:	2			LUE
1990 05 25.92	B	5.6	S	5.0	B		10	30	3			LUE
1990 05 25.92	S	5.3	S	5.0	B		10	30	3			LUE
1990 05 25.93	S	5.7	S	9.0	M	6	20	30	3	1.0	270	LUE
1990 05 25.94	B	5.3	S	3.0	B		8	30	2			LUE
1990 05 25.94	S	5.2	S	3.0	B		8	30	2			LUE
1990 05 25.97	S	5.5:	S	20.3	T	10	30		4			LUE
1990 05 26.63	M	5.8	S	6.5	R	8	16	14	4/			NAK01
1990 05 26.63	S	5.8	S	20	L	6	46	11	4			NAK01
1990 05 26.68	B	5.2	AA	3	R		6	18	2			NAK05
1990 05 26.71	B	5.5	S	5.6	B		8	&20	3			OKA05
1990 05 26.71	M	5.0	AA	3.5	B		7	20				TSU02
1990 05 28.03	B	6.7	SC	5.0	B		10		3			AND03
1990 05 28.69	M	5.3	AA	3.5	B		7	23				TSU02
1990 06 02.65	S	5.0	S	0.0	E		1	20				TAK05
1990 06 02.70	S	5.5	AA	14	S	4	12	15	1			NAK05
1990 06 02.72	M	6.3	S	6.5	R	8	16	11	4	1.7	330	NAK01
1990 06 02.72	S	6.7	S	20	L	6	46	10	4	1.4	330	NAK01
1990 06 02.98	M	7.2	SC	5.0	B		10		2			AND03
1990 06 03.89	M	7.8	SC	5.0	B		10		2			AND03
1990 06 04.47	B	7.8	SC	5.0	B		10		1			AND03
1990 06 04.49	M	8.2	SC	5.0	B		10		2			AND03
1990 06 10.86	M	8.3	SC	5.0	B		10		2			AND03
1990 06 16.61	S	8.9	AA	20	H	4	32	4	0/			NAK05
1990 06 17.59	M	9.5	S	31	L	4	40	8				TSU02

Comet Austin 1989c1 [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 06 22.56	M	9.5	S	16	W	4	49	6				TSU02
1990 06 23.51	S	8.7	S	20	L	6	46	7.5	1			NAK01

Comet Skorichenko-George 1989e1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 18.81	S	8.8	S	20.3	T	10	50	2	3			LUE
1990 04 01.83	S	9.5:	S	20.3	T	10	80	2	2			LUE

Comet Černis-Kiuchi-Nakamura 1990b

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 03 18.82	S	8.5	S	20.3	T	10	50	2	4			LUE
1990 03 22.81	S	8.2	S	20.3	T	10	50	3	6			LUE
1990 03 26.90	S	8.3	S	9.0	M	6	20	2.5	2			LUE
1990 04 01.85	S	9.3	S	20.3	T	10	80	2.5	2			LUE
1990 05 14.29	S	13.8:	AC	154.9	L	13	654	1.5	2			LEV

Comet Levy 1990c

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 05 20.45	S	9.6	AC	40.6	L	5	101					LEV
1990 05 25.71	S	9.8	S	15.0	B		25	2.5	4			TAK05
1990 05 25.73	S	9.9	AC	20	L	6	58	4	5			NAK01
1990 05 25.76	S	9.8	AC	25	L	5	40	1.5	6			NAK05
1990 05 26.70	S	9.8	AC	20	L	6	58	3	4/			NAK01
1990 05 26.74	M	9.5	S	16	W	4	49	2.3	4			TSU02
1990 05 28.76	M	9.5	S	31	L	4	103	1.5	4			TSU02
1990 06 02.69	S	9.8	S	15.0	B		25	3	4			TAK05
1990 06 02.72	S	9.1	AA	25	L	5	40	2	5			NAK05
1990 06 02.74	S	9.6	AC	20	L	6	46	4	5			NAK01
1990 06 04.73	S	9.6	S	15.0	B		25	3	4			TAK05
1990 06 18.69	S	8.9	S	15.0	B		25	3.5	4			TAK05
1990 06 21.71	S	8.5	S	15.0	B		25	4	5			TAK05
1990 06 22.63	M	8.5	S	16	W	4	49	4.5	5			TSU02
1990 06 22.70	S	8.5	AA	20	H	4	90	3.5	5			NAK05
1990 06 22.70	S	8.7	AC	20	L	6	58	4	5/			NAK01
1990 06 23.72	S	8.3	AC	20	L	6	46	6	5			NAK01
1990 07 05.74	M	8.0	AA	3.5	B		7	5	5			TSU02
1990 07 06.77	S	7.7	S	25	L	5	40	5	4			NAK05
1990 07 12.84	B	8.3	S	6.8	R	6	20		2			SWI
1990 07 12.95	B	8.3	AA	5.0	R	10	13					JAH
1990 07 12.95	B	8.3	AA	20.4	L	6	72					JAH
1990 07 12.95	S	8.3	AA	5.0	R	10	13	3.0	3			JAH
1990 07 12.95	S	8.5	AA	20.4	L	6	72	4.0	7	0.22	290	JAH
1990 07 13.89	B	7.5:	AA	5.0	B		10		2			REI01
1990 07 13.94	B	8.4	AA	5.0	R	10	13					JAH
1990 07 13.94	B	8.6	AA	20.4	L	6	72					JAH
1990 07 13.94	S	8.2	AA	5.0	R	10	13	5.1	3			JAH
1990 07 13.94	S	8.4	AA	20.4	L	6	72	4.4	7	&0.30	260	JAH
1990 07 15.84	B	7.8	S	6.8	R	6	20		3			SWI
1990 07 16.84	B	8.0	S	6.7	L	6	25	& 5	4			ADA02
1990 07 17.61	S	6.2	S	15.0	B		25	7		>0.33		TAK05
1990 07 17.95	B	8.2	HD	8	R	10	28	6.5	6			NES
1990 07 18.64	M	7.4	AC	20	L	6	46	7	5			NAK01
1990 07 18.91	B	6.5	S	5.0	B		10		5			SLU01
1990 07 19.75	M	6.9	S	8.0	B		11					TSU02
1990 07 19.93	S	7.5	S	9.0	M	6	20	6	4			LUE
1990 07 20.67	S	6.8	AA	25	L	5	40	6	4	0.33	220	NAK05

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 20.69	M	6.5	AA	3.5	B		7	9	5			TSU02
1990 07 20.91	B	7.7	AA	20.4	L	6	72					JAH
1990 07 20.91	S	7.4	AA	20.4	L	6	72	4.0	5			JAH
1990 07 21.02	B	6.9	AA	5.0	B		10		3			REI01
1990 07 21.63	M	7.0	AA	6.5	R	8	16	8.5	5			NAK01
1990 07 21.63	M	7.3	AA	20	L	6	46	7	5		255	NAK01
1990 07 21.92	S	7.1	S	9.0	M	6	20	6	3			LUE
1990 07 22.23	B	6.7	S	6.0	R	5	10		3			CHO01
1990 07 22.90	S	6.9	S	9.0	M	6	20	7	3			LUE
1990 07 22.98	B	7.2	AA	20.4	L	6	72					JAH
1990 07 22.98	S	7.5	AA	20.4	L	6	72	10	7	0.33	265	JAH
1990 07 22.99	B	6.7	AA	6.0	R	5	9	6	7	0.26	230	JAH
1990 07 23.02	B	6.7	AA	5.0	R	10	13	4.1	6	&0.20	230	JAH
1990 07 23.02	S	6.5	AA	5.0	R	10	13					JAH
1990 07 23.88	B	8.0	S	25	L	7	100		4			ADA02
1990 07 23.88	B	8.0	S	25	L	7	100		4			SWI
1990 07 23.92	S	6.8	S	9.0	M	6	20	6	3			LUE
1990 07 23.93	S	6.9	S	5.0	B		10	8	3			LUE
1990 07 23.94	B	6.6	AA	5.0	R	10	13					JAH
1990 07 23.94	S	6.5	AA	5.0	R	10	13	8.1	6	0.38	251	JAH
1990 07 24.94	B	6.5	AA	5.0	R	10	13					JAH
1990 07 24.94	S	6.4	AA	5.0	R	10	13	11.4	4	1.1	241	JAH
1990 07 26.92	S	6.6	S	5.0	B		10	8	2			LUE
1990 07 26.92	S	6.7	S	9.0	M	6	20	6	3			LUE
1990 07 26.93	B	6.8	AA	5.0	R	10	13					JAH
1990 07 26.93	S	6.8	AA	5.0	R	10	13	10.7	4	1.0	217	JAH
1990 07 27.04	B	6.7	AA	5.0	B		10	&15	4			REI01
1990 07 27.88	B	6.9	S	6.8	R	6	20		4			SWI
1990 07 27.88	B	7.8	S	6.7	L	6	25		4			ADA02
1990 07 27.90	B	6.6	AA	5.0	R	10	13					JAH
1990 07 27.90	S	6.4	AA	5.0	R	10	13	&10	4	&1.0	240	JAH
1990 07 27.93	B	6.8	AA	20.4	L	6	72	5.5	7	0.40	243	JAH
1990 07 27.99	S	6.5:	S	9.0	M	6	20	6	3			LUE
1990 07 28.08	B	6.8	S	6.0	R	5	10		3			CHO01
1990 07 28.65	B	6.4	AA	5.0	B		7	8	3/			NAK05
1990 07 28.84	B	7.0	S	6.7	L	6	25	& 7	4			ADA02
1990 07 28.93	B	6.4	AA	5.0	R	10	13					JAH
1990 07 28.93	S	6.2	AA	5.0	R	10	13	11	5	0.60	244	JAH
1990 07 29.00	B	6.5	AA	5.0	B		10		4			REI01
1990 07 29.14	B	6.6	S	6.0	R	5	10		3			CHO01
1990 07 29.58	B	6.5	S	5.6	B		8		7			OKA05
1990 07 29.88	B	6.9	S	25	L	7	100		4			SWI
1990 07 29.91	S	6.3	S	5.0	B		10	9	2			LUE
1990 07 29.92	S	6.5	S	9.0	M	6	20	6	4			LUE
1990 07 30.75	M	5.5	AA	3.5	B		7	9				TSU02
1990 07 30.88	B	6.9	S	6.8	R	6	20		4			SWI
1990 07 30.90	B	6.1	AA	5.0	R	10	13	10.1	5	0.86	211	JAH
1990 07 30.90	S	6.2	AA	5.0	R	10	13					JAH
1990 07 31.80	B	6.7	S	6.8	R	6	20		4			SWI
1990 07 31.84	B	7.0	S	6.7	L	6	25	& 7	4			ADA02
1990 07 31.91	S	6.1	S	5.0	B		10	6	3			LUE
1990 07 31.91	S	6.3	S	9.0	M	6	20	6	3			LUE
1990 07 31.99	B	5.5	HD	8	R	10	28	6	4	0.5		NES
1990 08 01.66	M	6.1	S	6.5	R	8	16	8	6			NAK01
1990 08 01.66	M	6.4	S	20	L	6	46	7.5	6			NAK01
1990 08 01.92	S	6.0	S	5.0	B		1(	8	3			LUE
1990 08 01.92	S	6.3	S	9.0	M		2(	6	5			LUE
1990 08 01.99	B	5.6:	HD	8	R	10	28	6.5	4			NES
1990 08 02.84	B	7.0	S	6.7	L	6	25	& 7	4			ADA02

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 02.85	B	6.2	AA	5.0	B		10		4			REI01
1990 08 02.87	S	6.0	S	8.0	B		10	8	3			LUE
1990 08 02.90	S	5.8	S	5.0	B		10	10	5			LUE
1990 08 02.98	B	5.8	AA	5.0	R	10	13	11.7	6	1.9	231	JAH
1990 08 02.98	S	5.9	AA	5.0	R	10	13					JAH
1990 08 02.99	G	5.8	AA	0.8	E		1	&20	2			JAH
1990 08 03.00				5.0	R	10	29	8	7	&0.20	230	JAH
1990 08 03.01				6.0	R	5	9	12	5	0.90	230	JAH
1990 08 03.01				20.4	L	6	72	5.4	7	0.40	235	JAH
1990 08 03.78	B	5.8	AA	5.0	B		7	10	3			NAK05
1990 08 03.84	B	6.7	S	6.7	L	6	25	& 7	4			ADA02
1990 08 04.00	S	5.7	S	5.0	B		7	15	5			LUE
1990 08 04.05	B	6.6	S	6.0	R	5	10		3			CHO01
1990 08 04.71	B	6.2	S	5.6	B		8		6			OKA05
1990 08 04.80	B	6.7	S	6.8	R	6	20		4			SWI
1990 08 04.93	B	6.2	AA	5.0	B		10		4			REI01
1990 08 04.98	B	5.3	HD	8	R	10	28	6.5	4			NES
1990 08 05.80	B	6.7	S	6.7	L	6	25	& 7	4			ADA02
1990 08 05.83	B	6.3:	AA	5.0	B		10		4			REI01
1990 08 05.93	S	5.7	S	5.0	B		10	11	3			LUE
1990 08 06.00	B	5.3	HD	5	R		20	12	4			NES
1990 08 06.89	S	5.6	S	5.0	B		10	11	4			LUE
1990 08 06.92	B	5.5	AA	5.0	R	10	13					JAH
1990 08 06.92	S	5.6	AA	5.0	R	10	13	8	4			JAH
1990 08 07.89	B	5.5	AA	5.0	R	10	13					JAH
1990 08 07.89	S	5.6	AA	5.0	R	10	13	10	4			JAH
1990 08 07.91	S	5.7	S	5.0	B		10	12	4			LUE
1990 08 08.85	B	5.3:	HD	8	R	10	28	7	6			NES
1990 08 09.80	B	6.5	S	3.0	B		8	& 7	4			ADA02
1990 08 09.84	B	6.3	S	6.8	R	6	20		4			SWI
1990 08 10.80	B	6.1	S	6.8	R	6	20		4			SWI
1990 08 10.81	B	6.5	S	6.7	L	6	25	& 7	4			ADA02
1990 08 10.86	S	5.2:	S	5.0	B		10	15	5			LUE
1990 08 10.87				20.4	L	6	72	6.6	7	&0.10	235	JAH
1990 08 10.88	B	5.4	AA	5.0	R	10	13	9.4	6			JAH
1990 08 10.88	S	5.6	AA	5.0	R	10	13					JAH
1990 08 10.91	S	5.0	S	5.0	B		10	17	4			LUE
1990 08 10.96	B	5.0:	HD	8	R	10	28	6	4			NES
1990 08 11.80	B	5.3	S	6.7	L	6	25	& 8	4			ADA02
1990 08 11.84	B	5.9	S	6.8	R	6	20		4			SWI
1990 08 11.94	B	4.8:	HD	5	R		20	12	4			NES
1990 08 12.80	B	4.9	S	6.8	R	6	20		5			SWI
1990 08 12.80	B	4.9	S	6.8	R	6	20	& 8	5			ADA02
1990 08 12.88	B	5.0:	AA	5.0	B		10	&15				REI01
1990 08 12.88	S	4.8	AA	5.0	R	10	13	12.6	6	1.30	200	JAH
1990 08 12.88	S	5.0	AA	5.0	R	10	13					JAH
1990 08 12.89	G	4.5	AA	0.8	E		1	&26	1			JAH
1990 08 13.14	B	4.9	S	6.7	L	6	25	& 8	5			ADA02
1990 08 13.59	S	4.4	AA	5.0	B		7	20	3	1	220	NAK05
1990 08 13.80	B	4.6	S	6.8	R	6	20		5			SWI
1990 08 13.81	B	4.5	S	6.7	L	6	25	& 8	5			ADA02
1990 08 13.85	S	4.5	HD	5	R		20	12	4			NES
1990 08 13.88	B	4.8	AA	5.0	B		10	&20	6			REI01
1990 08 13.91	B	4.6:	S	31.0	L	7	70		5			LIS
1990 08 13.94	S	4.9	S	5.0	B		10	15	4			LUE
1990 08 13.97	B	4.4	HD	8	R	10	28	10	4			NES
1990 08 14.54	I	3.2	S	0.0	E		1					TAK05
1990 08 14.85	B	5.6	S	5.0	B		10		5			PIS01
1990 08 14.85	M	5.4	S	5.0	B		10		5			PIS01

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 14.86	B	4.2	S	6.7	L	6	25	&12	5			ADA02
1990 08 14.88	B	4.9	S	5.0	B		10					KUR01
1990 08 14.98	B	4.7	S	31.0	L	7	70		5			LIS
1990 08 15.47	S	5.1	AA	10.0	B		14	10	5			IWA01
1990 08 15.60	M	4.9	S	6.5	R	8	16	20	6	1.2	190	NAK01
1990 08 15.62	I	4.1	AA	0.0	E		1					TSU02
1990 08 15.80	B	4.0	S	25	L	7	100		5			SWI
1990 08 15.80	B	4.0	S	25	L	7	100	&12	5			ADA02
1990 08 15.92	S	4.0	HD	5	R		20	12	3			NES
1990 08 16.47	S	4.6	AA	10.0	B		14	20	6			IWA01
1990 08 16.51	M	4.5	S	6.5	R	8	16	21	6	1.3	175	NAK01
1990 08 16.76	B	4.2	S	5.0	B		10		4			SWI
1990 08 16.80	B	4.0	S	6.7	L	6	25	&12	5			ADA02
1990 08 16.86	S	4.3	S	0.7	E		1	20	5			LUE
1990 08 16.88	B	4.3	AA	5.0	B		10		5			REI01
1990 08 16.96	B	4.5	S	31.0	L	7	70		6			LIS
1990 08 16.96	B	4.6	S	5.0	B		10					KUR01
1990 08 17.03	B	4.2	HD	8	R	10	28	7	4			NES
1990 08 17.63	M	4.4	S	6.5	R	8	16	23	6			NAK01
1990 08 17.88	G	4.2	AA	0.8	E		1	40	4			JAH
1990 08 17.89	B	4.1	AA	5.0	R	10	13					JAH
1990 08 17.89	S	4.8	AA	5.0	R	10	13	16.5	7	1.8	145	JAH
1990 08 18.48	S	4.7	AA	10.0	B		14		5			IWA01
1990 08 18.84	B	4.4	S	5.0	B		10					KUR01
1990 08 18.91	B	4.0:	AA	5.0	B		10		6			REI01
1990 08 18.95	S	4.2	HD	5	R		20	12	4			NES
1990 08 18.98	B	4.3	S	31.0	L	7	70		5			LIS
1990 08 18.99	B	4.1	HD	8	R	10	28	12	4			NES
1990 08 19.07	B	4.4	S	6.0	R	5	10	12	5			CHO01
1990 08 19.50	S	4.7	AA	10.0	B		14	20	6			IWA01
1990 08 19.54	B	4.2	S	5.0	B		7	20	7			SOW
1990 08 19.57	B	4.3	S	5.6	B		8	16	8			OKA05
1990 08 19.63	I	3.6	AA	0.0	E		1					TSU02
1990 08 19.89	B	4.0:	AA	5.0	B		10		5			REI01
1990 08 19.90	B	4.0	S	31.0	L	7	70		6			LIS
1990 08 20.02	B	4.5	S	6.0	R	5	10	12	3			CHO01
1990 08 20.51	S	4.4	AA	10.0	B		14	20	7	0.5		IWA01
1990 08 20.54	I	3.8	S	0.0	E		1					TAK05
1990 08 20.56	S	3.9	AA	5.0	B		7	30	6			KON03
1990 08 20.62	I	3.8	AA	0.0	E		1					TSU02
1990 08 20.65	B	4.3	S	4.2	B		10	14	7			OKA05
1990 08 20.89	B	4.3	AA	5.0	R	10	13	35	7	&3.0	160	JAH
1990 08 20.89	G	4.1	AA	0.8	E		1	45	4			JAH
1990 08 20.98	B	3.8	S	31.0	L	7	70		7			LIS
1990 08 21.49	S	4.5	AA	10.0	B		14	15	6	0.42		IWA01
1990 08 21.57	B	3.9	S	5.0	B		7	30	7			SOW
1990 08 21.67	M	4.3	S	6.5	R	8	16	16	6		60	NAK01
1990 08 21.68	B	4.3	S	4.2	B		10	12	7			OKA05
1990 08 21.80	S	3.8	HD	5	R		20	12	3			NES
1990 08 21.95	B	3.7	HD	8	R	10	28	12	3			NES
1990 08 22.01	B	4.4	S	6.0	R	5	10	20	3			CHO01
1990 08 22.62	S	3.9	AA	5.0	B		7	20	6			KON03
1990 08 22.76	B	4.0	S	5.0	B		10		5			SWI
1990 08 22.80	B	3.7	HD	5	R		20	12	3	0.5		NES
1990 08 22.80	B	4.0	S	3.0	B		8	&12	5			ADA02
1990 08 22.95	B	3.4	S	31.0	L	7	70		7			LIS
1990 08 23.61	B	4.5	S	4.2	B		10	12	7			OKA05
1990 08 23.76	B	3.7	HD	5.0	B		7	14	3	1.0		NES
1990 08 23.76	B	4.0	S	5.0	B		10		5			SWI

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 23.81	B	3.7	HD	5	R		20	12	3	0.5		NES
1990 08 23.81	B	3.8	AA	5.0	B		10		6			REI01
1990 08 23.85	S	3.8	AA	0.8	E		1					MEY
1990 08 23.86	S	3.8	AA	5.0	B		10	25	5	&1.0	85	MEY
1990 08 23.89	B	4.1	S	5.0	B		7	20	5	0.5	60	LUE
1990 08 23.89	G	3.9	AA	0.8	E		1	50	5			JAH
1990 08 23.89	S	3.6	S	0.7	E		1	20	5			LUE
1990 08 23.89	S	3.8	S	5.0	B		7					LUE
1990 08 23.90	B	3.9	AA	5.0	B		7					JAH
1990 08 23.90	S	3.8	AA	5.0	B		7	14	6	0.75	100	JAH
1990 08 23.93	S	3.6	AA	6.3	B		9	&20	5			NIE
1990 08 23.98	B	3.4	S	31.0	L	7	70		7			LIS
1990 08 24.08	B	4.3	S	6.0	R	5	10	25	5			CHO01
1990 08 24.48	S	4.2	AA	10.0	B		14		5			IWA01
1990 08 24.50	S	3.8	AA	5.0	B		7	30	7			KON03
1990 08 24.61	B	3.1	AA	5.0	B		7	30	4	2	90	NAK05
1990 08 24.68	M	3.8	S	6.5	R	8	16	18	6		100	NAK01
1990 08 24.76	B	3.7	S	5.0	B		7	30	7	1		SOW
1990 08 24.76	B	4.0	S	3.0	B		8	&12	5			ADA02
1990 08 24.76	B	4.0	S	5.0	B		10		5			SWI
1990 08 24.81	B	3.9	AA	5.0	B		10		6			REI01
1990 08 24.81	B	4.3	S	5.0	B		10		6			PIS01
1990 08 24.88	S	3.6	AA	6.3	B		9	&20	5			NIE
1990 08 24.91	B	4.0	S	5.0	B		10		5/	&0.5		SLU01
1990 08 24.94	G	3.8	AA	0.8	E		1	45	5			JAH
1990 08 24.95	B	3.6	AA	5.0	B		7	15	5	1.40	75	JAH
1990 08 24.96	B	3.0	S	31.0	L	7	70		6			LIS
1990 08 25.02	B	4.1	S	6.0	R	5	10	25	5			CHO01
1990 08 25.50	S	4.0	AA	10.0	B		14	15	5			IWA01
1990 08 25.56	B	3.5	S	5.0	B		7	30	7	1		SOW
1990 08 25.87	B	3.5	HD	5	R		20	12	3	1.5		NES
1990 08 25.87	G	3.6	AA	0.8	E		1	35	4			JAH
1990 08 25.89	B	4.6	S	5.0	B		10		5/	&1		SLU01
1990 08 25.90	S	3.5	AA	6.3	B		9	&25	5			NIE
1990 08 25.91	B	4.1	AA	5.0	R	10	13	&15	6	&1.0	40	JAH
1990 08 25.91	S	3.9	AA	5.0	R	10	13					JAH
1990 08 25.94	B	3.5	HD	8	R	10	28	10	3	1.5		NES
1990 08 25.95	S	3.8	S	5.0	B		10	20	5			LUE
1990 08 26.10	B	3.9	S	6.0	R	5	10	30	5			CHO01
1990 08 26.50	S	3.7	AA	5.0	B		7	20	7			KON03
1990 08 26.51	M	3.7	S	6.5	R	8	16	23	6	2.1	65	NAK01
1990 08 26.64	I	3.8	AA	0.0	E		1					TSU02
1990 08 26.65	B	4.1	S	3.5	B		7		8			OKA05
1990 08 26.82	B	4.0	S	3.0	B		8	&12	5			ADA02
1990 08 26.82	B	4.2	S	5.0	B		7	8.2	7	0.5	91	WOZ
1990 08 26.84	G	3.6	AA	0.8	E		1	50	4	&1.2	75	JAH
1990 08 26.85	B	4.1	AA	5.0	R	10	13	12.1	6	1.5	45	JAH
1990 08 26.85	S	4.3	AA	5.0	R	10	13					JAH
1990 08 26.86				20.4	L	6	72	12	8	1.20	60	JAH
1990 08 26.87	S	3.8	AA	5.0	B		10	16	5	0.8	85	MEY
1990 08 26.88	S	3.6	AA	0.8	E		1					MEY
1990 08 26.89	S	3.5	AA	6.3	B		9	&25	5			NIE
1990 08 26.98	B	3.0	S	4.5	B		12		5			LIS
1990 08 27.00	B	4.4	S	25	L	7	100		5			SWI
1990 08 27.07	B	3.7	S	6.0	R	5	10	30	5		70	CHO01
1990 08 27.76	B	3.9	S	3.0	B		8	&12	5			ADA02
1990 08 27.82	B	4.4	S	5.0	B		7	&9	6/	0.6	90	WOZ
1990 08 27.84	B	4.4	S	6.8	R	6	20		6			SWI
1990 08 27.85	S	3.6	S	5.0	B		7	20	5	1.0	60	LUE

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 08 27.86	S	3.8	AA	0.8	E		1					MEY
1990 08 27.86	S	3.9	AA	5.0	B		10	10	6	0.5	75	MEY
1990 08 27.87	G	4.0	AA	0.8	E		1	36	3			JAH
1990 08 27.88	S	3.5	AA	6.3	B		9	&25	5			NIE
1990 08 27.89	B	5.0	AA	5.0	R	10	13	11.2	6	1.8	48	JAH
1990 08 27.89	S	4.8	AA	5.0	R	10	13					JAH
1990 08 27.91	B	4.3	S	5.0	B		10		5/	&1.5		SLU01
1990 08 28.03	B	3.9	S	6.0	R	5	10	30	5			CHO01
1990 08 28.84	B	4.4	S	25	L	7	100		5			SWI
1990 08 28.85	B	4.6	S	5.0	B		7	8.7	6			WOZ
1990 08 28.87	B	4.6	S	5.0	B		10		7		60	PIS01
1990 08 28.95	B	3.0	S	4.5	B		12		6			LIS
1990 08 29.02	B	4.0	S	6.0	R	5	10	30	5			CHO01
1990 08 29.76	B	4.4	S	25	L	7	100	&10	5			ADA02
1990 08 29.84	B	4.4	S	6.8	R	6	20		5			SWI
1990 08 29.90	B	2.8	S	4.5	B		12		6			LIS
1990 08 29.90	S	3.9	AA	5.0	B		10	11	6			MEY
1990 08 29.91	B	3.9	S	5.0	B		10		7		90	PIS01
1990 08 30.54	B	3.8	S	5.0	B		7	20	7	1		SOW
1990 08 30.95	B	2.7	S	0.0	E		1		6			LIS
1990 08 31.57	B	4.5	S	10	L	6	24	24	7			OKA05
1990 08 31.90	B	2.7	S	0.0	E		1		7			LIS
1990 09 01.77	B	3 :	HD	5	R		20	&10	4			NES
1990 09 01.96	B	2.9	S	0.0	E		1		7			LIS
1990 09 02.43	B	4.4	S	5.6	B		8	20	8			OKA05
1990 09 04.76	B	6.0	S	6.8	R	6	20		2			SWI
1990 09 08.43	B	5.0	S	5.0	B		7	10	5			SOW
1990 09 08.45	M	4.2	AA	3.5	B		7	13				TSU02
1990 09 08.83	S	4.4:	S	7.0	B		10	20	5	0.5	55	LUE
1990 09 09.43	S	4.6	AA	5.0	B		7					NAK05
1990 09 09.46	B	5.2	S	5.0	B		7	10	5			SOW
1990 09 09.46	M	4.0	AA	3.5	B		7	22				TSU02
1990 09 10.45	B	5.1	S	5.0	B		7	10	4			SOW
1990 09 10.87	S	4.4	S	7.0	B		16	15	7	1.5	60	LUE
1990 09 11.82	B	4.7	S	5.0	B		10	10	7	1.5	80	LUE
1990 09 11.82	S	4.6	S	5.0	B		10					LUE
1990 09 20.42	M	5.2	AA	3.5	B		7	8				TSU02
1990 09 21.42	S	4.6	S	20	L	6	46	6	6			NAK01
1990 09 29.00	B	6.1	S	7.0	B		10					DEA
1990 10 08.94	B	5.6	S	7.0	B		10	3.7	8	0.6	115	DEA
1990 12 10.85	S	7.1	S	20	L	6	58	3				NAK01
1990 12 12.85	S	6.8	S	20	L	6	46	4.5	5/			NAK01
1990 12 16.86	M	7.0	S	20	L	6	46	6	6/			NAK01
1990 12 21.84	M	7.0	S	20	L	6	46	4	7			NAK01
1990 12 21.87	B	7.3	S	25	L	5	40	2.5	5			NAK05
1990 12 27.85	M	7.2	S	20	L	6	46	5	6			NAK01
1991 01 04.24	S	7.7	SC	5.0	B		7	3.7				DAH
1991 01 11.57	B	7.6	SC	8.0	B		15		3			SEA01
1991 01 12.52	B	7.5	SC	8.0	B		15					SEA01
1991 01 12.53	B	7.4	SC	5.0	B		10					SEA01
1991 01 12.78	B	7.0	AA	25	L	5	40	5	5	0.17	275	NAK05
1991 01 13.57	B	7.4	SC	5.0	B		10					SEA01
1991 01 13.57	B	7.5	SC	8.0	B		15					SEA01
1991 01 18.81	M	8.1	AA	20	L	6	46	5.5	5			NAK01
1991 01 19.54	B	7.5	SC	5.0	B		10					SEA01
1991 01 19.54	B	7.7	SC	8.0	B		15					SEA01
1991 01 19.56	S	7.5	AC	6.0	B		20	10	3/	0.7	305	BOA
1991 01 19.80	M	7.7	AA	20	L	6	46	5.5	5			NAK01
1991 01 21.49	B	7.7	SC	8.0	B		15					SEA01

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 21.49	S	7.6	SC	5.0	B		10					SEA01
1991 01 21.63	B	7.7	SC	8.0	B		15					SEA01
1991 01 22.59	B	7.5	SC	5.0	B		10					SEA01
1991 01 22.59	B	7.6	SC	8.0	B		15					SEA01
1991 01 22.59	S	7.5	SC	5.0	B		10					SEA01
1991 01 22.59	S	7.6	SC	8.0	B		15					SEA01
1991 01 23.75	M	7.5	AA	20	L	6	46	6	6			NAK01
1991 01 24.50	! M	7.6	NP	5.0	B		10					HAL
1991 01 26.80	M	7.4	AA	20	L	6	46	7	5	0.5	145	NAK01
1991 02 04.48	S	7.8	AA	5.0	B		10					SEA01
1991 02 04.48	S	8.0	AA	8.0	B		15					SEA01
1991 02 05.46	S	7.9	AA	5.0	B		10	10	2			SEA01
1991 02 05.46	S	7.9	AA	8.0	B		15	8	3			SEA01
1991 02 05.55	S	7.0	SM	8.0	B		20	& 3	6	1.5	180	CAM03
1991 02 06.35	M	7.6	NP	5.0	B		10					HAL
1991 02 06.51	S	7.0	SM	8.0	B		20	3	6		305	CAM03
1991 02 07.56	S	7.0	SM	8.0	B		20	3.5	6	1.5	180	CAM03
1991 02 08.48	S	7.8	AA	5.0	B		10					SEA01
1991 02 08.48	S	8.0	AA	8.0	B		15	4	2			SEA01
1991 02 08.54	S	6.7	SM	8.0	B		20	3	6	1.5	180	CAM03
1991 02 08.65	M	7.6	AC	20	L	6	46	7.5	5/		155	NAK01
1991 02 09.24	M	9.2	GA	35.9	L	7	45	3.0	6	?0.04	320	MOD
1991 02 09.26	M	7.4	SC	5.0	B		10	9	4			MOD
1991 02 09.44	S	8.0	AA	5.0	B		10					SEA01
1991 02 09.44	S	8.2	AA	8.0	B		15	9	2			SEA01
1991 02 09.62	S	6.7	SM	8.0	B		20	4	6			CAM03
1991 02 09.82	M	7.0	SC	16	L	6	40	> 6	4			LIN03
1991 02 10.74	M	7.2	SC	16	L	6	40		4	1	345	LIN03
1991 02 11.34	M	8.4	GA	20.0	L	5	35	4.0	5			MOD
1991 02 11.56	S	8.2	AA	5.0	B		10					SEA01
1991 02 11.56	S	8.3	AA	8.0	B		15	10	2			SEA01
1991 02 12.62	S	7.8	AC	20	L	6	46	5.5	5	0.7	150	NAK01
1991 02 12.94	M	7.8	SC	5.0	B		10		3			AND03
1991 02 13.51	S	8.4	AA	5.0	B		10					SEA01
1991 02 13.51	S	8.6	AA	8.0	B		15	9	2			SEA01
1991 02 13.75	S	8.4	AA	5.0	B		10					SEA01
1991 02 13.75	S	8.5	AA	8.0	B		15					SEA01
1991 02 14.43	S	8.4	AA	5.0	B		10					SEA01
1991 02 14.46	M	7.6	NP	5.0	B		10					HAL
1991 02 14.52	S	6.9	SM	8.0	B		20	4	5	1	195	CAM03
1991 02 14.72	S	8.4	AA	5.0	B		10					SEA01
1991 02 14.72	S	8.6	AA	8.0	B		15	6	1			SEA01
1991 02 14.73	S	8.6	AA	8.0	B		15	6	1			SEA01
1991 02 15.37	M	7.6	NP	5.0	B		10					HAL
1991 02 15.43	S	8.4	AA	5.0	B		10	10	1			SEA01
1991 02 15.43	S	8.6	AA	8.0	B		15	6	1			SEA01
1991 02 15.72	S	8.6	AA	5.0	B		10					SEA01
1991 02 15.72	S	8.7	AA	8.0	B		15					SEA01
1991 02 16.61	S	8.0	AC	20	L	6	46	7.5	5	0.6	160	NAK01
1991 02 17.51	S	7.7	AC	20	L	6	46	7	5		155	NAK01
1991 02 18.98	M	8.6	SC	5.0	B		10		2			AND03
1991 02 19.44	S	8.5	AA	5.0	B		10	9	2			SEA01
1991 02 19.44	S	8.8	AA	8.0	B		15	6	3			SEA01
1991 02 20.51	S	8.5	AA	5.0	B		10	8	2			SEA01
1991 02 20.51	S	8.7	AA	8.0	B		15	6	2			SEA01
1991 02 20.93	M	8.7	SC	5.0	B		10		1			AND03
1991 02 20.98	S	8.3	AA	5.0	B		10	8	3			MEY
1991 02 20.99	S	9.1	S	20.3	T	10	80	2.4	3			GRA04
1991 02 21.31	M	8.5	AA	20.0	L	5	35	2.7	5			MOD

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 02 21.56	S	8.5	AA	5.0	B		10	9	2			SEA01
1991 02 21.56	S	8.7	AA	8.0	B		15	7	2			SEA01
1991 02 21.96	B	7.8	A	10	R	4	29	14	3			KOR01
1991 02 22.00	S	8.5:	AA	5.0	B		10	6	2			MEY
1991 02 22.34	M	8.4	AA	20.0	L	5	35	4.5	5			MOD
1991 02 22.35	M	7.4	SC	5.0	B		10	8	3			MOD
1991 02 22.42	M	7.8	NP	5.0	B		10					HAL
1991 02 22.56	S	8.5	AA	5.0	B		10	8	3			SEA01
1991 02 22.56	S	8.6	AA	8.0	B		15	8	3			SEA01
1991 02 23.59	S	8.7	AA	5.0	B		10	6	1			SEA01
1991 02 23.59	S	8.8	AA	8.0	B		15	6	1			SEA01
1991 02 24.22	S	8.4	S	20	T	10	63	1.5	5			PRY
1991 02 28.94	B	8.4	A	10	R	4	29	6	3			KOR01
1991 03 01.93	B	8.5	A	10	R	4	80	5	2			KOR01
1991 03 03.46	S	8.1	AC	20	L	6	46	6.5	4/		155	NAK01
1991 03 03.86	B	8.6	A	10	R	4	29	5	2			KOR01
1991 03 04.18	M	8.0	NP	5.0	B		10					HAL
1991 03 04.86	B	8.6	A	10	R	4	80	5	3			KOR01
1991 03 05.17	S	8.9	AA	20.0	L	5	35	3.1	3			MOD
1991 03 05.41	S	9.0	AA	8.0	B		15	5	1			SEA01
1991 03 06.41	S	9.0	AA	8.0	B		15	4	1			SEA01
1991 03 07.41	S	8.7	AA	8.0	B		15	4	3			SEA01
1991 03 07.71	M	8.5	SC	16	L	6	40		3	&0.08		LIN03
1991 03 07.82	B	9.0	A	10	R	4	80	3	2			KOR01
1991 03 08.46	M	8.7	AA	16	L	6	40		3			LIN03
1991 03 08.49	S	9.0	AA	8.0	B		15					SEA01
1991 03 08.84	B	9.1	A	10	R	4	80	3	2			KOR01
1991 03 09.09	M	9.4	GA	35.9	L	7	85	2.5	6			MOD
1991 03 09.10	M	8.9	GA	5.0	B		10	& 4	4			MOD
1991 03 09.15	M	9.2	GA	20.0	L	5	35	3.0	5			MOD
1991 03 09.29	S	9.2	S	20	T	10	100	1.8	4		160	PRY
1991 03 09.41	S	9.1	AA	8.0	B		15	4	2			SEA01
1991 03 09.45	S	8.8	AC	20	L	6	46	6.5	4/			NAK01
1991 03 09.56	S	9.1	AA	8.0	B		15	4	2			SEA01
1991 03 10.41	S	9.3	AA	8.0	B		15					SEA01
1991 03 10.46	S	8.1	AA	25	L	5	40	6	3			NAK05
1991 03 11.19	S	9.4	GA	20.0	L	5	35	3.0	3			MOD
1991 03 11.40	S	8.9	AA	8.0	B		15					SEA01
1991 03 11.53	M	9.0	AA	16	L	6	40		3			LIN03
1991 03 11.55	S	8.9	AA	8.0	B		15					SEA01
1991 03 11.83	E	9.5:	A	20	R	15	214	2	3			ZHU
1991 03 11.94	B	9.5	A	10	R	4	80	2.5	3			KOR01
1991 03 11.96	B	8.5	S	7.0	B		10	7.2	2			DEA
1991 03 12.23				40	L	7	100	2.0	6	0.1	145	MOD
1991 03 12.24	S	8.9	GA	5.0	B		10	& 5	2			MOD
1991 03 12.27	M	9.2	GA	20.0	L	5	35	3.5	5			MOD
1991 03 13.07	M	9.8	GA	20.0	L	5	35					MOD
1991 03 13.07	S	9.6	GA	20.0	L	5	35	2.5	2			MOD
1991 03 13.26	S	9.2	NP	5.0	B		10					HAL
1991 03 13.44	S	9.5	AC	8.0	B		15					SEA
1991 03 13.45	S	9.7	AC	15.2	L	5	47					SEA
1991 03 14.42	S	9.7	AC	15.2	L	5	47					SEA
1991 03 14.96	S	8.8	S	7.0	B		10	5.4	1			DEA
1991 03 15.21	M	9.5	GA	20.0	L	5	35	4.0	5			MOD
1991 03 15.22	S	9.4	GA	5.0	B		10	& 4	1			MOD
1991 03 16.14	M	9.4	GA	20.0	L	5	35	3.0	5	0.04	135	MOD
1991 03 16.15	S	9.3	GA	5.0	B		10	& 5	2			MOD
1991 03 16.42	S	9.8	AC	15.2	L	5	47					SEA
1991 03 17.06	S	8.3	AC	8.0	B		20	6.0	2			BOR

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 03 17.06	S	8.8	AC	31.7	L	6	55	5.4	3/			BOR
1991 03 17.19	M	9.7	GA	20.0	L	5	35	3.0	5			MOD
1991 03 17.28	M	9.2	CA	41	L	4	83					HAL
1991 03 17.31	S	9.4	S	20	T	10	100	1.9	3			PRY
1991 03 17.41	S	9.8	AC	15.2	L	5	47					SEA
1991 03 17.45	S	9.3	AC	20	L	6	46	5	4			NAK01
1991 03 18.57	P	10.5:	A	23	A	10		1	3			ZHU
1991 03 20.65	M	9.5	AA	16	L	6	40		1			LIN03
1991 03 21.12	S	9.8	GA	20.0	L	5	35	2.2	2			MOD
1991 03 21.14	S	8.6	AC	8.0	B		20	7.0	2			BOR
1991 03 21.14	S	9.1	AC	31.7	L	6	55	5.3	3			BOR
1991 04 01.86	S	10.3	AC	15.0	L	4	26	& 3	3			PER01
1991 04 02.17	M	9.8	CA	41	L	4	83					HAL
1991 04 03.08	S	9.5	AC	31.7	L	6	55	3.4	2			BOR
1991 04 03.08	S	9.5	AC	31.7	L	6	68	3.4	2/			BOR
1991 04 03.12	S	11.0	GA	35.9	L	7	85	3.0	5			MOD
1991 04 03.16	S	10.8	GA	20.0	L	5	35	3.0	3			MOD
1991 04 03.90	S	10.6	V	20.3	T	10	80	2.3	6			DAH
1991 04 05.89	S	10.8	AC	15.2	L	5	44	2	1			MOE
1991 04 06.90	S	10.3	AC	15.0	L	4	26	& 2	3			PER01
1991 04 07.14	M	11.8	GA	35.9	L	7	45	1.3	3			MOD
1991 04 07.19	S	11.8	GA	20.0	L	5	35	1.3	1			MOD
1991 04 07.91	B	10.2	AC	35	T	7	122		8			AMO
1991 04 08.82	B	10.2	AC	35	T	7	122		7			AMO
1991 04 08.87	S	10.4	AC	15.0	L	4	26	& 1	2			PER01
1991 04 08.88	S	11.8	V	20.3	T	10	133	1.0	5			DAH
1991 04 09.29	M	10.1	CA	41	L	4	83					HAL
1991 04 09.50	S	10.8	AC	20	L	6	58	2.5	3			NAK01
1991 04 09.83	S	11.2	AC	15.2	L	5	44	2	1			MOE
1991 04 09.91	S	11.7:	AC	20.3	T	10	133	0.8	5			DAH
1991 04 10.85	S	11.2	AC	20.4	L	6	72	2.2	4			JAH
1991 04 11.19	S	10.6	GA	20.0	L	5	35	2.2	2			MOD
1991 04 11.83	S	11.1	AC	20.4	L	6	72	1.5	3			JAH
1991 04 11.84	S	11.3	AC	15.2	L	5	100	2	1			MOE
1991 04 12.08	S	9.9	AC	31.7	L	6	68	2.9	2/			BOR
1991 04 13.88	B	10.3	AC	35	T	7	122		7			AMO
1991 04 14.24	M	10.4	AC	41	L	4	83					HAL
1991 04 14.45	S	10.6	AC	20	L	6	58	3.5	3			NAK01
1991 04 15.86	C	10.5	AA	20.0	T	2		3.3	6			MIK
1991 04 15.87	S	11.4	AC	15.2	L	5	100	2.5	2			MOE
1991 04 16.12	S	11.6	GA	20.0	L	5	35	1.3	1			MOD
1991 04 16.15	S	12.0	GA	35.9	L	7	45	1.2	1			MOD
1991 04 16.56	S	12.1	VN	41	L	4	90	1.2	4			PEA
1991 04 16.84	S	11.4	AC	15.2	L	5	42	2	2			MOE
1991 04 17.52	S	12.1	VN	41	L	4	90	1.3	4/			PEA
1991 04 17.89	S	11.5	AC	15.2	L	5	42	1.5	2			MOE
1991 04 18.09	S	12.0	GA	20.0	L	5	35	1.3	1			MOD
1991 04 18.12	S	12.2	GA	35.9	L	7	45	1.0	2			MOD
1991 04 18.85	S	11.5	AC	15.2	L	5	100	1.5	2			MOE
1991 04 30.46	S	12.1	AC	20	L	6	106	2				NAK01
1991 05 02.15	M	11.4	CA	41	L	4	83					HAL
1991 05 03.11	S	13.1	GA	35.9	L	7	85	0.8	1			MOD
1991 05 03.47	S	12.7	AC	20	L	6	106	1.5				NAK01
1991 05 08.14	S	13.7	GA	35.9	L	7	164	0.6	1			MOD
1991 05 11.12	S	13.6	GA	40	L	7	190	0.6	2			MOD
1991 05 12.11	S	13.5	GA	40	L	7	190	0.5	2			MOD
1991 05 12.21	M	12.5	CA	41	L	4	183					HAL
1991 05 17.22	S	12.5	AC	50.0	L	4	166	0.9	1/			BOR
1991 05 30.16	I	[12.5		41	L	4	183					HAL

Comet Levy 1990c [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 05 31.18		I[12.5		41	L	4	183					HAL
1991 06 01.18		I[13.0		41	L	4	183					HAL
1991 06 03.11		S[13.5	GA	40	L	7	190	! 0.5				MOD
1991 06 07.16		I[13.0		41	L	4	183					HAL

Comet McNaught-Hughes 1990g

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 02 14.49		I[13.0		41	L	4	183					HAL
1991 03 15.50		S 13.4	AC	41	L	4	183					HAL
1991 04 06.34		S 13.5	AC	41	L	4	183					HAL
1991 04 11.35		S 13.4	GA	40	L	7	100	0.6	2			MOD
1991 04 14.34		S 13.3	AC	41	L	4	183					HAL
1991 04 18.31		S 13.3:	GA	35.9	L	7	164	1.0	1			MOD
1991 04 23.35		S 13.1	GA	40	L	7	100	1.1	2			MOD
1991 05 08.19		S[13.7	GA	40	L	7	100	! 1.0				MOD
1991 05 11.25		S[14.2	GA	40	L	7	190	! 0.5				MOD
1991 05 12.33		S 13.3	AC	41	L	4	183					HAL
1991 05 19.41	!	S 13.4	AC	41	L	4	183					HAL
1991 06 07.22		I[13.5		41	L	4	183					HAL

Comet Tsuchiya-Kiuchi 1990i

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 07 20.90		S 9.0	AA	20.4	L	6	72	1.9	1			JAH
1990 10 22.20		S 7.4	S	11.0	L	7	32	5	5			SCH04
1990 10 23.16		B 7.4	AA	5.0	R	10	13					JAH
1990 10 23.16		S 7.2	AA	5.0	R	10	13	4.1	3			JAH
1990 10 24.18		B 7.6	AA	5.0	R	10	13					JAH
1990 10 24.18		S 7.3	AA	5.0	R	10	13	4.5	4			JAH
1990 10 25.18		B 8.1	S	20.4	L	6	72	2.5	3	&0.16	300	JAH
1990 10 25.18		S 7.9	S	20.4	L	6	72					JAH
1990 11 13.18		B 8.1	S	6.0	B		20					OLE
1990 11 13.24		S 7.1	AA	3.4	B		9	& 9	5/			PER01
1990 11 18.17		B 7.8	S	5.0	B		10					OLE
1991 02 03.03		S[12.3	GA	35.9	L	7	85	! 1.0				MOD
1991 02 04.03		S 12.3	GA	40	L	7	100	& 1	1			MOD
1991 02 07.11		S 11.5	AC	41	L	4	83		0/			HAL

Comet Arai 1991b

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 08.95		S 12.2	AC	31.6	L	5	130	1	6			MID01
1991 01 10.89		S 10.4	A	28.0	T	10	88	& 2	2/			COM
1991 01 11.98		S 10.2	A	11.0	L	7	32	5	0			SCH04
1991 01 12.68		S 10.6	SM	8.0	B		20	& 4	0			CAM03
1991 01 13.09		S 9.8	AA	20.0	R	15	10	1.8	4			LOO01
1991 01 13.12		S 10.5:	A	11.0	L	7	32	4	0			SCH04
1991 01 13.20		S 9.5	S	31.6	L	5	62	1.6	6			MID01
1991 01 13.85		S 11.5	AC	20.3	T	10	80	1.5	2			GRA04
1991 01 13.96		S 11.0	A	28.0	T	10	88	& 1.5	2			COM
1991 01 14.18		S 9.9	A	11.0	L	7	32	4	0/			SCH04
1991 01 14.87		S 10.9	AC	20.3	T	10	50	2.0	2			LUE
1991 01 14.91		S 10.9	AC	20.4	L	6	72	4.0	2			JAH
1991 01 14.95		S 9.7	A	11.0	L	7	32	7	0/			SCH04
1991 01 14.97		S 10.7	A	28.0	T	10	88	& 3	2			COM
1991 01 15.91		B 11.4	AC	20.4	L	6	72					JAH
1991 01 15.91		S 11.2	AC	20.4	L	6	72	3.0	2			JAH
1991 01 15.92		S 10.9	A	28.0	T	10	88	3	2			COM

Comet Arai 1991b [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 15.97		S 10.0:	A	11.0	L	7	32	4				SCH04
1991 01 16.13		S 10.2	AA	20.0	R	15	10	1.8	3			LOO01
1991 01 16.89		S 9.8	A	11.0	L	7	32	8	1/			SCH04
1991 01 16.91		S 11.1	A	28.0	T	10	88	& 2	1			COM
1991 01 16.91		S 12.0	AC	20.4	L	6	72	2.4	0			JAH
1991 01 17.88		S 11.3	A	28.0	T	10	88	1.5	1/			COM
1991 01 19.24		S 10.5	AA	20	T	10	63	2.4	2			PRY
1991 01 19.85		S 11.5	A	28.0	T	10	88	2	1/			COM
1991 01 20.24		S 10.6	AA	20	T	10	63	2.3	2			PRY
1991 01 27.46		S 12.0	GA	35.9	L	7	85	1.0	1			MOD
1991 02 03.08		S 12.0	GA	35.9	L	7	85	1.6	1			MOD
1991 02 04.18		S 12.0	GA	40	L	7	52	2.2	1			MOD
1991 02 04.92		S 11.8	AC	20.3	T	10	80	1.9	2			DAH
1991 02 05.21		S 11.3	AC	41	L	4	83		1			HAL
1991 02 09.14		S 12.3	GA	35.9	L	7	85	2.0	1			MOD
1991 02 13.02		B 10.5	AA	20.0	L	9	58	2.5	2			NOW
1991 02 21.31		I[12.5		41	L	4	183					HAL
1991 02 22.38		S[11.8	GA	35.9	L	7	85	! 2.0				MOD
1991 02 22.38		S[12.5	GA	35.9	L	7	85	! 1.0				MOD
1991 03 12.20		S[13.2	GA	40	L	7	100	! 1.0				MOD

Comet Shoemaker-Levy 1991d

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 02 05.29		I[13.5		41	L	4	183					HAL
1991 02 15.40		M 13.7	AC	41	L	4	183					HAL
1991 02 21.36		M 13.7	AC	41	L	4	183					HAL
1991 03 13.29		S 13.6	CA	41	L	4	183					HAL
1991 04 04.28		S 13.6	CA	41	L	4	183					HAL
1991 04 07.85		C 13.5	AA	20.0	T	2		0.5	8			MIK
1991 04 11.29		S 13.7	CA	41	L	4	244					HAL
1991 04 16.54		S 13.6	VN	41	L	4	200	0.6	4			PEA
1991 04 17.51		S 13.7	VN	41	L	4	200	0.5	4			PEA
1991 05 02.19		S 13.7	CA	41	L	4	183					HAL
1991 05 14.21		S 13.6	CA	41	L	4	183					HAL
1991 06 04.18		S 13.6	CA	41	L	4	183					HAL

Comet Helin-Lawrence 1991l

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 03 21.45		S 13.6	AC	41	L	4	183					HAL
1991 04 04.17		S 12.9	AC	50.0	L	5	157	0.5	6			BOR
1991 04 05.30		S 13.6	AC	41	L	4	244					HAL
1991 04 14.29		M 13.4	AC	41	L	4	183					HAL
1991 04 16.65		S 13.9	VN	41	L	4	200	0.6	2			PEA
1991 05 11.11		S[13.0	AC	50.0	L	5	157					BOR
1991 05 11.29		S 13.5	AC	41	L	4	183					HAL
1991 05 19.34	!	S 13.6	AC	41	L	4	183					HAL
1991 06 04.24		S 13.0	AC	41	L	4	183					HAL
1991 06 17.21	!	S 13.3	AC	41	L	4	183					HAL

Periodic Comet Encke

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1961 01 04.06		9.0	UM	20.3	L		42					MCC03
1961 01 07.06		8.5	UX	20.3	L			& 5				MEI01
1961 01 07.06		8.6	S	20.3	L			& 5				MEI01
1961 01 10.11				43.2	L		120	& 2.5				HAA
1961 01 10.9		9.8		10.2	R		50					KEL01

Periodic Comet Encke [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1961 01 16.9		7.9		10.2	R		50	2				KEL01
1980 10 14.79	B	10.5	NP	15	L	6	28	5				KAN
1980 10 27.81	B	8.8	S	15	L	6	28	& 7				KAN
1980 10 27.82	S	8.1	S	6	R	12	22	9	1			TAN01
1980 10 29.78	B	7.8	S	20	L	6	38	12	4			ISH02
1980 10 29.82	B	7.7	S	7.0	B		10					KAN
1980 10 31.76	B	7.6	S	20	L	6	38	13	4			ISH02
1980 10 31.80	B	7.6	S	7.0	B		10					KAN
1980 10 31.81	S	7.9	S	6	R	12	22	7	2			TAN01
1980 11 01.80	B	7.5	S	7.0	B		10					KAN
1980 11 01.82	S	7.8	S	15	L	6	30	11	3			TAN01
1980 11 02.81	B	7.2	S	7.0	B		10	& 7				KAN
1980 11 03.81	B	7.3	S	7.0	B		10	15	6			ISH02
1980 11 03.81	B	7.6	S	7.0	B		10					KAN
1980 11 03.82	S	7.6	S	15	L	6	30	8	3			TAN01
1980 11 05.83	B	7.5	S	7.0	B		10					KAN
1980 11 06.84	B	7.5	S	7.0	B		10					KAN
1980 11 07.82	B	7.3	S	7.0	B		10					KAN
1980 11 08.82	B	7.1	S	7.0	B		10	20	6			ISH02
1980 11 08.84	B	7.2	S	7.0	B		10					KAN
1980 11 09.82	S	7.3	S	15	L	6	30	5	3			TAN01
1980 11 09.83	B	7.1	S	7.0	B		10					KAN
1980 11 10.83	B	7.4	S	7.0	B		10					KAN
1980 11 10.83	S	7.1	S	15	L	6	30	5	3			TAN01
1980 11 11.84	B	7.3	S	7.0	B		10					KAN
1980 11 14.84	B	6.8	S	7.0	B		10	15	7			ISH02
1980 11 14.84	S	6.8	S	15	L	6	30	4	5			TAN01
1980 11 17.84	S	6.8	S	15	L	6	30	4	5			TAN01
1980 11 18.84	S	6.6	S	15	L	6	30	4	5			TAN01
1980 11 18.85	B	7.0	S	7.0	B		10					KAN
1980 11 26.85	B	7.5	S	8.0	B		15					KAN
1980 11 26.85	S	6.4	S	15	L	6	30					TAN01
1990 09 17.10	B	9.7	AA	20.4	L	6	72					JAH
1990 09 17.10	S	9.4	AA	20.4	L	6	72	4.3	1			JAH
1990 09 18.07	S	9.6	S	7.0	B		16	3	5			LUE
1990 09 18.08	S	9.3	A	28.0	T	10	89	& 4	2	?		COM
1990 09 19.12	S	9.4	S	7.0	B		16	3	2			LUE
1990 09 20.09	S	9.4	S	7.0	B		16	4	1			LUE
1990 09 27.14	S	8.7	A	11.0	L	7	32	6	0/			SCH04
1990 09 29.14	S	8.6	A	11.0	L	7	32	5	3			SCH04
1990 10 01.15	S	8.5	AA	20.3	T	10	80	3	3			BRE02
1990 10 05.14	S	9.0:	S	20.4	L	6	72	1.5	2			JAH
1990 10 08.18	S	8.2:	S	11.0	L	7	32	4	7			SCH04

Periodic Comet Grigg-Skjellerup (1982 IV)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 05 21.50	S	10.8	AC	15	L	6	50	2.5				KAN
1982 05 21.50	S	10.9	AC	15	L	6	50	4	2			NAK01
1982 05 22.48	S	10.2	AC	15	L	6	28	4.5	1			KAN

Periodic Comet Clark (1989 XX)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 03 13.40	S	14.8:	AC	154.9	L	13	654	0.2	3			LEV

Periodic Comet Pons-Winnecke (1989 VIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 05 07.28	S	16.0:	AC	154.9	L	13	654	0.2	4			LEV

Periodic Comet Tempel 2 (1988 XIV)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 06 13.25	S	13.5:	AC	154.9	L	13	654	0.2	8			LEV

Periodic Comet Honda-Mrkos-Pajdušáková (1990f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1959 05 28.19		[11 :		14.0	A	5						MCC02
1990 07 23.03	S	12.5:		20.4	L	6	72	& 1.1	0			JAH
1990 08 03.06	S	12.0	AC	20.4	L	6	72	1.6	1			JAH
1990 08 24.11	S	8.5:	A	11.0	L	7	32	& 5	1			SCH04
1990 09 17.15	B	8.9	AG	20.4	L	6	72	& 1.0	3			JAH
1990 09 18.17	S	8.4	S	7.0	B		16	2	8			LUE
1990 09 18.18	B	8.8	S	7.0	B		16					LUE

Periodic Comet Hartley 1 (1991j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 04 06.30	I	[13.5		41	L	4	183					HAL
1991 04 14.31	I	[13.5		41	L	4	183					HAL
1991 04 16.68	S	13.9	VN	41	L	4	200	0.5	2/			PEA
1991 04 18.32	S	14.1	AC	41	L	4	183					HAL
1991 04 22.46	! S	13.9	AC	41	L	4	183					HAL
1991 05 14.25	I	[13.5		41	L	4	183					HAL

Periodic Comet Mrkos (1991k)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 03 21.41	M	13.8	AC	41	L	4	183					HAL
1991 03 22.60	I	13.8	GA	25.4	L	4	114		9			SEA
1991 04 06.28	I	[14.0		41	L	4	244					HAL
1991 04 16.62	S	14.2	VN	41	L	4	200	0.4	5			PEA
1991 04 17.62	S	14.1	VN	41	L	4	200	0.5	5			PEA

Periodic Comet d'Arrest (1982 VII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 08 20.53	S	11.4	AC	20	L	6	38	4.5	2			NAK01
1982 08 20.53	S	11.4	AC	20	L	6	96	3	1			WAT01
1982 10 20.40	S	10.7	AC	15	L	6	50	3.5				NAK01

Periodic Comet Finlay (1960 VIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1960 09 01.33		11.5:	UM	15.2	L	8	48	3				KNA

Periodic Comet Borrelly (1987 XXXIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 04 09.33	S	12.4	AC	154.9	L	13	654	2	7			LEV

Periodic Comet Giacobini-Zinner (1959 VIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1959 09 21.04		10.8		20.3	L		42	4			60	MEI01
1959 10 21.99		9.3:		15.2	L	10	37	& 4	7	?	90	BOR
1959 10 23.7		7.2:	UA	7.0	B		12			&0.5		MCC02
1959 10 24.15		7.5		20.3	L	8	70					SHA05
1959 10 25.10		7.5		20.3	L	8	70					SHA05
1959 10 26.10		8.2		20.3	L	8	70					SHA05
1959 10 29.00		8.9:		15.2	L	10	37	& 4	7	?	135	BOR
1959 11 03.6	O	6.6	BC	7.0	B		12			&0.58	295	MCC02

Periodic Comet Taylor (1990n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 02 06.29	I	[13.5		41	L	4	183					HAL
1991 06 15.19	I	[13.0		41	L	4	183					HAL

Periodic Comet Schwassmann-Wachmann 2 (1981 VI = 1987 XIX)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 01 25.51	S	13.0	AC	31	L	6	100					KAN
1981 01 31.54	S	12.0	AC	31	L	6	56	1				KAN
1981 01 31.55	S	12.1	AC	31	L	6	56	1	2			ISH02
1981 01 31.55	S	12.4	AC	31	L	6	56	& 1.5	0			OHT
1981 01 31.57	S	12.3	AC	31	L	6	56					NII
1981 02 04.61	S	12.6	AC	31	L	6	100					NII
1981 02 04.61	S	12.6	AC	31	L	6	100	& 1				KAN
1981 02 27.61	S	13.5	AC	31	L	6	144	0.7				KAN
1988 04 09.40	S	14.1	AC	154.9	L	13	654	2	7			LEV

Periodic Comet Gunn (1989 XI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 05 04.01	S	13.0	AC	36	T	11	434	0.5	4	?		KOR
1988 05 06.99	S	12.8	AC	36	T	11	434	0.7	3	?		KOR
1989 05 27.59	S	12.7	AC	31	L	6	112	2	3			KOB01
1989 05 31.58	S	12.6	AC	31	L	6	112	2	3			KOB01
1989 08 11.66	S	12.8	AC	31	L	6	112	1.1	4			KOB01

Periodic Comet Wild 2 (1989t)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 11 15.45	S	12.0	GA	35.9	L	7	85	1.2	1			MOD
1990 11 16.45	S	12.0	GA	35.9	L	7	85	1.2	1			MOD
1990 11 18.45	S	12.0	GA	35.9	L	7	85	1.2	1			MOD
1990 12 20.42	S	11.8:	GA	35.9	L	7	85	1.1	1			MOD
1991 01 24.53	S	12.7	AC	41	L	4	183					HAL
1991 01 27.48	S	12.2	GA	35.9	L	7	85	0.6	1			MOD
1991 02 17.53	S	12.6	AC	41	L	4	183					HAL
1991 02 22.44	S	12.4	GA	35.9	L	7	85	0.7	1			MOD
1991 03 15.42	S	12.8	GA	40	L	7	100	0.5	1			MOD
1991 03 17.51	S	12.7	AC	41	L	4	183					HAL
1991 04 11.40	S	13.2	GA	40	L	7	100	0.4	1			MOD
1991 04 11.48	S	12.8	AC	41	L	4	183					HAL
1991 04 17.85	S	13.0	AC	41	L	4	200	0.8	3/			PEA
1991 04 18.39	S	12.8	AC	41	L	4	183					HAL
1991 04 23.38	S	13.4	GA	40	L	7	190	0.35	4			MOD
1991 04 23.80	S	13.2	VN	41	L	4	200	0.6	3			PEA
1991 04 24.85	S	13.2	VN	41	L	4	200					PEA
1991 04 25.39	S	13.4	GA	40	L	7	190	0.35	2			MOD
1991 04 26.89	S	13.2	VN	41	L	4	200	0.6	3			PEA
1991 05 11.35	S	13.3	GA	40	L	7	190	0.30	1			MOD
1991 05 12.38	M	12.6	AC	41	L	4	183					HAL
1991 05 19.45	S	12.9	AC	41	L	4	183					HAL
1991 05 20.35	S	13.4	GA	40	L	7	190	0.30	3			MOD
1991 06 05.31	M	12.8	AC	41	L	4	183					HAL
1991 06 15.29	S	13.2	AC	41	L	4	183					HAL

Periodic Comet Takamizawa (1991h)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 05.23	I	[13.0		41	L	4	183					HAL

Periodic Comet Hartley 2 (1991t)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 07 16.07	S	10.0	AC	20.0	L	4	40	5	5			MIK
1991 07 20.05	S	10.3	AC	20.0	L	4	40	& 3.5	3			MIK

Periodic Comet Hartley 3 (1987 XII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 03 16.35	S	15.6	AC	154.9	L	13	654	1	0			LEV

Periodic Comet Wild 4 (1990a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 01 25.29	S	13.0:	AC	154.9	L	13	654	1	0			LEV

Periodic Comet Shoemaker-Levy 3 (1991e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 02 21.31	I	[13.5		41	L	4	183					HAL

Periodic Comet Faye (1991n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 18.44	I	[13.5		41	L	4	183					HAL

Periodic Comet Metcalf-Brewington (1991a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 01 08.13	S	9.2	GA	20.0	L	5	35	1.8	4			MOD
1991 01 10.48	S	8.3	SM	8.0	B		20	3	4	?		CAM03
1991 01 12.49	S	9.4	SM	8.0	B		20	3	3		70	CAM03
1991 01 13.47	S	9.6	SM	8.0	B		20	3	3			CAM03
1991 01 13.49	S	9.0	AC	6.0	B		20	5	2			BOA
1991 01 13.74	S	9.1	A	11.0	L	7	32	4	3			SCH04
1991 01 13.79	S	8.8	S	20.3	T	10	80	2.8	2/			GRA04
1991 01 13.98	B	9.2	AA	20	L	9	58	3	5			NOW
1991 01 14.46	S	9.4	SM	8.0	B		20	2	4	0.09	70	CAM03
1991 01 14.74	S	8.4	AC	20.4	L	6	72	3.2	4	&0.20	57	JAH
1991 01 14.74	S	9.0	S	20.4	L	6	72					JAH
1991 01 14.75	S	8.6	A	20.0	T	10	77	2	3			COM
1991 01 14.75	S	8.6	AC	5.0	R	10	13		1			JAH
1991 01 14.78	S	8.7	S	20.3	T	10	50	4.0	3			LUE
1991 01 15.03	S	9.3	GA	20.0	L	5	35	2.0	3			MOD
1991 01 15.74	S	8.9	A	11.0	L	7	32	4	1			SCH04
1991 01 15.75	S	8.7:	AA	5.0	B		10	& 4	2			MEY
1991 01 15.76	B	9.3	S	20.4	L	6	72					JAH
1991 01 15.76	S	8.9	AC	20.4	L	6	72	2.2	3	&0.10	114	JAH
1991 01 15.76	S	9.0	S	20.4	L	6	72					JAH
1991 01 16.73	S	9.0	S	20.4	L	6	72	2.5	2			JAH
1991 01 16.74	S	8.7	AA	5.0	B		10	3	2			MEY
1991 01 16.75	S	8.8	A	20.0	T	10	77	& 2.5	2			COM
1991 01 16.76	S	8.8	S	11.0	L	7	32	4	2/			SCH04
1991 01 17.73	S	9.5	AA	20.0	R	8	30	1.2	4			LOO01
1991 01 17.75	S	8.8	AA	5.0	B		10	& 3	3			MEY
1991 01 17.78	S	9.5:	S	20.4	L	6	72	1.7	1			JAH
1991 01 18.75	S	8.8	AA	5.0	B		10	3	6			MEY
1991 01 18.78	S	9.2:	A	20.0	T	10	77	& 2	2			COM
1991 01 19.04	S	10.0:	GA	35.9	L	7	85	& 2.0	3			MOD
1991 01 19.09	S	8.5	AA	20	T	10	63	3.1	4			PRY
1991 01 19.77	S	9.3	A	20.0	T	10	77	& 2.5	2/			COM
1991 01 20.16	S	8.6	AA	20	T	10	63	3.0	4			PRY

Periodic Comet Metcalf-Brewington (1991a) [cont.]

DATE (UT)		MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1991 01 21.74		S	10.4:	AC	20.3	T	10	80		2.1	4			DAH
1991 01 23.12		S	9.6	WA	41	L	4	83						HAL
1991 01 26.04		S	9.5	GA	20.0	L	5	35		1.2	1			MOD
1991 01 28.74		S	9.9	AC	20.3	T	10	80		3				DAH
1991 02 03.04		M	10.5	GA	35.9	L	7	85		2.2	4			MOD
1991 02 04.09		S	10.5	GA	40	L	7	52		2.0	3			MOD
1991 02 04.76		S	10.2	A	20.0	T	10	77		2.5	2			COM
1991 02 05.14		M	9.4	AC	41	L	4	83						HAL
1991 02 05.75		S	10.3	AC	20.3	T	10	80		2.8	3			DAH
1991 02 09.04		M	10.5	GA	35.9	L	7	85		1.7	4			MOD
1991 02 09.07		S	10.2	GA	20.0	L	5	35		1.7	2			MOD
1991 02 10.12		S	9.5	AA	20	T	10	100		2.2	2			PRY
1991 02 10.49		M	10.0	AA	16	L	6	40			1			LIN03
1991 02 11.04		S	10.2	GA	20.0	L	5	88		1.5	1			MOD
1991 02 14.12		M	9.5	AC	41	L	4	83			4			HAL
1991 02 22.15		S	9.7	AC	41	L	4	83						HAL
1991 02 28.92		B	9.8	A	10	R	4	80		3	2			KOR01
1991 03 03.88		B	10.0	A	10	R	4	80		3	2			KOR01
1991 03 04.16		S	10.2	PC	41	L	4	83						HAL
1991 03 04.90		B	10.0	A	10	R	4	80		3	2			KOR01
1991 03 08.88		B	10.1	A	10	R	4	80		3	2			KOR01
1991 03 15.04		S	11.5	GA	40	L	7	52		2.0	2			MOD
1991 03 15.14	!	S	10.6	PC	41	L	4	83			0/			HAL
1991 03 17.05		S	11.7	GA	35.9	L	7	85		1.3	1			MOD
1991 04 03.06		S[	12.5	GA	40	L	7	100	!	1.0				MOD

Periodic Comet Wolf-Harrington (1990e)

DATE (UT)		MM	MAG.	RF	AP.	T	F/	PWR		COMA	DC	TAIL	PA	OBS.
1990 11 15.21		S[	13.0	GA	35.9	L	7	85	!	1.0				MOD
1990 12 08.07		S	13.8	GA	40	L	7	100		0.6	1			MOD
1990 12 12.03		S	13.6	GA	40	L	7	100		0.6	2			MOD
1990 12 20.15		S[	12.5	GA	35.9	L	7	85	!	1.0				MOD
1991 02 03.07		S[	12.6	GA	35.9	L	7	85	!	1.0				MOD
1991 02 04.06		S	12.5	GA	40	L	7	100		0.8	1			MOD
1991 02 04.78		S	13.2:	A	28.0	T	10	89	&	3	1			COM
1991 02 05.13		S	12.7	AC	41	L	4	183						HAL
1991 02 17.13		S	12.6	AC	41	L	4	183						HAL
1991 03 09.06		S[	12.6	GA	35.9	L	7	85	!	1.0				MOD
1991 03 12.07		S	13.3	GA	40	L	7	100		0.30	1			MOD
1991 03 13.15	!	S	12.5	PC	41	L	4	183						HAL
1991 03 17.06		S[	13.0	GA	35.9	L	7	85	!	0.5				MOD
1991 03 17.15	!	S	12.6	PC	41	L	4	183						HAL
1991 04 02.14		S	12.3	PC	41	L	4	183						HAL
1991 04 03.08		S[	13.0	GA	40	L	7	190	!	0.5				MOD
1991 04 04.13	!	S	12.3	WA	41	L	4	183						HAL
1991 04 07.07		S[	12.5	GA	40	L	7	190	!	0.5				MOD
1991 04 16.47		S	12.9	VN	41	L	4	200		0.9	2			PEA
1991 04 17.47		S	13.1	VN	41	L	4	200		0.6	1/			PEA

Periodic Comet Shoemaker-Holt 2 (1988 XI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 03 14.36	S	13.0:	AC	154.9	L	13	654	1.2	4	0.05	270	LEV

Periodic Comet Swift-Gehrels (1981 XIX = 1991c)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 01 15.39	S	10.9	AC	15	L	6	28	3				KAN

Periodic Comet Swift-Gehrels (1981 XIX = 1991c) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 01 17.40	S	10.7	AC	15	L	6	28	7	0			KAN
1982 01 19.42	S	11.0	AC	15	L	6	28	6	0			KAN
1982 01 21.42	S	11.0	AC	15	L	6	28	7	0			KAN
1982 01 21.52	S	12.0	AC	31	L	6	72					NII
1982 01 23.51	S	11.6	AC	31	L	6	72	& 4				NII
1982 01 25.43	S	11.9	AC	15	L	6	50	2				KAN
1991 02 05.10	I[	12.5		41	L	4	183					HAL
1991 02 14.10	I[	12.5		41	L	4	183					HAL
1991 03 04.12	I[	12.5		41	L	4	183					HAL
1991 03 13.12	! S	12.4	PC	41	L	4	183					HAL
1991 03 17.12	! S	12.5	PC	41	L	4	183					HAL
1991 04 06.14	I[	12.0		41	L	4	183					HAL

Periodic Comet Schaumasse (1960 III)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1960 04 14.05		10.9:		20.3	L		80	4	5	?	30	MEI01
1960 04 19.10	N	12 :		20.3	L		80	& 6	5	?	55	MEI01
1960 04 19.14		11.5:		20.3	L	8	70	& 3	0	?	210	SHA05
1960 04 20.14		11.5:		20.3	L	8	70	& 3	0			SHA05
1960 04 21.13		12 :		20.3	L	8	70	& 3	0			SHA05
1960 04 22.15		11.5:		20.3	L	8	70	& 3	0			SHA05

Periodic Comet Kearns-Kwee (1981 XX = 1989u)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 12 05.69	S	14.0	AC	31	L	6	144					NII
1981 12 05.69	S	14.0	AC	31	L	6	144	0.9				KAN
1990 10 01.40	S[	13.3	GA	40	L	7	100	! 1.0				MOD
1990 10 20.29	S[	13.5	GA	35.9	L	7	85	! 1.0				MOD
1990 11 15.29	S[	13.5	GA	35.9	L	7	85	! 1.0				MOD
1990 11 16.36	S[	13.5	GA	35.9	L	7	85	! 1.0				MOD
1990 12 08.18	S[	13.7	GA	40	L	7	100	! 1.0				MOD
1990 12 12.42	S	14.0	GA	40	L	7	100	0.30	2			MOD
1990 12 20.39	S	13.8	GA	35.9	L	7	85	0.4	1			MOD
1991 02 03.14	S[	14.0	GA	35.9	L	7	85	! 0.5				MOD
1991 02 04.19	S[	14.2	GA	40	L	7	100	! 0.5				MOD
1991 02 06.28	I[	13.5		41	L	4	183					HAL
1991 02 09.32	S[	13.2	GA	40	L	7	100	! 0.5				MOD
1991 02 15.27	I[	13.5		41	L	4	183					HAL
1991 03 12.16	S[	14.2	GA	40	L	7	100	! 0.5				MOD

Periodic Comet Parker-Hartley (1987 XXXVI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 03 13.37	S	14.6:	AC	154.9	L	13	654	0.3	1			LEV

Periodic Comet Halley (1986 III)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1986 03 03.17	S	3.3:	AA	6.3	B		9					ZAN
1990 02 21.14	V	24.4	HE	154	C	8		0.0	9			WES01
1990 02 22.18	V	24.6	HE	154	C	8		0.0	9			WES01
1990 02 23.20	V	24.2	HE	154	C	8		0.0	9			WES01
1990 02 24.20	V	24.2	HE	154	C	8		0.0	9			WES01
1991 02 12.3	V	18.93	HE	154	C	8		+ 1.00				HAI
1991 02 12.3	V	19.13	HE	154	C	8		+ 0.50				HAI
1991 02 12.3	V	19.70	HE	154	C	8		+ 0.25				HAI
1991 02 12.3	V	20.30	HE	154	C	8		+ 0.17				HAI

Periodic Comet Halley (1986 III) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 02 12.3	V	1.30	HE	154	C	8		+ 0.08				HAI
1991 02 13.2	V	19.10	HE	154	C	8		+ 1.00		?	225	HAI
1991 02 13.2	V	19.19	HE	154	C	8		+ 0.50				HAI
1991 02 13.2	V	19.79	HE	154	C	8		+ 0.25				HAI
1991 02 13.2	V	20.41	HE	154	C	8		+ 0.17				HAI
1991 02 13.2	V	21.41	HE	154	C	8		+ 0.08				HAI
1991 02 14.2	V	18.83	HE	154	C	8		+ 1.00				HAI
1991 02 14.2	V	19.14	HE	154	C	8		+ 0.50				HAI
1991 02 14.2	V	19.78	HE	154	C	8		+ 0.25				HAI
1991 02 14.2	V	20.41	HE	154	C	8		+ 0.17				HAI
1991 02 14.2	V	21.40	HE	154	C	8		+ 0.08				HAI
1991 02 15.3	V	20.2:	HE	358	C	11		+ 0.25				HAI
1991 02 15.3	V	20.35	HE	358	C	11		+ 0.17				HAI
1991 02 15.3	V	21.21	HE	358	C	11		+ 0.08				HAI
1991 02 15.4	R	19.3	L	220	C	4		+ 0.17				MEE
1991 02 15.4	R	20.4	L	220	C	4		+ 0.08				MEE
1991 02 16.2	V	20.2:	HE	358	C	11		+ 0.25				HAI
1991 02 16.2	V	20.4:	HE	358	C	11		+ 0.17				HAI
1991 02 16.2	V	21.2:	HE	358	C	11		+ 0.08				HAI
1991 02 17.2	V	20.3:	L	220	C	8		+ 0.25				GIR
1991 02 17.2	V	20.44	L	220	C	8		+ 0.17				GIR
1991 02 17.2	V	21.21	L	220	C	8		+ 0.08				GIR
1991 02 18.89	V	19.5:		61	L			& 0.62		?	225	BUI
1991 02 18.89	V	21.6		61	L			+ 0.11				BUI
1991 02 19.85	V	20.0		61	L			0.42				BUI
1991 02 19.85	V	21.6		61	L			+ 0.11				BUI
1991 03 06.1	V	19.3:	HE	358	C	11						HAI
1991 03 06.1	V	20.5:	HE	358	C	11		+ 0.25				HAI
1991 03 06.1	V	20.9:	HE	358	C	11		+ 0.17				HAI
1991 03 06.1	V	21.8:	HE	358	C	11		+ 0.08				HAI
1991 03 11.2	V	19.35	HE	358	C	11		+ 0.50				HAI
1991 03 11.2	V	20.39	HE	358	C	11		+ 0.25				HAI
1991 03 11.2	V	21.09	HE	358	C	11		+ 0.17				HAI
1991 03 11.2	V	22.17	HE	358	C	11		+ 0.08				HAI
1991 03 12.2	V	18.90	HE	154	C	8		+ 1.00				WES01
1991 03 12.2	V	19.37	HE	154	C	8		+ 0.50				WES01
1991 03 12.2	V	20.38	HE	154	C	8		+ 0.25				WES01
1991 03 12.2	V	21.01	HE	154	C	8		+ 0.17				WES01
1991 03 12.2	V	22.09	HE	154	C	8		+ 0.08				WES01
1991 03 13.2	V	19.12	HE	154	C	8		+ 1.00				WES01
1991 03 13.2	V	19.57	HE	154	C	8		+ 0.50				WES01
1991 03 13.2	V	20.59	HE	154	C	8		+ 0.25				WES01
1991 03 13.2	V	21.24	HE	154	C	8		+ 0.17				WES01
1991 03 13.2	V	22.29	HE	154	C	8		+ 0.08				WES01
1991 03 14.2	V	19.05	HE	154	C	8		+ 1.00				WES01
1991 03 14.2	V	19.50	HE	154	C	8		+ 0.50				WES01
1991 03 14.2	V	20.53	HE	154	C	8		+ 0.25				WES01
1991 03 14.2	V	21.13	HE	154	C	8		+ 0.17				WES01
1991 03 14.2	V	22.12	HE	154	C	8		+ 0.08				WES01
1991 03 15.2	V	19.05	HE	154	C	8		+ 1.00				WES01
1991 03 15.2	V	19.50	HE	154	C	8		+ 0.50				WES01
1991 03 15.2	V	20.53	HE	154	C	8		+ 0.25				WES01
1991 03 15.2	V	21.13	HE	154	C	8		+ 0.17				WES01
1991 03 15.2	V	22.12	HE	154	C	8		+ 0.08				WES01
1991 03 16.2	V	19.12	HE	154	C	8		+ 1.00				WES01
1991 03 16.2	V	19.51	HE	154	C	8		+ 0.50				WES01
1991 03 16.2	V	20.55	HE	154	C	8		+ 0.25				WES01
1991 03 16.2	V	21.16	HE	154	C	8		+ 0.17				WES01
1991 03 16.2	V	22.17	HE	154	C	8		+ 0.08				WES01

Periodic Comet Halley (1986 III) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 03 17.2	V	19.07	HE	154	C	8		+ 1.00				WES01
1991 03 17.2	V	19.42	HE	154	C	8		+ 0.50				WES01
1991 03 17.2	V	20.43	HE	154	C	8		+ 0.25				WES01
1991 03 17.2	V	21.04	HE	154	C	8		+ 0.17				WES01
1991 03 17.2	V	21.98	HE	154	C	8		+ 0.08				WES01
1991 03 18.2	V	19.30	HE	154	C	8		+ 1.00				WES01
1991 03 18.2	V	19.64	HE	154	C	8		+ 0.50				WES01
1991 03 18.2	V	20.69	HE	154	C	8		+ 0.25				WES01
1991 03 18.2	V	21.29	HE	154	C	8		+ 0.17				WES01
1991 03 18.2	V	22.14	HE	154	C	8		+ 0.08				WES01
1991 04 12.0	V	22.0:	HE	358	C	11		+ 0.25				HAI
1991 04 12.0	V	22.4:	HE	358	C	11		+ 0.17				HAI
1991 04 12.0	V	23.4:	HE	358	C	11		+ 0.08				HAI
1991 04 12.3	R	21.5:	L	220	C	11		+ 0.08				MEE

Periodic Comet Tuttle (1980 XIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 10 31.77	B	9.5	S	15	L	6	28	5				KAN
1980 10 31.79	B	9.5	S	20	L	6	38	4	4			ISH02
1980 11 01.81	B	9.3	S	10	L	10	56	3				ICH
1980 11 01.81	S	9.2	S	15	L	6	30	2	3			TAN01
1980 11 02.76	B	9.4	S	10	L	10	25	2				ICH
1980 11 02.83	B	9.2	S	20	L	6	38	6	5			ISH02
1980 11 03.78	B	9.0	S	15	L	6	28	5				KAN
1980 11 03.80	B	9.2	S	20	L	6	38	6	5			ISH02
1980 11 03.80	S	9.2	S	15	L	6	30	5	2			TAN01
1980 11 05.78	B	8.7	S	15	L	6	28	5				KAN
1980 11 05.80	B	9.0	S	20	L	6	38	8	5			ISH02
1980 11 06.78	B	8.9	S	15	L	6	28	5				KAN
1980 11 07.79	B	8.6	S	15	L	6	28					KAN
1980 11 08.78	B	8.1	S	7.0	B		10					KAN
1980 11 08.78	B	8.8	S	20	L	6	38	10	5			ISH02
1980 11 09.77	B	8.1	S	7.0	B		10					KAN
1980 11 09.81	S	8.8	S	15	L	6	30	5	4			TAN01
1980 11 10.78	B	8.2	S	7.0	B		10					KAN
1980 11 10.78	B	8.3	S	20	L	6	38	10	5			ISH02
1980 11 10.81	S	8.4	S	15	L	6	30	6	3			TAN01
1980 11 11.79	B	8.2	S	7.0	B		10					KAN
1980 11 14.77	B	8.2	S	7.0	B		10	7				KAN
1980 11 14.81	B	8.7	S	15	L	6	30	4	5			TAN01
1980 11 17.79	B	8.1	S	7.0	B		10					KAN
1980 11 17.81	B	8.5	S	15	L	6	30	4	4			TAN01
1980 11 18.79	B	8.4	S	15	L	6	30	4	4			TAN01
1980 11 18.80	B	8.0	S	7.0	B		10					KAN
1980 11 26.81	B	7.9	S	7.0	B		10					KAN
1980 11 26.83	S	8.1	S	15	L	6	30	4	4			TAN01
1980 11 26.86	B	8.0	S	10	L	10	40	4				ICH
1980 12 01.79	B	7.8	S	7.0	B		10					KAN
1980 12 01.79	B	8.0	S	20	L	6	38	10	5			ISH02
1980 12 03.79	B	8.4	S	20	L	6	38	8	5			ISH02
1980 12 03.80	S	7.8	S	15	L	6	28	5	4			TAN01
1980 12 04.79	B	7.3	S	6	R	12	22	5				ICH
1980 12 04.79	B	8.1	S	20	L	6	38	12	6			ISH02
1980 12 04.82	B	7.2	S	7.0	B		10	& 6				KAN
1980 12 05.82	B	7.9	S	20	L	6	38	12	6			ISH02
1980 12 06.81	B	7.1	S	7.0	B		10					KAN
1980 12 07.82	S	7.3	S	15	L	6	28	5	4			TAN01
1980 12 09.82	B	7.5	S	20	L	6	38	10	6			ISH02

Periodic Comet Tuttle (1980 XIII) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 09.83	B	7.3	S	7.0	B		10					KAN
1980 12 10.82	B	7.3	S	7.0	B		10					KAN
1980 12 11.82	B	7.3	S	7.0	B		10					KAN
1980 12 12.83	B	7.4	S	7.0	B		10					KAN
1980 12 13.80	B	7.4	S	7.0	B		10					KAN
1980 12 13.81	B	7.3	S	7.0	B		10	15	5			ISH02
1980 12 13.82	S	7.5	S	15	L	6	28	5	4			TAN01
1980 12 14.84	B	7.5	S	7.0	B		10					KAN
1980 12 15.84	B	7.5	S	7.0	B		10					KAN
1980 12 16.84	B	7.6	S	8.0	B		15					KAN

Periodic Comet Brorsen-Metcalf (1989 X)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 07 26.70	B	8.7	S	8	R	8	30	7	3/			OBU
1989 07 27.65	B	8.4	S	8	R	8	30	10	3/			OBU
1989 07 28.67	B	7.2	AA	25	L	5	40	8	4			NAK05
1989 07 28.76	M	7.5	S	31	L	4	40	8	4			TSU02
1989 07 28.77	S	7.9	AA	31	L	6	62	12	5	0.17	270	KOB01
1989 07 29.75	**B**	**6.6**	**AA**	**3**	**R**		**6**	**12**	**3**			**NAK05**
1989 08 03.70	B	7.2	S	8	R	8	30		3/			OBU
1989 08 04.69	S	7.4	AC	10.0	B		20					HIR01
1989 08 04.71	B	7.3	S	8	R	8	30		3/			OBU
1989 08 04.77	B	6.4	AA	7	R		11					NAK05
1989 08 05.67	B	7.2	S	6	R	8	20	10	4			OBU
1989 08 07.75	B	6.9	S	8	R	8	30	8	5			OBU
1989 08 08.67	S	6.9	S	15.0	B		25	8	5			TAK05
1989 08 08.79	M	6.8	S	3.5	B		7	9	5			TSU02
1989 08 09.36	B	7.5	AC	15.2	L	5	30	4				HER02
1989 08 10.75	B	6.9	S	8	R	8	30	7	4/			OBU
1989 08 11.75	B	6.7	AA	8	R	8	30	7	5			OBU
1989 08 11.77	B	6.7	S	5.0	B		7	9	3	0.25	280	AKI01
1989 08 11.77	M	6.6	AA	3.5	B		7	7				TSU02
1989 08 11.77	S	6.1	AA	7.0	B		10	7	5	1.7	275	KOB01
1989 08 12.74	M	6.4	AA	3.5	B		7	8				TSU02
1989 08 12.79	S	6.0	AA	7.0	B		10	7	5	1.5	280	KOB01
1989 08 13.74	B	5.9	AA	14	S	4	12		6			NAK05
1989 08 13.75	S	6.7	S	15.0	B		25	8	6			TAK05
1989 08 13.77	B	6.3	S	5.0	B		7	10	3	0.25	280	AKI01
1989 08 14.74	S	6.5	S	15.0	B		25	6	6			TAK05
1989 08 15.75	B	6.4	AA	8	R	8	30	7	5/			OBU
1989 08 20.75	B	6.0	S	8	R	8	30	5	5/			OBU
1989 08 20.82	S	6.0	AA	31	L	6	62	7	5	0.42	280	KOB01
1989 08 21.73	S	6.0	S	15.0	B		25	5		0.8		TAK05
1989 08 21.79	S	5.8	AA	7.0	B		10	5	5	1.2	280	KOB01
1989 08 22.76	B	6.2	AA	8	R	8	30	5	6			OBU
1989 08 24.78	B	6.3	AA	8	R	8	30	4	6/	>0.5	290	OBU
1989 08 25.78	B	6.2	AA	8	R	8	30	4	6/			OBU
1989 08 26.39	B	6.0	AC	15.2	L	5	30	2.5				HER02
1989 08 28.79	B	6.1	AA	8	R	8	30	4	6/	>0.5	290	OBU
1989 08 28.80	M	6.0	AA	3.5	B		7					TSU02
1989 08 29.77	B	6.2	S	8	R	8	30	4	6/	>1	290	OBU
1989 08 29.79	S	5.2	S	15.0	B		25	5	7	2.8		TAK05
1989 08 31.80	B	6.2	S	8	R	8	30	3	7/			OBU
1989 09 03.38	B	5.5	AC	15.2	L	5	30	3		0.20		HER02
1989 09 03.79	M	5.6	AA	3.5	B		7					TSU02
1989 09 03.80	S	5.5	AA	7.0	B		10	6	6	3.0	310	KOB01
1989 09 04.39	B	5.5	AC	15.2	L	5	119					HER02
1989 09 08.81	M	5.4	AA	3.5	B		7					TSU02

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

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 09 09.82	S	5.6	AA	7.0	B		10	4	7	2.0	300	KOB01
1989 09 10.80	S	6.0	S	15.0	B		25			1.5		TAK05
1989 09 10.81	M	5.4	AA	3.5	B		7					TSU02
1989 09 11.82	S	5.4	AA	7.0	B		10	4	7	1.0	310	KOB01
1989 09 17.83	S	6.0	AA	31	L	6	62	3.5	6	0.2	310	KOB01

Periodic Comet Schwassmann-Wachmann 1

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 09 17.35	S	13.4	AC	40.6	L	5	101	0.5	2			LEV
1988 09 18.33	S	13.6	AC	40.6	L	5	101	0.5	1			LEV
1988 09 20.31	S	13.3	AC	40.6	L	5	101	1	2			LEV
1991 02 05.16	I[	13.5		41	L	4	183					HAL
1991 02 17.14	I[	13.0		41	L	4	183					HAL
1991 03 04.13	I[	13.0		41	L	4	183					HAL
1991 03 15.12	I[	13.0		41	L	4	183					HAL

Periodic Comet Stephan-Oterma (1980 X)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 10 14.81	B	11.0	NP	15	L	6	28					KAN
1980 10 29.76	B	10.7	NP	20	L	6	61	1.5	7			ISH02
1980 10 31.71	B	10.6	NP	20	L	6	61	1.5	7			ISH02
1980 10 31.74	B	10.4	NP	15	L	6	28	2				KAN
1980 10 31.80	S	9.8	S	15	L	6	30	3	6			TAN01
1980 11 01.77	S	10.2	AC	15	L	6	30	3	6			TAN01
1980 11 01.78	B	10.0	S	10	L	10	56	2				ICH
1980 11 02.73	B	9.5	S	10	L	10	56	1.5				ICH
1980 11 02.79	B	10.3	NP	20	L	6	61	2	6			ISH02
1980 11 03.76	S	9.4	AC	15	L	6	30	3	6			TAN01
1980 11 05.79	B	10.3	NP	20	L	6	61	2.5	6			ISH02
1980 11 05.82	B	10.0	NP	15	L	6	28					KAN
1980 11 08.76	B	10.1	NP	20	L	6	61	3	6			ISH02
1980 11 09.77	S	9.8	AC	15	L	6	30	1	6			TAN01
1980 11 10.76	S	10.2	AC	15	L	6	30	2	5			TAN01
1980 11 10.78	B	10.1	NP	20	L	6	61	3	6			ISH02
1980 11 11.76	S	10.1	AC	15	L	6	30	2	5			TAN01
1980 11 14.77	S	9.9	AC	15	L	6	100		5/			TAN01
1980 11 26.69	B	9.8	S	10	L	10	40	1.5				ICH
1980 11 26.77	S	9.7	AC	15	L	6	30	2	5			TAN01
1980 11 29.53	B	9.4	S	15	L	6	28					KAN
1980 11 29.77	S	9.6	AC	15	L	6	28	2	6			TAN01
1980 12 01.52	B	9.5	S	20	L	6	61	3.5	7			ISH02
1980 12 01.63	B	9.0	S	15	L	6	28	& 3				KAN
1980 12 03.75	S	9.7	AC	15	L	6	28	2	5			TAN01
1980 12 03.83	B	9.3	S	6	R	12	22	2				ICH
1980 12 04.49	B	9.0	S	15	L	6	28	3				KAN
1980 12 04.55	B	9.4	S	20	L	6	38	4	6			ISH02
1980 12 05.77	B	9.4	S	20	L	6	38	4	6			ISH02
1980 12 06.60	B	9.0	S	10	L	10	40	1				ICH
1980 12 06.70	B	8.9	S	15	L	6	28	& 3				KAN
1980 12 07.53	B	9.1	S	20	L	6	38	4	6			ISH02
1980 12 07.77	S	9.8	AC	15	L	6	28	3	5			TAN01
1980 12 09.76	B	8.9	S	20	L	6	38	4	6			ISH02
1980 12 09.76	B	9.1	S	15	L	6	28	& 3				KAN
1980 12 10.51	B	9.1	S	15	L	6	28	& 3				KAN
1980 12 11.78	B	9.1	S	15	L	6	28	3				KAN
1980 12 12.68	B	8.8	S	10	L	10	40	2				ICH
1980 12 12.80	B	8.9	S	15	L	6	28	3				KAN

Periodic Comet Stephan-Oterma (1980 X) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1980 12 13.44	B	9.1	S	15	L	6	28	3				KAN
1980 12 14.78	B	9.3	S	15	L	6	50	2				KAN
1980 12 15.54	B	9.0	S	20	L	6	38	3	7			ISH02
1980 12 15.78	B	9.0	S	15	L	6	28	5				KAN
1980 12 16.79	B	9.0	S	15	L	6	28	4				KAN
1980 12 17.79	B	9.0	S	15	L	6	28	3				KAN
1980 12 26.43	B	9.5	S	15	L	6	50	2				KAN
1980 12 27.81	B	9.5	S	15	L	6	28	& 3				KAN
1980 12 28.77	B	9.7	S	15	L	6	28	& 3				KAN
1980 12 29.59	B	10.0	S	10	L	10	56	3				ICH
1980 12 29.60	B	9.7	AC	20	L	6	38	3	5			ISH02
1980 12 30.51	B	9.8	S	10	L	10	56	2				ICH
1980 12 30.81	B	10.0	AC	15	L	6	28					KAN
1980 12 31.42	B	9.8	AC	15	L	6	28	3				KAN
1980 12 31.48	B	10.1	S	10	L	10	56	2				ICH
1980 12 31.56	B	9.8	AC	20	L	6	38	3	4			ISH02
1981 01 02.43	B	9.8	AC	15	L	6	50	3				KAN
1981 01 02.49	B	9.8	S	10	L	10	56	2				ICH
1981 01 02.53	B	9.8	AC	20	L	6	38	2.5	4			ISH02
1981 01 03.41	B	9.8	AC	15	L	6	50	3.5				KAN
1981 01 04.46	B	9.8	AC	15	L	6	28	2.5				KAN
1981 01 05.45	B	10.0	AC	15	L	6	50	2				KAN
1981 01 05.55	B	9.9	AC	20	L	6	61	2	4			ISH02
1981 01 06.57	B	10.0	AC	20	L	6	61	2	3			ISH02
1981 01 07.49	B	10.1	AC	15	L	6	28	& 3				KAN
1981 01 07.52	S	10.2	AC	15	L	6	75	1.5	2			TAN01
1981 01 07.57	B	10.0	AC	20	L	6	61	3	3			ISH02
1981 01 08.48	S	9.7	AC	15	L	6	28					KAN
1981 01 08.52	S	10.4	AC	15	L	6	75	2	2			TAN01
1981 01 08.58	B	10.0	AC	20	L	6	61	3	3			ISH02
1981 01 09.80	S	10.0	AC	15	L	6	50	2				KAN
1981 01 10.63	B	10.2	AC	20	L	6	61	3	3			ISH02
1981 01 10.65	B	10.2	AC	10	L	10	40					ICH
1981 01 11.45	S	9.8	AC	15	L	6	28	& 7				KAN
1981 01 11.47	B	10.3	AC	20	L	6	61	3	1			ISH02
1981 01 12.41	B	10.5	AC	15	L	6	28	1.5				ICH
1981 01 12.41	S	10.2	AC	15	L	6	28	2	3			TAN01
1981 01 12.47	B	10.4	AC	20	L	6	61	3	2			ISH02
1981 01 13.52	B	10.2	AC	15	L	6	50	4				KAN
1981 01 14.51	B	10.2	AC	15	L	6	50	& 5				KAN
1981 01 22.41	B	10.3	AC	15	L	6	50	1.5				ICH
1981 01 22.44	S	10.4	AC	15	L	6	50	2	3			TAN01
1981 01 23.43	S	10.5	AC	15	L	6	50	2	3			TAN01
1981 01 23.44	B	10.3	AC	15	L	6	50	2				ICH
1981 01 25.55	S	10.2	AC	31	L	6	56	3				KAN
1981 01 25.55	S	10.5	AC	31	L	6	56	4	5			ISH02
1981 01 26.42	S	10.5	AC	15	L	6	50	2	2			TAN01
1981 01 26.43	B	10.6	AC	15	L	6	50	1.5				ICH
1981 01 26.49	S	10.2	AC	15	L	6	28	& 3				KAN
1981 01 26.55	S	10.7	AC	20	L	6	61	3	2			ISH02
1981 01 28.44	B	11.1	AC	15	L	6	50	2				ICH
1981 01 28.44	S	10.9	AC	15	L	6	50	2	2			TAN01
1981 01 29.48	S	10.4	AC	15	L	6	50	2.5				KAN
1981 01 30.45	S	11.0	AC	15	L	6	50	2	2			TAN01
1981 01 30.46	B	11.2	AC	15	L	6	50	1.5				ICH
1981 02 02.46	B	11.8	AC	15	L	6	50	1				ICH
1981 02 02.49	S	11.4	AC	15	L	6	50	2	3/			TAN01
1981 02 02.54	S	11.2	AC	20	L	6	61	3	2			ISH02
1981 02 04.44	S	11.6	AC	15	L	6	50	1	2/			TAN01

Periodic Comet Stephan-Oterma (1980 X) [cont.]

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1981 02 04.55	S	11.2	AC	31	L	6	56	2.5				KAN
1981 02 07.62	B	12.4	AC	31	L	6	100	3				ICH
1981 02 07.64	S	11.7	AC	31	L	6	56	3				KAN
1981 02 10.58	S	12.3	AC	31	L	6	56	2.5	3			ISH02
1981 02 10.61	S	12.0	AC	31	L	6	56	2				KAN
1981 02 27.52	S	13.1	AC	31	L	6	100	1	1			ISH02
1981 02 27.53	S	12.9	AC	31	L	6	100	1.4				KAN

Periodic Comet Van Biesbroeck (1989h1)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 04 13.48	I[	13.5		41	L	4	183					HAL
1991 05 12.41	I[	13.0		41	L	4	183					HAL
1991 05 23.44	S	13.6	AC	41	L	4	183					HAL
1991 05 24.45	S	13.6	AC	41	L	4	183					HAL
1991 06 16.44	S	13.4	AC	41	L	4	183					HAL
1991 06 21.43	M	13.4	AC	41	L	4	183					HAL

Periodic Comet Wild 1 (1960 I)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1960 04 19.16		13.5:		20.3	L		80	& 2				MEI01

Periodic Comet Lovas 1 (1989 XIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 08 24.41	S	16.3:	AC	154.9	L	13	654	0.1	5			LEV

Periodic Comet Ge-Wang (1988 VIII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1988 12 13.31	S	14.8:	AC	154.9	L	13	654	0.2	6			LEV

Periodic Comet Helin-Roman-Alu 1 (1987 XXXVII)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1989 10 24.32	S	14.5	AC	154.9	L	13	654	1.5	5			LEV

Periodic Comet Shoemaker-Levy 1 (1990o)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1990 11 19.79	S	12.8:	A	28.0	T	10	108	& 1.5	1			COM
1990 11 21.89	S	12.7	A	28.0	T	10	108	& 1	1/			COM

Periodic Comet Levy (1991q)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 06 15.44	M	9.6	AC	41	L	4	83	& 2.5	4			HAL
1991 06 17.45	S	7.6	AC	40.6	L	5	64	& 3	5	&0.05	90	LEV
1991 06 20.05	S	8.7	AA	8.0	B		15	& 4	3			MIK
1991 06 20.14	S	8.6	A	5.0	B		10		4			KID
1991 06 21.45	S	8.9	NP	5.0	B		10					HAL
1991 06 23.05	S	9.0	AA	8.0	B		15	& 3.5	3			MIK

BOOK REVIEW: *Supernova Search Charts*

Supernova Search Charts and Handbook by G. D. Thompson and J. T. Bryan, Jr. (1989), Cambridge University Press, ISBN 0-521-26721-8, US$100.00.

This well-produced set of 236 observing charts, printed with white stars and galaxies on a black background, was compiled for the purpose of searching for supernovae. Gregg Thompson and James Bryan are amateur astronomers who spent about a decade preparing these charts — which are mostly drawings scaled by photographs of some 300 of the brightest galaxies — for publication. Almost all of the 8.25×11.75-inch (21×30-cm) charts — which come in a box that opens at one end — have a 30′ field depicted around the galaxies and are produced at the same scale (1 mm = 10″), a feature than can be quite convenient for observers who use them often. The accompanying 134-page hardbound *Handbook* discusses how the charts were constructed, lists the charted galaxies in Tables, and includes Appendices with contributions concerning the nature of supernovae and how to report discoveries written by professional astronomers J. C. Wheeler, G. de Vaucouleurs, H. G. Corwin, Jr., and B. G. Marsden.

Many of the charts, which are basically ordered by right ascension, have photoelectric magnitudes of stars, usually in the range $11 < V < 15$. The magnitudes are listed as on most variable-star charts: to tenths of a magnitude, with the decimal point eliminated to avoid confusion with other stars on the chart. Thompson and Bryan have taken V magnitudes both from the professional literature and from previously-unpublished sources, and references are given in the notes at the bottom of each chart. Each drawn chart (only about 7 charts are simply photographs) has a magnitude scale given for the stars sizes, going by whole magnitudes from −1 to +10 and by half magnitudes from 10 to 15.5, making for a more visually accurate rendition of each field. Though most charts list the magnitudes of some stars, most of these charts would be of little use to an observer who is interested in using the stellar magnitudes to determine the total visual magnitude of nearby comets, for the simple reason that there are either too few magnitudes given or that there are large gaps in the sequences. About 30 percent of the charts have no magnitudes given, and an additional 5 percent or so of the charts have only one listed magnitude; on average, ~ 6.5 stars per chart have printed magnitudes. Nonetheless, many charts can be used when comets are nearby, to the degree that the "Guide Star Photometric Catalog" can be used (*ICQ* **10**, 124) — that is, in connection with other charts. Observers should *never* use stars on these charts that are brighter than magnitude 10, unless they are stated as being measured by photoelectric means, as the authors claim that such stars' magnitudes were taken from the *SAO Star Catalog* (again see page 124 of the October 1988 *ICQ*, where I indicated how poor the *SAOC* magnitudes are for stars fainter than mag 9).

I searched through the first third of the charts to see what might be useful for cometary photometrists, and the following results will give the reader an idea of what can be done with the comparison-star magnitudes. Out of 80 charts, I found the following 20 to be of some use (listed by galaxy and useful magnitude range, where 'useful' means gaps not more than 0.5 or 0.6 mag in a sequence): NGC 45 (11.8-16.0), NGC 55 (11.4-16.2), NGC 224 (8.4-10.3), SMC (6.1-9.0), LMC/SMC (1.7-5.6), NGC 247 (10.8-14.2), NGC 253 (13.8-15.2), NGC 300 (14.2-16.0), NGC 908 (12.0-12.8), NGC 1055 (11.3-12.9), NGC 1087 (11.4-11.8), NGC 1300 (12.2-13.0), NGC 1316 (12.9-14.5), NGC 1433 (11.9-14.2), NGC 1437 (11.0-11.9), IC 342 (9.9-13.1), NGC 1808 (12.0-12.8), LMC (5.1-8.9), NGC 1961 (13.0-14.0), NGC 2841 (13.5-15.4). It will be noted that some of these sequences have very limited ranges for useful magnitudes; most sequences with a range < 0.8 mag were ignored in making this list. An exceptionally detailed chart is that for NGC 2403, which contains magnitudes for some 29 stars in the range $11.9 < V < 15.7$. This means that ~ 25 percent of the charts could be considered of practical use for visual comet observers.

An example of a chart that was not included in my 'useful' list is that of NGC 1097, which has the following labelled stellar magnitudes: 10.1, 10.3, 11.4, 11.5, 12.5, 13.7, 14.5. I found 40 to 45 percent of the charts to have sequences like this, with gaps of around 0.8-1.2 mag; observers estimating the brightness of a 12th-magnitude comet using *only* a chart such as that for NGC 1097 would introduce an additional error of perhaps 0.1-0.3 mag in the m_1 estimate of the comet (*vs.* using a chart with stars having gaps of only 0.2-0.3 mag, for example).

I must note that I've used only about 3 charts at the telescope thus far, the rest of my perusing having been done in my office. With this in mind, I am concerned about the relatively large number of typographical errors that I have found. For example, 13.4- and 13.7-mag stars on the chart for NGC 2903 read as '34' and '37', and two different charts for M31 list the same star as '99' and '100'. A foreground star of mag 12.7 located some 310″ east and 405″ south of the nucleus of NGC 2146 was omitted from Thompson and Bryan's chart, and this has been reported as a supernova by observers using this chart twice already in 1991! Another chart has galaxy NGC 4374 erroneously listed as 'NGC 4375'. More extensive use at the telescope will be needed to find other errors, such as potentially misidentified stars, and I would be interested in receiving reports of such errors from observers (as I'm sure the authors would, also). I have not looked very closely at the majority of the charts in the *Atlas*, and I hope that the number of errors found in my small sample are not indicative of the *Atlas* as a whole; observers should be wary, however!

It does seem reasonable for comet observers to make use of these charts where practical, as noted in this review; therefore, the *ICQ* reference code 'TB' — to which observers should refer — is hereby assigned to Thompson and Bryan's *Supernova Search Charts*. — D. W. E. Green

The Last 40 Comets to Receive Provisional Letter Designations

Listed below, for handy reference, are the last 40 comets which have been given letter designations (1989a is the first comet to be discovered or recovered in 1989, 1989b is the second comet..., etc.). After the "equal sign" is given the name, preceded by a star (⋆) if the comet is a new discovery (as opposed to a recovery from predictions of a previously-known short-period comet); a 'sharp' sign (#) is used to indicate a 're-discovery' of a comet that had been lost for many years. Also given are such values as the orbital period (in years) for periodic comets, date of perihelion, T (month/date/year), and the perihelion distance, q (in AU). Four-digit numbers in the last column indicate the *IAU Circular* containing the discovery/recovery announcement. [This list updates the previous list in the July 1990 issue, p. 106.]

Desig.			*Comet*	*P*	*T*	*q*	*IAUC*
1989e_1	=	⋆	Skorichenko-George		4/11/90	1.6	4925
1989f_1	=	⋆	McKenzie-Russell		11/7/89	2.0	4930
1989g_1	=		P/Russell 4	6.6	7/6/90	2.2	4932
1989h_1	=		P/Van Biesbroeck	12.4	4/24/91	2.4	4936
1990a	=	⋆	P/Wild 4	6.2	7/2/90	2.0	4950
1990b	=	⋆	Černis-Kiuchi-Nakamura		3/17/90	1.07	4980
1990c	=	⋆	Levy		11/10/90	0.94	5017
1990d	=		P/Peters-Hartley	8.1	6/23/90	1.6	5026
1990e	=		P/Wolf-Harrington	6.5	4/4/91	1.6	5033
1990f	=		P/Honda-Mrkos-Pajdušáková	5.3	9/12/90	0.5	5035
1990g	=	⋆	McNaught-Hughes		2/27/91	2.7	5036
1990h	=		P/Johnson	7.0	11/18/90	2.3	5038
1990i	=	⋆	Tsuchiya-Kiuchi		9/28/90	1.10	5052
1990j	=	⋆	P/Mueller 2	6.4	11/8/90	2.1	5091
1990k	=	⋆	P/Holt-Olmstead	6.2	9/28/90	2.0	5093
1990l	=	⋆	P/Mueller 3	8.6	7/26/90	2.9	5102
1990m	=		P/Harrington-Abell	7.6	7/6/91	1.8	5129
1990n	=		P/Taylor	7.0	12/28/90	1.95	5134
1990o	=	⋆	P/Shoemaker-Levy 1	18.2	9/18/90	1.5	5135
1990p	=	⋆	P/Shoemaker-Levy 2	9.3	9/25/90	1.8	5138
1991a	=	#	P/Metcalf-Brewington	7.8	1/5/91	1.6	5155
1991b	=	⋆	Arai		12/10/90	1.43	5157
1991c	=		P/Swift-Gehrels	9.2	2/22/91	1.36	5164
1991d	=	⋆	Shoemaker-Levy		12/31/91	2.3	5175
1991e	=	⋆	P/Shoemaker-Levy 3	7.2	12/12/90	2.8	5183
1991f	=	⋆	P/Shoemaker-Levy 4	6.5	7/14/90	2.0	5185
1991g	=	⋆	McNaught-Russell		10/18/90	4.8	5187
1991h	=		P/Takamizawa	7.2	8/17/91	1.6	5192
1991i	=		P/Kowal 1	15.0	3/10/92	4.7	5195
1991j	=		P/Hartley 1	6.0	5/17/91	1.8	5209
1991k	=	⋆	P/Mrkos	5.6	3/18/91	1.4	5212
1991l	=	⋆	Helin-Lawrence		1/20/92	1.5	5213
1991m	=		P/Giacobini-Zinner	6.6	4/13/92	1.03	5225
1991n	=		P/Faye	7.3	11/16/91	1.6	5246
1991o	=		P/Chernykh	14.0	1/25/92	2.4	5285
1991p	=		P/Shoemaker 1	7.3	12/18/91	2.0	5286
1991q	=	⋆	P/Levy	50	7/8/91	0.98	5291
1991r	=	⋆	Helin-Alu		2/17/92	4.9	5292
1991s	=		P/Wirtanen	5.5	9/20/91	1.08	5303
1991t	=		P/Hartley 2	6.3	9/11/91	0.95	5304

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