INTERNATIONAL COMET QUARTERLY

Whole Number 105 | JANUARY 1998 | Vol. 20, No. 1

SMITHSONIAN ASTROPHYSICAL OBSERVATORY
60 Garden Street · Cambridge, MA 02138 · U.S.A.

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 October issue (odd-numbered years); the *ICQ* is also indexed in *Astronomy and Astrophysics Abstracts* and in *Science Abstracts Section A*.

The regular (invoiced) subscription rate is US$31.00 per year for surface-mail delivery (price includes the annual *Comet Handbook*; the price without the *Handbook* is US$23.00 per year). Subscribers who do not wish to be billed may subscribe at the special rate of US$23.00 per year for surface-mail delivery (rate is $15.00 without *Handbook*). Add $15.00/year to each of these rates for airmail delivery outside of the United States or for first-class delivery within the U.S. [The last set of digits (after the hyphen) on the top line of the mailing address label gives the Whole Number that signifies the last *ICQ* issue which will be sent under the current subscription status. An asterisk after these numbers indicates credit for the next annual Comet Handbook. The first five digits represent the subscriber's account number.] Make checks or money orders payable in U.S. funds (and drawn on a U.S. bank) to *International Comet Quarterly* and send to Mail Stop 18; Smithsonian Astrophysical Observatory; 60 Garden St.; Cambridge, MA 02138, U.S.A.

Credit cards may be used for payment of subscriptions, though a minimum of US$20.00 can be accepted for each charge. Credit-card orders may be placed by e-mail (to iausubs@cfa.harvard.edu), by fax (to USA 617-495-7231), or by telephone (to USA 617-495-7280, generally between 14:00 and 21:00 UT, Monday to Friday). When sending orders by fax or e-mail, please include the following information: (1) your name (as given on the credit card); (2) card type (MasterCard, Visa, or Discover); (3) credit-card number and expiration date; (4) address at which the card is registered; (5) which services you wish to subscribe to; (6) if the payment is for the renewal of a current or expired account, please include your account number.

Group subscription rates available upon request. Back issues are $6.00 each — *except* for "current" *Comet Handbooks*, which are available for $15.00 ($8.00 to subscribers if ordered with their *ICQ* subscription; see above). Up-to-date information concerning comet discoveries, orbital elements, and ephemerides can be obtained by subscribing to the *IAU Circulars* and/or the *Minor Planet Circulars* (via postal mail and also available via computer access); for further information, contact the above e-mail address (or the *ICQ* at the above postal address).

Cometary observations 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 observational data (or manuscripts) in machine-readable form are encouraged to do so [especially through e-mail via the computer networks *SPAN* (6700::DAN) or Internet (ICQ@CFA.HARVARD.EDU), or via floppy disks that can be read on an IBM PC], and should contact the Editor for further information. The *ICQ* has extensive information for comet observers on the World Wide Web, including the Keys to Abbreviations used in data tabulation (see URL http://cfa-www.harvard.edu/cfa/ps/icq.html). In early 1997, the *ICQ* published a 225-page *Guide to Observing Comets*, available in first-edition form to *ICQ* subscribers for $15.00 (one copy only), or to non-subscribers for $25.00 per copy; only a few copies are still available.

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

ICQ EDITORIAL STAFF::

Daniel W. E. Green.....Editor Charles S. Morris.....Associate Editor
Syuichi Nakano.....*Comet Handbook* Editor

OBSERVATION COORDINATORS::

AUSTRALIA ..... Paul Camilleri (51 Mookarii Street; Cobram 3644, Victoria); David A. J. Seargent
BELARUS ..... Sergey A. Shurpakov (Flat 22; 1 Korban Street; 211011 Baran)
BRAZIL..... José Guilherme de S. Aguiar (R. Candido Portinari, 241; 13089-070 - Campinas - S.P.)
BULGARIA..... Veselka Radeva (Astronomical Observatory and Planetarium; P.O.B. 120; 9000 Varna)
CHINA ..... Chen Dong Hua (101 Quan Zhou Road; Gulangyu, Xiamen 361002)
CZECH REPUBLIC..... Petr Pravec (Astronomical Institute; CS-25165 Ondřejov); Vladimir Znojil
FRANCE..... Stephane Garro (Horizon 1800; Batiment A; 05170 Orcieres-Merlette)
GERMANY ..... Andreas Kammerer (Johann-Gregor-Breuer-Str. 28; 76275 Ettlingen)
HUNGARY..... Krisztián Sárneczky (Kadar u. 9-11., H-1132 Budapest)
ITALY..... G. Antonio Milani (Dip. Scienze Biomediche; via Trieste 75; 35121 Padova)
JAPAN..... Akimasa Nakamura (P.O. Box 9, Kuma Post Office; Kuma-cho, Ehime 791-12)
Syuichi Nakano (P.O. Box 32; Sumoto Post Office; Hyogo-Ken, 656-91)
THE NETHERLANDS ..... Alex Scholten (Horsterdijk 6a; NL-6961 KP Eerbeek)
NEW ZEALAND ..... Alan C. Gilmore and Pamela Kilmartin (P.O. Box 57; Lake Tekapo 8770)
NORWAY ..... Bjoern H. Granslo (Postboks 1029; Blindern; N-0315 Oslo 3)
POLAND..... Janusz Pleszka and Tomasz Sciezor (Faculty of Physics and Nuclear Technique; University of Mining and Metallurgy; Al. Mickiewicza 30; 30-059 Cracow)
PORTUGAL..... Alfredo Pereira (R. Antero de Quental 8, 2 dto; Carnaxide; 2795 Linda-a-Velha)
SLOVENIA..... Herman Mikuž (Kersnikova 11; 61000 Ljubljana)
SOUTHERN AFRICA..... Tim Cooper (P.O. Box 14740; Bredell 1623; Kempton Park; South Africa)
SPAIN..... Jose Carvajal Martinez (San Graciano 7; 28026 Madrid)
SWEDEN ..... Joergen Danielsson (Hasselstigen 2D; 386 00 Farjestaden)
UKRAINE ..... Alexandr R. Baransky (Komarova 12; Vladimir — Volynsky; Volynska 264940)
UNITED KINGDOM..... Jonathan Shanklin (11 City Road; Cambridge CB1 1DP; England)
Guy M. Hurst (16 Westminster Close; Kempshott Rise; Basingstoke, Hants RG22 4PP; England)
former U.S.S.R..... Klim I. Churyumov (Astronomical Observatory; Kiev University; Observatorna 3; Kiev 254053; Ukraine)

EDITORIAL ADVISORY BOARD::

Michael F. A'Hearn, *University of Maryland*
Brian G. Marsden, *Harvard-Smithsonian Center for Astrophysics*
David D. Meisel, *State University College of New York, Geneseo*
Zdenek Sekanina, *Jet Propulsion Laboratory, California Institute of Technology*
Michel Festou, *Observatoire Midi-Pyrenees, Toulouse*
Thomas L. Rokoske, *Appalachian State University*

++++++++++++

This issue is No. 105 of the publication originally called *The Comet* (founded March 1973) and is Vol. 20, No. 1, of the *ICQ*. *[ISSN 0736-6922]*

****

MEETING ON COMET C/1995 O1 (HALE-BOPP) AT TENERIFE

A meeting was held in the Canary Islands in early February to discuss results from the observation campaigns of comet C/1995 O1 thus far. An excellent summary by Richard West is available on the World Wide Web at URL http://www.eso.org/outreach/info-events/hale-bopp/report-rw-hbitp98.html.

Stanley William Milbourn (1925-1997)

Stan Milbourn, who died on 1997 August 24, was born on 1925 September 5 at Hampton, England (to the southwest of London). After attending school in nearby Surbiton, he joined the Royal Air Force in 1944 and trained as a navigator, but was transferred to the Air Ministry in London due to a shortage of meteorologists. He had set up a weather station in his garden in his schooldays. After demobilization, he joined the family grocery business and in 1971 moved to a country Post Office in Copthorne Bank, near Crawley, West Sussex, in search of darker skies. He and his wife Eileen, who survives him, retired to Gloucestershire in 1990.

Stan was interested in astronomy from an early age, and he joined the British Astronomical Association (BAA) in 1957 after the launch of Sputnik 1. He became an observer of artificial earth satellites with a reputation for great accuracy, and his positional observations showed very small residuals. He took part in the Moonwatch program. His other great interest was in computing, especially comet orbits. He became Assistant Director of the BAA Computing Section in 1962 and remained so until his death. He was responsible for the predictions of comets in the *BAA Handbook 1963-1998* and had an international reputation in this area.

In 1968, Stan took over the Directorship of the BAA Comet Section upon the retirement of Mike Candy, a post that he held until 1977. He was also *BAA Circulars* editor from 1968. When he handed over the directorship of the Comet Section to me in 1977, he continued to edit the *Circulars* until 1986.

Stan was awarded the BAA Merlin Medal and Gift in 1980, and minor planet (3699) Milbourn was named in his honor. He was also a Fellow of the Royal Astronomical Society. Stan was a quiet personality but maintained very high standards in all his work. He was free with his advice and he helped many astronomers to achieve better results. He was a very good friend and mentor and will be a great loss to all who knew him or benefitted from his work.

— *Michael Hendrie*

Φ Φ Φ

Book Review: Millennium Star Atlas

Millennium Star Atlas: An All-Sky Atlas Comprising One Million Stars to Visual Magnitude Eleven from the Hipparcos and Tycho Catalogues and Ten Thousand Nonstellar Objects, *by Roger W. Sinnott and Michael A. C. Perryman (**$249.95** from Sky Publishing Corp.; P.O. Box 9111; Belmont, MA 02178-9111; U.S.A.), 3 vols., 1997 [ISBN 0-933346-84-0].*

This *Atlas* is really wonderful: a delight to read and use. The *Millennium Star Atlas* is a very useful set of star charts for all astronomers, but especially for visual comet observers. Previous drawn atlases of the entire sky stopped around mag 9 or 10, and there were always problems regarding omissions of both stars and deep-sky objects and regarding representative star sizes (in terms of brightness). Photographic star atlases always suffered from being constructed in a wavelength rather different from that of the human eye.

This new *Atlas*, published jointly by the European Space Agency (ESTEC, Noordwijk, The Netherlands) and Sky Publishing Corporation, is a computer plotting of all one million stars in the Tycho Catalogue (available as discussed in the October 1997 issue of the *ICQ*, page 224, and in the Letter immediately following this Review). I have found the star sizes to be exceptionally good in terms of respresenting respective brightness of the stars visually — making identifications of star fields in the telescope a very quick process (and, thus, identifying comets more easy).

The three volumes of the *Millennium Star Atlas* are divided into three sections comprising 8 hours of right ascension each (so that each volume contains charts from the north to the south celestial poles). The first volume contains 35 pages of introductory text, as well as some useful tables indexing the chart numbers of bright stars and such items as Messier objects. The page size is 23.5 × 33 cm, printed with black stars on white paper, with chart grids drawn for every 1° of declination and generally every 4^m of right ascension. There is no overlay grid for plotting positions of moving comets easily, but the 1° printed grids should help the observer to identify comets brighter than mag 12 or so without a problem. The equinox for this *Atlas* is essentially J2000.0; the epoch is for 1991.25, but this should not present problems for users.

Constellation boundaries are provided, and stars are identified as appropriate by their Flamsteed, Bayer, or variable-star numbers/letters; distances in light years and proper motions for 1000 years are given for the stars where such quantities are known (quite a lot). Various deep-sky catalogues (notably the NGC and IC, UGC, and MCG, but with only one designation provided per object) have their identifications printed alongside the particular object, whose size and general shape is also depicted. Curiously, hundreds of new variable stars are listed in this *Atlas* with their designations, but the International Astronomical Union has yet to officially release the designations via customary publication in the *Information Bulletin on Variable Stars* Namelists. Variable stars are denoted on the charts with a circle around the filled circular star symbol, with type of variable and amplitude of variability (in magnitudes) also provided in many cases.

Much usefulness for comet observers comes via the Tycho Catalogue photometry, in which all stars plotted in the *Atlas* have *V* magnitudes in the Catalogue. One must look up the star magnitudes in the catalogue(s), via the procedures outlined in the October 1997 *ICQ* and below. While many observers may already be plotting their star charts via their own computers for each comet-observing session, others will certainly want to make use of the *Millennium Star Atlas* in their observing. There simply is no better non-photographic atlas. — *D. W. E. Green*

Letters Regarding the Tycho Catalogue

After receiving the October 1997 issue of the *ICQ*, which contained some remarks by Dan Green on the new Tycho catalogue (with recommended usage for comet photometry), Brian Skiff sent the *ICQ* Editor some comments regarding his concern for use of the V_T magnitudes. At our request, he submitted the following Letter to the Editor, to which we respond below. After the responses by *ICQ* staff members Green and Charles Morris is given a tutorial on the use of 'VizieR', kindly supplied by Brian Skiff in response to questions about its practicality. — *Ed.*

Φ Φ Φ

After several years of encouraging comet observers to use only reliable standard V magnitudes for comparison stars, the *ICQ* editor made a surprising error in the October 1997 issue by urging the use of the raw Tycho spacecraft photometry — which is not on any standard system! I think this resulted from a misunderstanding of the Tycho results. Straying from the standard V system is bound to add systematic errors to the results. He also recommended a very poor Web utility for browsing the catalogue. Both problems are readily amerliorated, the first by simply *using the corrected Tycho photometry*, and the second by an excellent catalogue-browsing utility URL.

First, let's look at the supposed problem with the Tycho V and $B-V$ data that have been transformed from the raw 'instrumental' system. The filter passbands on the spacecraft were shifted somewhat blueward of the standard B and V, but in fact they were not terribly much farther off the standard system than a filter/detector combination one might find on a ground-based telescope. The Tycho consortium provided a rough transformation of the 'raw' instrumental photometry to standard V: $V = V_t - 0.09(B_t{-}V_t)$, where V_t and B_t are the instrumental Tycho values. This was said to apply pretty well throughout the range of ordinary star colors, but broke down for M-giants, as many instrumental transformations do. The reason the consortium recommended against using these transformed data was simply that the transformation itself introduces a scatter of about 0.02 mag in the results. Thus while the data are systematically very close to the standard system, the *internal* errors were much larger than in the raw data. This is the normal (nearly inevitable) result of doing such photometric transformations, and is not a good reason to avoid the corrected Tycho photometry.

In their transformation, the Tycho folks used many thousands of stars that are not even secondary or tertiary standards. Arne Henden (USNO, Flagstaff; e-mail `aah@nofs.navy.mil`) has made a more rigorous comparison by including only high-weight bona-fide standard stars in the transformation. He found

$$V = 0.005 + V_t - 0.095(B_t{-}V_t) \quad \pm 0.019 \text{ mag},$$

using 301 Landolt equatorial and Cousins E-region standards, which essentially *define* the *UBVRI* system for observers. The stars used in this analysis covered the range $-0.2 < B_t - V_t < 2.0$, thus reaching well into red stars. Notice that the zero-point offset is close to zero, and that the coefficient on the color term is nearly identical to that used by the Tycho team. This means the nominal transformation given by the Tycho team is just fine, and there is no problem with using the corrected Tycho V magnitudes for most purposes.

By the way, Arne also found $R = -0.020 + V_t - 0.534(B_t{-}V_t)$ ± 0.041 mag, which means that CCD observers can use the Tycho data to set fairly reasonable zero-points for Cousins R-band CCD photometry. I would think the uncertainty of ± 0.04 mag would be entirely acceptable for comet work, given the convenience of always having nearby 'standards' from Tycho. (Let's call them 'reference stars', not standards.)

Now let's talk about finding the data in convenient form. The Web site Green mentioned is crummy, as he found. Instead, use the "VizieR" catalogue browser provided by the Centre de Données Astronomiques in Strasbourg, France:

`http://vizier.u-strasbg.fr/cgi-bin/VizieR`

There will soon be a mirror site for VizieR in the USA at the Goddard ADC site, although I find exchange with the Strasbourg site quite fast from the western USA. At this top page, key-in the Hipparcos/Tycho catalogue number, I/239, and submit it. On the following page, click on the "main part of the Tycho Catalogue" (final entry), and proceed to the search page. Before entering a name or position, scroll down the search page and select the corrected V and $B-V$ magnitude/color *and their errors*. As Green mentions, the scatter on the Tycho magnitudes starts creeping up below about mag 10 or so. Many stars at $V = 10.5$ still have acceptably small uncertainties, but you really need to check each entry before using the data. (Despite the hype that came out about Hipparcos/Tycho in summer 1997, the more you look into this database, the more you'll find it doesn't live up to the hype. There's lots of good stuff here, but the results cannot be used indiscriminately!) Some additional description of the Hipparcos/Tycho results, along with a simple application of the Hipparcos parallaxes, can be found in my article in the January 1998 *Sky & Telescope*, starting on page 65.

A final problem worth addressing at least briefly is that of deciding to use standard V and/or some agreed-upon "visual" magnitude scale. This problem affects comet observers but also the larger group of people making visual observations of variable stars — which includes many *ICQ* contributors. Various tests, especially by Richard Stanton for the AAVSO, have shown that the dark-adapted eye has a color term of *roughly*: $m_v = V + 0.2(B{-}V)$. Because the eye is a poor judge of brightness and because of differences among observers, not only in spectral sensitivity (mostly very small) but also in observing conditions (*i.e.*, not strictly in the scotopic realm), the coefficient is difficult to nail down accurately. The value 0.2 seems "good enough" given the scatter in ordinary visual observations.

Because gassy comets are emission-line objects, there is no such thing as transforming to a standard system, and at some point folks have to decide what's "good enough" for the science to be derived from comet magnitude observations. The inevitable differences in perceived visual magnitude in gassy and dusty comets of the same photometric brightness are always going to be present unless every observer has some standard-issue filter with which he/she observes all comets and comparison stars. Dream on. Back in the real world, comet scientists perhaps could suggest at what level the total magnitudes matter: the differences in the minimum surface brightness detected by CCDers versus visual observers at true-dark sites versus light-polluted sites; or whether integrated comet magnitudes matter at all.

One suggestion is to provide as comparison-star data both a magnitude and a color on some standard photometric system (probably V and B–V or V–R), plus a dark-adapted "visual" magnitude derived from the photometric data. Visual observers would then report the name and V/B–V or the assumed "m_v" for each star used. CCD observers would report the observed (not the adopted ones!) magnitudes/colors for both the comparison stars and the object of interest. This additional information might not eliminate all problems, but would at least provide a way to trace systematic problems among observers and comparison-star sets. More discussion among the comet- and variable-star observing communities and organizations should lead to broad international agreement on data sources and chart materials.

Brian A. Skiff
Lowell Observatory
1400 West Mars Hill Road
Flagstaff AZ 86001-4499
USA

e-mail: bas@lowell.edu

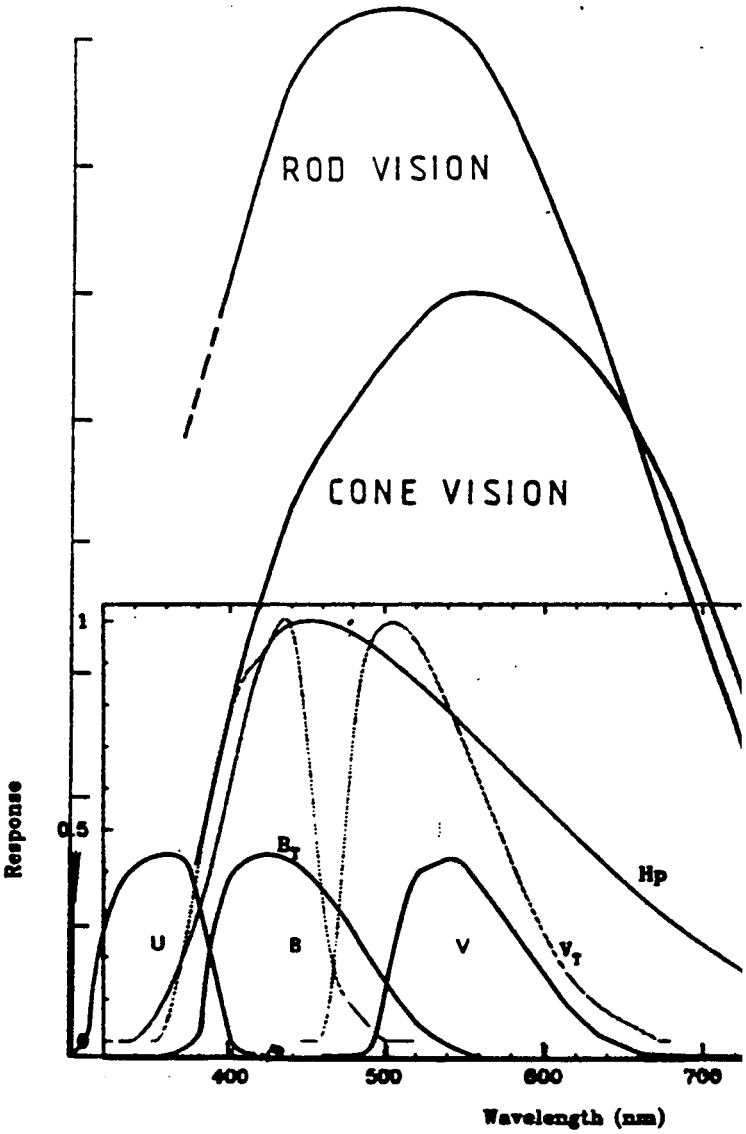
Φ Φ Φ

COMMENTS ON BRIAN SKIFF'S LETTER

My remarks about using V_T magnitudes over transformed Johnson V magnitudes in the Tycho catalogue, in terms of visual comet photometry, may have been poorly stated in light of the inherent larger potential errors that arise from other sources (methodology, *etc.*). However, as the figure at right shows, the V_T response peak matches rather closely the peak sensitivity of the human eye's rods (used in night-time vision), whereas the Johnson V peak more closely matches the eye's cones (daytime vision). The figure actually is a compilation of three published figures in the literature: Figure 1 of van Leeuwen *et al.* (1997, *A.Ap.* **323**, L61); Figure 2.3 of Henden and Kaitchuck (1982, *Astronomical Photometry*, New York: Van Nostrand Reinhold, p. 39); and Figure 1.10 of Sterken and Manfroid (1992, *Astronomical Photometry: A Guide*, Dordrecht: Kluwer Academic Publ., p. 21). The response scales (x-axes) are different so that the overlaid curves can be better seen. In the lowest fifth of the figure are the Johnson U, B, and V response curves, given by bold lines; rising above the Johnson UBV curves, in the bottom half of the figure, are the Hipparcos H_p and Tycho B_T and V_T response curves (the Tycho curves having lighter, dotted lines); and at the top are the rod and cone response curves.

The figure suggests that V_T magnitudes of comparison stars, indeed, might be better for *visual* observers of comets. The broad tails of the H_p filter, representing more closely the broad tails of the rod response curve, suggest that H_p magnitudes may also be used for visual comet observers in the absence of other comparison magnitudes. The comments on page 226 of the October issue are thus modified such that magnitudes employing the *ICQ* codes HK, HV, TJ, and TT can all be recommended for *visual* comet photometry.

Regarding Web sources for obtaining useful magnitudes of comparison stars for use in cometary photometry, I welcome suggestions of readers when they find (as did Brian Skiff) sites that may be unknown to the *ICQ* staff. I did, however, find Skiff's source to be less user friendly that the site mentioned in the October issue. — *D.W.E. Green*



COMMENTS ON BRIAN SKIFF'S LETTER, by Charles S. Morris

I'm not sure I buy Brian Skiff's statement that "because gassy comets are emission-line objects, there is no such thing as transforming to a standard system". The problem with comparison stars is the following: Let's say that you have two that are magnitude 119.5" in the V system; however, they appear to be perhaps several tenths different to the eye. This is a different problem than saying that the gassy comet doesn't appear to be the same "color" as the comparison stars — which is what I believe the author's statement is discussing. I would like to see a system where all the stars with precise magnitude determinations come close to looking consistent to the dark-adapted eye. Should someone try to combine the corrections — from V_t to V to V_e, where V_e is the dark-adapted V for the eye?

I do agree with Skiff's comment that "at some point folks have to decide what's 'good enough' for the science to be derived from comet magnitude observations." Such a V_e magnitude catalog would *only* have to be accurate to about $\pm$ 0.05 mag (1σ error). Fact is that there are other error sources that often dominant the visual magnitude estimate. While I do believe that we should use the best possible magnitude sources, one can not tell which catalog observers are using just by looking at their magnitude estimates.

Regarding Skiff's comment that "back in the real world, comet scientists perhaps could suggest at what level the total magnitudes matter", I agree, but the answer will depend on which comet scientists are asked, I would think.

Regarding Skiff's suggestion of reporting magnitude color information to diagnose observer procedures, I honestly don't believe that systematic differences among observers can be traced in this way (again other errors will often dominant) — and, more importantly, I doubt that any analyst is going to take the time to research a single magnitude estimate in that manner.

The only possible exception is if the estimate is in some way critical — say, a lone observation that suggests some unusual behavior. To burden the observer with reporting V and B–V, *etc.*, for each star used (and hence, requesting that the *ICQ* publish such data) is a waste of time. However, this could be done as a limited study with a few selected observers — the purpose of the study being a resolution of this problem.

Φ Φ Φ

TUTORIAL ON 'VizieR', by Brian Skiff

It's a lot harder to describe in print than to simply demonstrate in person, but:

Here's a brief tutorial about VizieR. The Web utility is in essence an on-line catalogue look-up widget. Whereas the regular Goddard and Strasbourg catalogue services allow you to grab major catalogues 'in toto', this allows you to look up a specific entry without having to dig a catalogue or journal volume out of the library or have huge amounts of disk space taken up with catalogues you use only occasionally. In cases where you happen to have the catalogue to hand in your office, VizieR is probably going to be slower, except in cases where you'd like to insert data into a machine-readable file.

The regular top page for VizieR is:

`http://vizier.u-strasbg.fr/cgi-bin/VizieR`

This brings up a catalogue search page. Many of the 1500+ lists available are tables from recent journal papers, not really catalogues as you and I think of them. Anyway, the box in item 1. allows you to key-in the catalogue number if you happen to know it. To give a simple example, type in "i/122", which is the number for the BD catalogue. (The general star catalogues are binned under Roman numeral I [case insensitive], and the BD is item 122 in that list. You could also type in a search string in item 2., such as "argelander" or simply "bd", and the search will done for you.) Hit the "submit query" button. This brings up the selection page, which asks in this case whether you want the main catalogue or the corrections list made to the Goddard version of the BD. Click on the button for the main catalogue, and then the "continue" button.

This leads to the catalogue search page. VizieR allows you to search by catalogue entry (or any name in SIMBAD for that matter) or by position. If you want to search for a position at an equinox other than J2000, notice that the box following "Coordinates in ..." allows you to select just about any common equinox. Note that the resulting display will be in the chosen equinox. Notice also the default search radius (10 arcmin) can be changed and made in units of arcsec, arcmin, or degrees. Depending on how good your search coordinates are, or the quality of the catalogue you're looking at is, or how dense the catalogue is, you may want to make this fairly small. There is a known bug here: if you search by name for a BD star that is not in SIMBAD (or another name not in SIMBAD), then it will come back and say so. Thus the system is looking in SIMBAD for a position, when it probably should be looking in the source catalogue itself. I'm told by the Strasbourg folks that making this happen is easier said than done. Thus it is best to search on position rather than a source name unless the object is clearly in some catalogue.

Try searching for `BD+40 5040` to give you an idea of what to expect. Then go back to the catalogue-selection page and ask for catalogue `i/239`, which leads to the Hipparcos/Tycho area. The first page that comes up asks you to select what chunk of the catalogue you want: try as an example the very bottom item, which is the main Tycho catalogue. Click either on the little button or on the name highlighted in blue. (It is okay to search on multiple chunks of the dataset, so for brighter stars, one can get both Hipparcos and Tycho results sent to the same results page.) Again, hit the "continue" button. This then again brings up the search page, which allows input by position or name.

Notice however that there is a long list of parameters to select or sort on, basically all the various stuff included in the catalogue. When I do work on star catalogues, I tend to omit most of the astrometric information, and calling up the photometric items and their associated errors. The corrected Johnson V magnitude is near the top of the list, there evidently since it is useful as an aid in identification. I would "unhighlight" the little boxes for the epoch 1991.25 position, the position in degrees (which are among the default display parameters), and the B_T and V_T (uncorrected magnitudes). I would however highlight the e_VTmag and e_B-V, since these are the only handles you have on the quality of the photometry. If you want the parallax and proper-motion information, be sure also to ask for their errors, since they can be quite large compared to the values themselves (only about 20 percent of the Hipparcos stars have meaningful parallaxes). Note also that the Tycho (but not Hipparcos) motions are nearly a factor of ten worse than contemporary astrometric catalogues like the PPM, ACRS, and ACT. (The ACT is now the astrometric catalogue of choice for general use.)

As a test, again key-in BD+40 5040 with the default 10′ search radius, and see what you get (hit the "submit query" button to get it to run). Using it just now, VizieR returned three stars listed in order of radius from the search position. Notice the message in blue under the header, pointing out that you can get *all* the data for each entry by clicking on the blue-highlighted number at the start of each entry.

From here you can play around with the system and see what sorts of things you can found out. Try looking up data for a star where you think you know the answers and see what you get.

Φ Φ Φ

Tabulation of Comet Observations

Descriptive Information, to complement the Tabulated Data (all times UT):

◇ *Comet C/1995 O1 (Hale-Bopp)* ⟹ 1996 June 13.21: slight brightening w/ Swan-band filter [SHA04]. July 24.70: tail fan-shaped in p.a. 350°-0° [SON]. Sept. 10.12: 33.3-cm L revealed a nearly-stellar nucleus of mag ~ 7.5; most of the coma was centered in the region N-NE of the nucleus [KRO02]. Sept. 13.04: fan-shaped tail centered at p.a. 350° [SHA04]. Oct. 16.04: fan-shaped tail w/ spikes at p.a. 35° and 75° [SHA04]. Nov. 1.00: comet w/in a few arcmin of M14 [SHA04]. Nov. 7.00: comet more nebulous w/ Swan-band filter; tail fan-shaped w/ spikes in p.a. 50° and 100° [SHA04]. Dec. 24.71: broad tail visible despite full Moon [SCH04]. Dec. 25.71: also tail 1°.6 long in p.a. 42° [DIJ].

1997 Jan. 12.51: comet seen in bright twilight [KRO02]. Jan. 15.25: w/ 15×80 B, faint gas tail ~ 2° in p.a. 335° and broad dust tail 0°.8 long in p.a. 335°-350°; bright elliptical coma [SCH04]. Jan. 16.24: w/ 15×80 B, faint gas tail 2° long in p.a. 335° and broad dust tail 0°.5 long in p.a. 335°-10°; bright elliptical coma [SCH04]. Jan. 17.24: also tail 0°.7 long in p.a. 238° [DIJ]. Jan. 17.24: w/ 15×80 B, faint gas tail ~ 1°.5 in p.a. 335° and broad dust tail ~ 0°.5 long in p.a. 335°-15° ; more condensed bright nucleus than on previous days [SCH04]. Jan. 28.49: strong, nearly-stellar cond. of mag 3.6 seen in 7×35 B [KRO02]. Jan. 30.49: w/ 7×35 B, strong nearly stellar cond. of mag 3.5, 11′ coma, DC = 8, 1°.4 tail [KRO02]. Feb. 2.24: w/ 20-cm L (42×), bright dust jet several arcmin long in p.a. 30°; broad dust tail ~ 0°.4 long in p.a. 307°-335°; w/ 15×80 B, gas tail 1°.3 long, despite moonlight and cirrus [SCH04]. Feb. 8.22: also dust tail 2°.6 long in p.a. 271° [DIJ]. Feb. 8.22: broad dust tail ~ 2° long in p.a. 270°-300° [COM]. Feb. 9.45: 1° dust tail in p.a. 300° [MOR03]. Feb. 10.44: 1° dust tail in p.a. 305° [MOR03]. Feb. 11.21: dust tail ~ 1°.5 long [COM]. Feb. 11.22: w/ 20-cm L (42×), bright nucleus with jet in p.a. 215°-228° and broad tail in p.a. 298°-337°; tail-length estimate difficult because of interference with Milky Way [SCH04]. Feb. 13.44: 1°.5 dust tail in p.a. 295° [MOR03]. Feb. 14.21: w/ 20-cm L (42×), bright nucleus with jet in p.a. 170°-240° and curved dust tail 1° long in p.a. 300°; broad dust tail in p.a. 300°-330°; gas tail 4° long in p.a. 330° [SCH04]. Feb. 15.49: comet seen in 33.3-cm L; bright fan of material extends from nucleus in p.a. 185°-246°; nucleus is either elongated toward p.a. 246° or the border of the jet (0′.3 long) is especially bright there; border of the jet toward p.a. 185° seems to bisect this nucleus [KRO02]. Feb. 15.49 and 17.49: w/ 33.3-cm f/4 L (58×), 6′ coma [KRO02]. Feb. 15.90: tab. gas tail; also dust tail 1°.2 long in p.a. ~ 280° [SON]. Feb. 17.91: tab. gas tail; also dust tail 1°.5 long in p.a. ~ 310° [SON]. Feb. 18.91: tab. gas tail; also dust tail 1°.8 long in p.a. ~ 320° [SON]. Feb. 19.21: w/ 20-cm L (42×), bright nucleus with jet in p.a. 160°-220° and curved dust tail 1°.5 long in p.a. 285°-300°; gas tail 5° long in p.a. 315°-320° [SCH04]. Feb. 19.21: dust tail 6° long in p.a. 293° [LAN01]. Feb. 19.22: dust tail 2°.5 long in p.a. 285° [GIL01]. Feb. 20.21: dust tail 3° long in p.a. 290° [GIL01]. Feb. 20.23: dust tail 2°.5 long in p.a. 295°; jet and dust tail brighter than on Feb. 19 [SCH04]. Feb. 20.45: 2° dust tail in p.a. 295° [MOR03]. Feb. 22.19: despite moon and cirrus, gas tail 4° long and dust tail 2° long [COM]. Feb. 23.47 and 24.48: obs. made w/ naked eye and full moon [KRO02]. Feb. 25.48 and 28.46: in 20×80 B, the tail fanned in p.a. 284°-312°, w/ a bright ray at 293°; moonlight [KRO02]. Feb. 26.21: w/ 20×80 B, gas tail 3°.5 long in p.a. 325° and dust tail 2° in p.a. 290° [GIL01]. Feb. 26.22: dust tail 1° in p.a. 350° [COM]. Feb. 27.22: w/ 20-cm L (80×), elongated false nucleus with jet and envelopes; dust tail 3° long [SCH04]. Feb. 28.18: dust tail 2° long in p.a. 350°; w/ 30.5-cm T, bright envelopes in coma [COM].

Mar. 1.19: dust tail 2° long in p.a. 297°-310°; w/ 20.0-cm L, envelopes in coma [SCH04]. Mar. 1.19: dust tail > 6° long [BUS01]. Mar. 1.19: dust tail > 5° long in p.a. 290° [LAA]. Mar. 2.78: dust tail 4° long in p.a. 290° [LAA]. Mar. 3.17: also dust tail 4°.5 long in p.a. 300° [DIJ]. Mar. 3.17: dust tail 5° long in p.a. 310°; w/ 30.5-cm T, envelopes in coma [COM]. Mar. 3.18: dust tail 2°.5 long in p.a. 310° [SCH04]. Mar. 3.18: dust tail > 6° long [BUS01]. Mar. 3.19: dust tail 4° long in p.a. 60° [ZAN01]. Mar. 3.43: 3° dust tail in p.a. 295° [MOR03]. Mar. 5.17: dust tail 4° long in p.a. 310° [COM]. Mar. 5.18 and 6.82: dust tail 5° long in p.a. 315° [LAA]. Mar. 5.18: dust tail 3° long in p.a. 315° [SCH04].

◇ *Comet C/1995 O1 (Hale-Bopp) [text continued from page 7]* ⟹

1997 Mar. 6.77: w/ 30.0-cm L, envelopes in coma [SCH04]. Mar. 6.79: dust tail 4° long in p.a. 55° [ZAN01]. Mar. 6.79: w/ 20-cm L (120×), hoods in coma; yellow coma [GIL01]. Mar. 7.16: also dust tail 6°.3 long in p.a. 300° [DIJ]. Mar. 7.16: dust tail 5° long in p.a. 315° [COM]. Mar. 7.42: 4° dust tail in p.a. 310° [MOR03]. Mar. 9.03: dust tail 6° long in p.a. 57° [ZAN01]. Mar. 9.18: dust tail 10° long in p.a. 320° [LAA]. Mar. 9.42: 5° dust tail in p.a. 310° [MOR03]. Mar. 10.16: dust tail ~ 8° long in p.a. 290° [COM]. Mar. 10.16: dust tail 8° in p.a. 289°-336°; first 1°.5 of dust tail easily visible; w/ 30-cm L (90×), three envelopes visible in coma (p.a. ~ 210°) [SCH04]. Mar. 10.17: also dust tail 6°.5 long [DIJ]. Mar. 12.42 and 13.42: 6° dust tail in p.a. 310° [MOR03]. Mar. 15.41: 6° dust tail in p.a. 315° [MOR03]. Mar. 18.83: dust tail ~ 3° long in p.a. 330°; moonlight [SCH04]. Mar. 22.17: moonlight; w/ 20-cm L (80×), three envelopes visible in coma (p.a. ~ 265°) [SCH04]. Mar. 23.15: moonlight; dust tail ~ 6° long in p.a. 320° [COM]. Mar. 27.05: 7° dust tail in p.a. 330° [MOR03]. Mar. 28.85: dust tail ~ 15° long in p.a. 340° [COM]. Mar. 28.87: dust tail 10° long in p.a. 343° [LAN01]. Mar. 28.88: dust tail 13° long in p.a. 25° [ZAN01]. Mar. 29.00: moonlight; comet only 8° above horizon; w/ 20-cm L (80×), three envelopes visible in coma [SCH04]. Mar. 29.04: same mag estimate (−0.2:) given w/ 8×50 B and 20-cm *f*/10 T (50×) [!], and this pattern occurred on other nights, as well (where mags through all instruments and naked eye were identical – Ed.); coma dia. 8′.7 w/ 20-cm T [SHA04]. Mar. 30.82: also dust tail 13°.5 long in p.a. 336° [DIJ]. Mar. 30.84: dust tail 10° long in p.a. 0°; w/ 20.5-cm L, hoods in coma [LAA]. Mar. 30.85: dust tail 14° long in p.a. 25° [ZAN01]. Mar. 30.87: dust tail ~ 18° long in p.a. 335° [COM]. Mar. 30.89: dust tail 12° long in p.a. 357°; w/ 11.4-cm L, details in coma [LAN01]. Mar. 31.84: also dust tail 12° long in p.a. 341° [DIJ]. Mar. 31.85: dust tail ~ 15° long in p.a. 350° [COM]. Mar. 31.87: dust tail 7° long in p.a. 335°-355°; w/ 30-cm L, hoods in coma [SCH04]. Mar. 31.91: dust tail 8° long in p.a. 25° [ZAN01].

Apr. 1.10 and 2.06: 8° dust tail in p.a. 340° [MOR03]. Apr. 1.82: dust tail 14° long [BUS01]. Apr. 1.83: w/ 20.5-cm L, hoods in coma [LAA]. Apr. 1.84: also dust tail 15° long in p.a. 340° [DIJ]. Apr. 1.84: dust tail ~ 18° long in p.a. 350° [COM]. Apr. 1.85: dust tail 7° long in p.a. 330°-345°; w/ 30-cm L, hoods in coma [SCH04]. Apr. 1.87: dust tail 8° long in p.a. 15° [ZAN01]. Apr. 3.83: dust tail 18° long [BUS01]. Apr. 3.84: dust tail ~ 20° long in p.a. 340° [COM]. Apr. 3.85: dust tail 15° long in p.a. 340°-5°; w/ 30-cm L, hoods in coma [SCH04]. Apr. 3.87: also dust tail 11° long in p.a. 334° [DIJ]. Apr. 3.87: dust tail 12° long in p.a. 20° [ZAN01]. Apr. 5.85: dust tail 18° long in p.a. 340°-360°; blue gas tail [SCH04]. Apr. 6.84 and 7.85: also dust tail 18° long in p.a. 348° [DIJ]. Apr. 6.85: dust tail 10° long in p.a. 0°; w/ 20.5-cm L, hoods in coma [LAA]. Apr. 6.85: dust tail ~ 22° long in p.a. 10°; w/ 15×80 B, structures in gas tail [COM]. Apr. 6.86: dust tail 21° long in p.a. 18°; w/ 9×63 B, three gas tails [LAN01]. Apr. 6.86: dust tail 18° long in p.a. 335°-350°; w/ 30-cm L, hoods in coma [SCH04]. Apr. 6.92: dust tail 10° long in p.a. 15° [ZAN01]. Apr. 7.85: w/ 20.5-cm L, hoods in coma [LAA]. Apr. 7.85: dust tail 13° long in p.a. 15° [ZAN01]. Apr. 7.85: dust tail 15° long in p.a. 23° [LAN01]. Apr. 7.85: dust tail ~ 20° long in p.a. 10° [COM]. Apr. 7.87: dust tail 16° long in p.a. 340°-5° [SCH04]. Apr. 9.84: w/ 20.5-cm L, hoods in coma [LAA]. Apr. 9.85: dust tail ~ 15° long in p.a. 10° [COM]. Apr. 9.86: dust tail 10° long in p.a. 355°-15°; w/ 30-cm L, hoods in coma [SCH04]. Apr. 9.92: dust tail 13° long in p.a. 5° [ZAN01]. Apr. 11.87: dust tail 15° long [BUS01]. Apr. 11.89: dust tail 6° long in p.a. 0° [ZAN01]. Apr. 12.92: dust tail ~ 10° long in p.a. 20° [SCH04]. Apr. 12.99: also dust tail 7° long in p.a. 0° [DIJ]. Apr. 16.85: dust tail 5° long in p.a. 345° [ZAN01]. Apr. 16.85: dust tail ~ 15° long in p.a. 50° [COM]. Apr. 16.86: also dust tail 12°.5 deg in p.a. 357° [DIJ]. Apr. 17.85: dust tail ~ 15° long in p.a. 50° [COM]. Apr. 17.86: w/ 20.5-cm L, hoods in coma [LAA]. Apr. 20.85: dust tail 4° long in p.a. 330° [ZAN01]. Apr. 20.86: w/ 20-cm L, several hoods visible [SCH04]. Apr. 20.86: dust tail ~ 10° long [COM]. Apr. 22.87: "w/ 20-cm L, more diffuse false nucleus and more diffuse hoods than on Apr. 20.86; false nucleus brighter?" [SCH04]. May 1.87: dust tail ~ 8° long [COM]. May 1.87: dust tail 2° long in p.a. 340° [ZAN01].

Aug. 21.74-30.74: 2.5×23 B [JON]. Sept. 2.72-14.72: 2.5×49 B [JON]. Sept. 24.65: w/ 25.6-cm f/5 L (169×), main jets in p.a. 20°, 80°, 180°, 205°, and 320° [BIV]. Sept. 26.61: obs. from mid-level facilities at Mauna Kea (elevation 2840 m); comet was faintly visible to the naked eye as a fuzzy patch, but due to the richness of the background Milky Way, binoculars had to be used for an accurate mag estimate; innermost 1°.0 of the tail was quite bright — the rest was quite faint and very broad and diffuse, and it ended in a rich part of the Milky Way, which made an accurate tail estimate difficult; tail curved strongly towards N at a distance of ~ 1°.0 from the nucleus; this bend changed the tail direction at this point by ~ 50°; tabulated p.a. refers to the tail direction closest to the nucleus; the p.a. measured from the nucleus to the end of the tail was ~ 325°; waning crescent moon interfered significantly w/ the obs. [H. Dahle, Hale Pohaku, Hawaii, HI, USA]. Sept. 30.63: "obs. from the summit of Mauna Kea, outside the dome of the Canada-France-Hawaii Telescope, w/ the observer being physiologically adjusted to the elevation; naked-eye m_1 = 4.7 (MM: VSS); in 9×63 B, tail was fan-shaped, extending from p.a. 292° to 330°, w/ the brightest portion going off at the lowest p.a. (which is the tabulated value), and getting fainter w/ increasing p.a.; perfectly clear, no moon, but the background Milky Way still makes the tail obs. difficult" [DAH].

Oct. 6.64: w/ 25.6-cm f/5 L (169×, 507×), main jets seen in p.a. 30°, 80°, 145°, 200°-215°, and 340° [BIV]. Oct. 8.21: "alt. 4°.5; obs. from Funchal, Madeira, Portugal (through Oct. 13); mag is uncertain due to cloud interference; I was not able to see the comet w/ certainty in 10×50 B" [GRA04]. Oct. 9.23: alt. 8°.5, in weak morning twilight; sky was moderately light polluted and somewhat hazy, otherwise favorable conditions [GRA04]. Oct. 10.24: alt. 9°; some haze [GRA04]. Oct. 11.25: alt. 10°.5, astronomical twilight; some haze and interference from clouds [GRA04]. Oct. 13-Nov. 3: increase seen in the brightness of the central cond. — w/ 25.6-cm f/5 L (169×) and ref HS, m_2 = 12.4 on Oct. 13.65, 12.0 on Oct. 14.65, 12.6 on Oct. 21.64, 11.9 on Oct. 25.64, 12.6 on Oct. 26.65, 12.1 on Oct. 27.64, 11.5 on Oct. 29.65, 11.6 on Oct. 30.62, 11.7 on Nov. 1.62, and 11.5 on Nov. 3.65 [BIV]. Oct. 13.25: alt. 10°.5; obs. in astronomical twilight; some haze in an otherwise nearly clear sky; comet last seen in 7.0-cm R (24×) in bright nautical twilight [GRA04]. Oct. 28.63: interference from star of mag 6.6 [SEA01]. Oct. 29.63: obs. from Hale Pohaku on Mauna Kea (also on Oct. 31); tail very wide in 9×63 B, and the comet formed a very nice pair w/ the star cluster NGC 2547; w/ naked eye, m_1 = 5.6 (MM = VSS); comet was clearly visible and separated from NGC 2547 [DAH]. Oct. 29.70: broad, diffuse dust tail,

◇ *Comet C/1995 O1 (Hale-Bopp) [text continued from page 8]* ⟹
0°.2 wide at end; nearly-stellar central cond.; from Geraldton, W. Australia [KAR02]. Oct. 31.63: w/ 9×63 B, the comet seemed fainter than 2 nights ago; wide, fan-shaped and very diffuse tail; Milky Way background interfered w/ the tail obs., and the quoted tail length is a conservative estimate; w/ naked eye, $m_1 = 6.0$ (MM = VSS), but the comet was at the very edge of visibility [DAH].

Nov. 1.63: obs. from the summit of Mauna Kea; in 9×63 B, wide, fan-shaped tail w/ two distinct components; tabulated tail component (dust tail?) was broad and diffuse, w/ the surface brightness dropping rapidly w/ increased distance from the coma; second component (ion tail?) was straight, long and narrow, extending 2°.5 at p.a. 347°; Milky Way was still a problem for the tail obs.; comet was clearly visible w/ naked eye, but very close to a star of mag 6.0, which made an accurate naked-eye mag estimate impossible [DAH]. Nov. 2.74: first glimpsed naked eye and then confirmed w/ 20×80 B; broad, diffuse dust tail towards p.a. 290°, starting in Vela and then curving towards p.a. 320° in Puppis; width 0°.7 at end (very low surface brightness); from Yerecoin, W. Australia [KAR02]. Nov. 2.80: broad fan ≈ 10′ long in p.a. 290° [PEA]. Nov. 3: "my last naked-eye sighting" of this comet, meaning "that it was a naked-eye object for me for 17 months," beginning w/ "my first sighting of it in June 1996 from the Peruvian Andes!"; note also that his name was mis-spelled in *ICQ* 75, 76, 82, and 100 [KAR02]. Nov. 5.58 and 7.56: "extreme VBM method used, whereby comet and comparison-star images were put out-of-focus almost to extinction and estimate made between large low-intensity images; VSS method also gave similar estimate, but w/ less confidence due to obvious difference in appearance between comet and out-of-focus star images"; this "extreme VBM method . . . is basically the VBM method, except that the images are placed out-of-focus until the surface brightness reaches a low level and the star images really look diffuse and not like scintillating silver discs as they do for the 'regular' VBM, Morris, and VSS methods when the comet is fairly bright and bright stars are required for comparison; unlike the true Beyer method, the images are not defocussed completely to extinction" [SEA]. Nov. 5.80: broad fan ≈ 6′ long in p.a. 295° [PEA]. Nov. 7.70: broad fan ≈ 6′ long faintly visible in p.a. 310° [PEA]. Nov. 8.60: w/ 25.6-cm f/5 L (169×), main jets in p.a. 70°, 290°, 330°, 350°, and 240° (diffuse) [BIV]. Nov. 8.72: tail faintly visible ≈ 15′ long in p.a. 315° [PEA]. Nov. 10.58: Moon interfering [SEA01]. Nov. 13.80: no tail seen; full Moon; from Balga, Perth, W. Australia [KAR02]. Nov. 22.19: round, diffuse w/ brighter center; alt. 3°.5; bright sky from 3rd-quarter Moon 70° away; cirrus over most of sky, but not locally at comet position; obs. from Obs. del Roque de los Muchachos, La Palma, Spain [WAR01]. Nov. 23.19: round, diffuse w/ brighter central cond.; alt. 3°; [WAR01]. Nov. 23.47: interference from a 6th-mag star [SEA01]. Nov. 26-1998 Jan. 4: Tycho magnitudes taken from Guide 6.0 software [JON]. Nov. 27.20: tail wide, diffuse and faint; small, bright central cond.; ref stars HD 62897 ($V = 6.2$) and HD 62850 ($V = 7.2$); also seen w/ 8×25 B; alt. of comet 1°.7 (actually ~ 3°.0, taking into account the low horizon from 2350 m; NGC 2516 easily visible w/ naked eye at alt. 0°.8/2°.1); from Observatorio del Roque de los Muchachos, La Palma, Spain (alt. 2350 m) [WAR01]. Nov. 29.60: obs. made between cloud breaks [PEA].

Dec. 1.50: unexpectedly bright, as observed under very good conditions at Cowra, N.S.W.; comet was also observed via naked eye at mag ≈ 6.1; w/ 25×100 B, tail seen to at least 1°.3 in p.a. 335°; tail was more conspicuous than during previous obs. from Cowra in late Oct. [SEA]. Dec. 1.78: thin cirrus cloud affected sky transparency [PEA]. Dec. 2.58: tail appears to be straightening (i.e., not displaying the curvature shown a few months previously) and becoming more pronounced [MAT08]. Dec. 2.80: "dramatic increase in the prominence of the central cond. in the last 24 hr, which may be indicative of some form of activity in the nucleus (I had previously noticed a similar increase in the prominence of the central cond. on a timescale of 24-48 hr around Oct. 28, after which the prominence slowly decayed over the ensuing weeks); through a 20-cm L, a starlike cond. of mag ≈ 10–11 was clearly visible; broad tail visible ≈ 20′ long in p.a. 328°" [PEA]. Dec. 3.50: from Cowra, N.S.W.; comet also observed via naked eye; in 25×100 B; tail 1°.2 long in p.a. 340°, and narrow, fainter, anti-tail to 0°.8 in p.a. 185°; the latter was suspected the previous night and was also observed using 25.4-cm L at 71× [SEA]. Dec. 3.80: "comet quite close to an 8th-mag star, which may have affected coma dia. estimate and obs. of tail; through a 20-cm L, a starlike nucleus of mag ≈ 10 is embedded w/in bright central cond. and is quite striking under high power" [PEA]. Dec. 13.61: bright moonlit sky may have affected mag estimate [PEA]. Dec. 17.47: observed from Cowra, N.S.W.; obs. cut short by high cloud; still detected via naked eye, though nearby stars may have contributed to apparent naked-eye brightness; difference in sky conditions makes a great difference to visibility of this comet; in clear skies, comet is readily visible in 2.5×25 opera glass, and estimates w/ this instrument yield brighter values than those w/ larger binoculars under less favorable conditions [SEA]. Dec. 22.55: obs. from The Entrance, N.S.W.; only faintly visible in opera glass under less than perfect conditions [SEA]. Dec. 24-25: alt. 4°-5°, from Oahu, HI; ref stars very close in alt. [BIV]. Dec. 25.52: tail may have been considerably longer, possibly 2°, but became difficult to trace after ≈ 1°; comet was glimpsed in 2.5×25 B, but conditions were not sufficient for a brightness estimate; from experience of the past few weeks, comet would probably have been estimated as ≈ 1 mag brighter, had skies been dark enough to allow estimate in the smaller binoculars [SEA]. Dec. 28.74: "comet is still a striking object in a dark sky; parabolic-shaped coma w/ a broad tail 2°.3 long in p.a. 4°; outer edges of tail remain || along the entire length of the tail; surface brightness of the tail is quite high for the first 1°.5" [PEA]. Dec. 30.52: in clearer skies, comet was a striking sight in 25×100 B; tail probably stretched right across the 2°.6 field of binoculars [SEA].

1998 Jan. 5.61: tail ≈ 2°.5 long in 25×100 B; anti-tail visible to ≈ 20′ [SEA]. Jan. 11.54: significant moon interference [SEA01]. Jan. 16.46: in very clear sky, comet glimpsed via naked eye w/ averted vision [SEA]. Jan. 17.48: probable fleeting glimpses via naked eye, but w/ less confidence than on previous night; sometimes there was an impression of tail length > 5° in 10×50 B; anti-tail visible in 25.2-cm L at 71×, but involved w/ line of stars that gave a 'false anti-tail' appearance in binoculars [SEA].

◇ *Comet C/1996 J1 (Evans-Drinkwater)* ⟹ 1997 Dec. 6.94 and 1998 Jan. 15.76: seeing 3″.2 [PRA02, w/ L. Kornos and L. Koleny].

◇ *Comet C/1996 Q1 (Tabur)* ⟹ 1996 Oct. 11.94: comet seen w/ naked eye [ZHO]. Nov. 2.05 and 3.02: coma dia. $3' \times 5'$ [KRO02].

◇ *Comet C/1997 D1 (Mueller)* ⟹ 1997 Oct. 5.15: four 30-sec exposures; seeing 3".3 [GAL03, w/ PRA02]. Nov. 22.40: central cond. w/ $m_2 = 14.3$, dia. $\approx 3''$ [ROQ]. Dec. 4.25: central cond. of mag 16.2 and dia. $\approx 2''$; coma displayed only a slight degree of asymmetry toward the faint, diffuse tail [ROQ]. Dec. 7.04: three 20-sec exposures; seeing 2".1 [PRA02, w/ L. Kornos and L. Koleny]. Dec. 27.72: distinct fade in brightness over the last 24 hr, as the two obs. were made in similar sky conditions [PEA]. Dec. 29.13: central cond. of mag 15.4 and dia. $\approx 3''$; a very faint, diffuse, irregularly-formed tail was noted at p.a. 70° (as tabulated) [ROQ]. 1998 Jan. 18.12: central cond. of mag 17.8 and dia. $\approx 2''$; tail very faint and diffuse [ROQ].

◇ *Comet C/1997 J1 (Mueller)* ⟹ 1997 Dec. 31.06: 60-sec exposures; seeing 2".5 [PRA02, w/ L. Kornos and L. Koleny].

◇ *Comet C/1997 J2 (Meunier-Dupouy)* ⟹ 1997 Aug. 8.88: unfiltered SBIG ST-6 CCD shows tail ~ 10° wide; seeing 4" [GAL03, w/ PRA02]. Aug. 13.84: w/ 0.6-m f/5.5 reflector + SBIG ST-6 CCD, and no filter, "two 150-sec exp.; a smaller (and fainter) 25" tail also appeared in p.a. 97°; our archive images revealed similar structure back to the end of May 1997, perhaps; for example, on June 11, its p.a. is 115° (while main tail was at p.a. 180°, or only 65° apart); on June 26, its p.a. was 117° (main tail in p.a. 187°, or 70° apart), and so on, to 126° apart now; such information was made available only w/ image processing — by creating a photometric mask of the comet and subtracting it from the raw image" [GAL03, w/ PRA02]. Sept. 24.93: dark sky; AAVSO R Dra sequence; CCD images by R. Skartlien and B. H. Granslo of this and other comets are available via the URL `http://www.uio.no/ bgranslo/images/ccd/comets.html` [GRA04]. Oct. 1.01: w/ 25.4-cm $f/4.5$ L (162×), comet suspected at $m_1 = 11.5$ (MM = S; ref = GA), coma dia. 1', DC = 0 [DID]. Oct. 5.08: favorable conditions from this moderately-light-polluted location; AAVSO R Dra sequence (visual mags) [GRA04]. Oct. 8.78: round, prominent central cond. [AND01]. Oct. 18.71: four 40-sec exposures; seeing 5".2 [GAL03, w/ PRA02]. Oct. 20.75: round fuzzy ball, prominent central cond. [AND01]. Oct. 25.00: round and diffuse; faint central cond.; Moon up [WAR01]. Oct. 25.80: AAVSO R Dra sequence; favorable conditions, but some light pollution from Oslo [GRA04]. Oct. 27.86: observer put a colon (:) after the mag est. (note that the other TI, TJ, and TT magnitudes fainter than mag 10.5 automatically get a colon, due to their inherent unreliability – Ed.) [HOR02]. Oct. 30.92: round and diffuse [WAR01]. Nov. 19.76: 30-sec exposures; seeing 2".5 [PRA02, w/ D. Kalmancok and P. Koleny]. Dec. 6.79: first-quarter moon interfered [KAR02]. Dec. 18.71: coma was unexpectedly faint; good sky condition [BAR06]. Dec. 28.76: "delicate tail" [MIK]. 1998 Jan. 31.83: for m_1, used his own software referring to compressed data at Kyoto Univ. [YOS04].

◇ *Comet C/1997 N1 (Tabur)* ⟹ 1997 Sept. 9.83: no diffuse object was seen w/in 10' of ephemeris position; alt. ~ 10° [GRA04].

◇ *Comet C/1997 T1 (Utsunomiya)* ⟹ 1997 Oct. 7.02: "generally diffuse coma, parabolic in outline, containing a very small but highly condensed knot which occupies only about 15% of the coma's full diameter (this knot is offset slightly sunward; axis of parabolic coma in p.a. 120°-300°, with the knot offset toward the latter); possible very faint, circular glow envelopes the entire head; tail is a direct extension of coma's parabolic outline; in general, the object appears like a large comet in miniature" [BOR]. Oct. 8.82: coma somewhat elongated; very distinct central cond.; tail 3' long in p.a. 125°; in all but apparent size, this comet is reminiscent of a well-developed bright comet [AND01]. Oct. 16.85: three 14-sec exposures; seeing 2".9 [GAL03, w/ PRA02]. Oct. 19.89: comet was quite faint but clearly visible; coma appeared compact and moderately condensed; a tail was possibly seen towards NE; AAVSO CH Cyg sequence (V mag); clear sky w/ Moon [GRA04]. Oct. 20.78: coma elongated into tail, pear-shaped; tail 5' long in p.a. 20°; seemed somewhat more diffuse than on Oct. 8 [AND01]. Oct. 20.86, 22.88, and 24.84: AAVSO CH Cyg sequence (V mag) [GRA04]. Oct. 21.88: comet only 4' from star SAO 31737 in Cyg (mag 5.7) [SCH04]. Oct. 21.91-29.88: elongated coma (possible tail) [LOO01]. Oct. 23.06: comet passed very near or over a 9th-mag star, making the comet difficult to observe and measure [DID]. Oct. 23.79: w/ 15-cm R, a NT-10AS plate was exposed for 60 min, showing an inner coma dia. of 36", DC = 4, no tail [BOR04]. Oct. 24.94: rather weak central cond.; straight, thin faint tail of length 7' in p.a. 70° [WAR01]. Oct. 25.81: outer part of coma was faint and diffuse, its central region quite bright; tabulated tail data is only approximate; AAVSO CH Cyg sequence (V mag) [GRA04]. Oct. 30.88: 10' in p.a. 70° [WAR01].

Nov. 1.40: Tycho catalogue data from an ftp site at Kyoto University, in which the data are not the original ESA database itself, but rather selected values picked out and compressed by Taichi Kato; a 'viewer program' written by S. Yoshida was then used to look at data for individual stars; these details also apply to other Tycho-referenced magnitudes from this observer for other comets [MIY01]. Nov. 1.87: mag uncertain, as the comparison stars were ~ 1 mag brighter than the comet; dark sky, comet clearly visible in 7.0-cm R [GRA04]. Nov. 2-Dec. 4: GUIDE ver. 6 used for m_1 [YOS02]. Nov. 3.07: central cond. of dia. $\approx 3''$ and mag 13.1; diffuse tail traceable to the edge of the field; image processing revealed a narrow 'spine' centered w/in the tail, extending for at least 1'.5 from the nuclear region of the coma [ROQ]. Nov. 3.77: AAVSO CH Cyg sequence (V mag); $m_1 = 9.1$: using ref HV (comparison star ~ 1 mag brighter than comet); obs. somewhat difficult, due to the closeness to HIP 93353 ($V = 6.80$) [GRA04]. Nov. 5.72: coma slightly elongated; five stars of mag 11.5-12 involved in coma [BAR06]. Nov. 6.85: moonlight; large, faint outer coma; weak central cond. offset towards SW; comet also seen in 14×100 B [PER01]. Nov. 7.72: coma slightly elongated [BAR06]. Nov. 7.82: moonlight; comet easy; large outer coma; compact central cond.; brightness profile of central cond. rated as DC = 5, and that of outer coma as DC = 1/ [PER01]. Nov. 18.81: central cond. of mag 12.8 and dia. $\approx 3''$; coma highly asymmetrical toward the direction of the tail [ROQ]. Nov. 19.72: difficult obs. (comet in the Milky Way) [OKS]. Nov. 19.73: 30-sec exposures; seeing 3" [PRA02, w/ D. Kalmancok and P. Koleny]. Nov. 19.82: 10th-mag star embedded; estimate w/ VSS method,

◇ *Comet C/1997 T1 (Utsunomiya) [text continued from page 10]* ⟹
ignoring the star; alternatively it would have been possible to use the M method, subtracting the star's brightness if known from a reliable source [PER01]. Nov. 20.72: difficult obs. (comet near bright star SAO 104123, mag 7.8) [OKS]. Nov. 24.06: central cond. w/ $m_2 = 13.1$, dia. $\approx 2'$; tail diffuse w/o evidence of substructure [ROQ]. Nov. 26.74: comet was faint and only seen w/ difficulty, but the obs. location agreed w/ the ephemeris position; it was much fainter than M71; this part of the sky was somewhat light-polluted, otherwise favorable conditions; an attempt to observe 103P/Hartley 2 was unsuccessful due to the bright sky background in that area (overlooking Oslo); mags of nearby comparison stars were taken from the Tycho catalogue via the VizieR Service of CDS (`http://vizier.u-strasbg.fr/cgi-bin/VizieR`) [GRA04]. Nov. 28.82: comp. stars from Tycho Cat., but a few degrees behind on the comet's track; *ICQ* 'a' alt. correction applied, amounting to only 0.1 mag [PER01 and VIT01]. Nov. 30.78: central cond. of ≈ dia. 3′ and mag 13.5; coma asymmetrical toward the low-intensity, featureless diffuse tail [ROQ].

Dec. 5.79: using 8-10 stars w/in 0.7 mag of the comet's m_1 (six such stars w/in 0.4 mag of the comet); comet's alt. ~ 24°, but no differential extinction corr. needed, given that all comp. stars were w/in 0°.5 of the comet; moonlight; good conditions [PER01 and VIT01]. Dec. 6.08: in strong moonlight [SPR]. Dec. 12.08: central cond. w/ $m_2 = 13.9$, dia. ≈ 2′; faint, diffuse tail equally visible in R and V filters, but slightly more enhanced in B; no sub-structure noted w/in the tail [ROQ]. Dec. 17.52: central cond. of mag 13.2 and dia. ≈ 2′; the tail, although readily apparent, was faint and very diffuse w/ no obvious sub-structure [ROQ]. Dec. 31.73: very uncertain obs. w/ 33-cm f/5 L (100×), w/ comet very low in twilight, yields $m_1 = 9.8$: (MM = S; ref = S), coma dia. 1′.3, DC = 3 [SHA02].

◇ *Comet 22P/Kopff* ⟹ 1997 Nov. 2: "22P is still [surprisingly] bright" at $m_1 = 16.9$, "and the comet is very diffuse" w/ dia. 25′; the predicted mag in *HOAA 1997* and *ICQ Comet Handbook* $m_1 = 21.0$ ($m_2 = 21.9$), and the last obs. made at Modra on 1997 Feb. 23 stated $m_1 = 16.1$ (predicted $m_1 = 16.5$) [T. Oribe, Saji Observatory, Japan, via S. Nakano]. Nov. 8.26: w/ 1.2-m reflector at Mt. Hopkins, $m_2 = 20.4$; "comet appears to consist of a slightly diffuse nucleus and a large 'cloud', which itself is circular and 20′ in dia.; the center of the 'cloud' lies 10′ due S of the main nucleus; this places the nucleus on the very N edge of the 'cloud'; the 'cloud' is poorly condensed toward its center; as the seeing came and went, I thought I could make out faint secondary nucleus in the center of the 'cloud'; we definitely need a larger scope to tell for sure; it's also possible that 22P experienced a very short outburst and the newly released material is simply falling behind; there also appears to be a very faint tail extending to the SW from the cloud; total mag (nucleus and cloud) is roughly 18.5" [HER02].

◇ *Comet 29P/Schwassmann-Wachmann 1* ⟹ 1998 Jan. 14.25-25.25: w/ the 82-cm f/11.3 IAC-80 Telescope (+ 1000×1000 CCD camera), "in a circular aperture of 14′ (equivalent to 28,600 km at the distance of the comet), we observed a 3.3-mag increase in brightness in V since Jan. 18.25, under photometric conditions; using Landolt standard stars, we found the comet's photometry on Jan. 15.25 to be $V = 17.50 \pm 0.02$, V–$R = +0.47 \pm 0.02$; on Jan. 25.25, $V = 14.25 \pm 0.02$, V–$R = +0.49 \pm 0.02$, R–$I = +0.48 \pm 0.02$ (note that these dates correct what was given on *IAUC* 6816); an elongation of the nuclear cond. in the direction of the sun is obvious on Jan. 18; on the contrary, previous images from the end of Dec. 1997 and beginning of Jan. 1998 show a very condensed nuclear region and a faint circular coma; also on Jan. 25, the nuclear cond. looks much larger, and a spiral structure pointing to the sun seems to be present very close to the nucleus" [Javier Andres Licandro Goldaracena and Ricard Casas, Instituto de Astrofisica de Canarias, Tenerife, Spain]. Jan. 25.85: w/ 25-cm f/6 reflector + CCD, $m_1 = 13.7$, in outburst; strong cond., w/ a "bit [of] spreading nucleus" [T. Kojima, Chiyoda, Japan]. Jan. 29.79: size of distinct central cond. (0′.5) indicates this outburst occured 3-4 days previously [NAK01]. Jan. 30.20: photometry obtained with 20-cm f/2 Baker-Schmidt camera + V filter + ST-6 CCD at Crni Vrh Observatory; "starlike object, probably in outburst" [MIK]. Jan. 31.75: for m_1, used THE SKY J2.00 [YOS04].

◇ *Comet 43P/Wolf-Harrington* ⟹ 1997 Aug. 5.07: seeing 3′ [GAL03, w/ PRA02]. Oct. 5.14: three 30-sec exposures; seeing 4′.1 [GAL03, w/ PRA02]. Nov. 1.45: central cond. of mag 14.3; tail broad, diffuse, and somewhat fan-shaped w/ no readily-apparent sub-structure [ROQ]. Dec. 6.21: two 50-sec exposures; seeing 4′.3 [PRA02, w/ L. Kornos and L. Koleny]. 1998 Jan. 22.29: central cond. of mag 14.6 and dia. ≈ 3′; tail broad and diffuse w/ a short central core of near-equal visibility in R and V; coma asymmetry was aligned w/ and toward the p.a. of tail (288°) [ROQ]. Jan. 31.70: for m_1, used THE SKY J2.00 [YOS04].

◇ *Comet 55P/Tempel-Tuttle* ⟹ 1997 Dec. 26.81: comet not seen; some thin cirrus cloud may have been present; stars to mag 15.0 seen clearly [PEA]. Dec. 28.81: large, diffuse object best seen under low power [PEA]. 1998 Jan. 1.19: starlike central cond. of dia. 10′, surrounded by delicate circular coma [MIK]. Jan. 3.66: Tycho catalogue data from an ftp site at Kyoto University, in which the data are not the original ESA database itself, but rather selected values picked out and compressed by Taichi Kato; a 'viewer program' written by S. Yoshida was then used to look at data for individual stars; these details also apply to other Tycho-referenced magnitudes from this observer for other comets [YOS04]. Jan. 5.14: three comp. stars w/in 0.4 mag of the comet's m_1; coma edges ill-defined, dia. could be as large as 6′ in the reflector; comet easily seen in 14×100 B, w/ coma dia. 6′, DC = 3/, $m_1 = 9.8 \pm 0.3$ [PER01]. Jan. 5.15: four comp. stars w/in 0.4 mag of the comet's m_1 [VIT01]. Jan. 6.15-6.19: in 25-cm L, comet gives the impression of having faded since last night; similar sky conditions w/ excellent transparency; swift motion very evident; bright galaxies near the field; 5-7 comp. stars w/in 0.5 mag of the comet's m_1; coma edges ill-defined; w/ 15-cm L, the need to keep nearby β CVn outside the field somewhat hampered the estimate [PER01]. Jan. 6.79: 'GUIDE ver. 6' used [NAK01]. Jan. 8.16: w/ 25-cm L, comet continues to grow more diffuse; the brightness profile is in essence completely flat now, though the coma edges became significantly better-defined than in previous obs. [PER01]. Jan. 10.22: at 50×, very large, diffuse coma, only vaguely condensed toward a center that was shifted towards NW; at 161×, no false nucleus brighter than mag 14.0 [KAM01]. Jan. 10.24: obs. after moonset; excellent transparency; w/ 15-cm L, coma brightness profile is nearly flat;

◇ *Comet 55P/Tempel-Tuttle [text cont. from page 11]* ⟹
for the first time, hint of a very faint non-stellar central cond.; w/ 14×100 B, coma dia. suspected to 12′ [PER01]. Jan. 10.26: weak nucleus of mag 13.0 [LOO01]. Jan. 11.30: very difficult object in strong moonlight; invisible w/o averted vision [CRE01]. Jan. 12.19: moonlight [MIK]. Jan. 12.70: w/ 11-cm *f*/7 L (50×), m_1 = [9.6: (MM = S, ref = AA), coma dia. = ! 2′ [BAR06]. Jan. 13.78: haze [BAR06]. Jan. 15.79: slightly hasty obs., due to approaching cloud; only two comparison stars w/in 0.4 mag of the comet's m_1; similar m_1 w/ mag ref NP for the same stars [PER01]. Jan. 16.44: GUIDE ver. 6 used for m_1 [YOS02]. Jan. 17.88-17.89: surface brightness of comet was rather low and comparable to M33 and NGC 7789; comet was faint but definitely seen in 10×50 B [GRA04]. Jan. 17.89: w/ 20-cm T (77×), knot of material ∼ 30″ in dia.; at 161×, no false nucleus down to mag 13.5 [KAM01]. Jan. 18.72: good sky conditions; faint disk-like inner coma and big, round, diffuse outer coma [BAR06]. Jan. 20.43: Tycho catalogue data from an ftp site at Kyoto University, in which the data are not the original ESA database itself, but rather selected values picked out and compressed by Taichi Kato; a 'viewer program' called 'HOC2.exe', written by variable-star observer K. Nagai, was then used to look at data for individual stars; these details also apply to other Tycho-referenced magnitudes from this observer for other comets [NAG08]. Jan. 20.79: comet appeared large and ill-defined; due to a darker sky background, it was considerably easier to see than 103P; it was also visible in 10×50 B [GRA04]. Jan. 20.85: w/ 14×100 B, comet looks perhaps slightly brighter than 4 nights ago, but the tabulated m_1 is fainter apparently due to a sequence change; a VSS estimate w/ the former NH sequence yields m_1 = 8.1 (0.11-mag differential extinction corr. applied) — *i.e.*, 0.2 mag brighter than four nights ago [PER01]. Jan. 20.85: a VSS estimate w/ ref NH yields m_1 = 8.6 (0.11-mag extinction corr. applied) [VIT01]. Jan. 20.87: comet visible for the first time in 9×34 B; coma edges rather well defined; a VSS estimate w/ mag ref NH yields m_1 = 7.8 (0.11-mag extinction corr. applied) — *i.e.*, no significant difference from the tabulated mag obtained w/ ref TT, thus suggesting the sequence problem is mainly w/ the mag-8.1 star in the NH seq., perhaps due to its proximity to α UMi [PER01]. Jan. 20.99: fuzzy, round, slightly brighter center; no tail, no central cond.; ref stars GSC 4041 95 (V = 7.69) and 4045 317 (V = 9.57); light sky, hazy, low drifting clouds; bright green rayed aurora borealis ended ∼ Jan. 21.00 [WAR01]. Jan. 23.47: GUIDE ver. 6 used to extract Tycho magnitudes [YOS02]. Jan. 24.71: in the last five days, the coma became more condensed, decreased in size, and increased in total brightness [BAR06]. Jan. 24.83: comet rather faint in 9×34 B, making this instrument less adequate now for a reliable estimate; previous simultaneous obs. w/ 9×34 B and 14×100 B hinted at a huge 0.9-mag instrumental effect when the comet was very large and diffuse [PER01]. Jan. 25.43: Tycho catalogue data from an ftp site at Kyoto University, in which the data are not the original ESA database itself, but rather selected values picked out and compressed by Taichi Kato; a 'viewer program' called 'Stella Navigator for Win95', which is one of the most popular astronomical software in Japan (commercial software like 'TheSky'), was then used to look at data for individual stars; these details also apply to other Tycho-referenced magnitudes from this observer for other comets [SHI]. Jan. 25.75: w/ 10.6-cm L (52×), very difficult, outer coma observed only w/ averted vision; a somehow brighter central condensation ≈ 6′ in dia. visible directly; no tail observed [TOL]. Jan. 26.07: central cond. of mag 13.9 and dia. ≈ 3″; coma asymmetrical toward p.a. 60° w/ no certain indication of initial tail formation [ROQ]. Jan. 26.72: coma involved w/ two bright stars of mag 8 [BAR06]. Jan. 27.81-27.82: comet significantly brighter and more condensed in 14×100 B; again very well visible in 9×34 B, possibly due to very good transparency, as compared w/ average conditions on Jan. 24 and 26 [PER01]. Jan. 28.85: "in 14×100 B, comet is again more diffuse and significantly fainter than last night in spite of even better transparency this evening; on the other hand, the appearance in 9×34 B is dramatically more condensed than on the previous evening" [PER01]. Jan. 29.48: HOC2.exe (see Jan. 20.43, above) was used for m_1 [NAG08]. Jan. 30.85: w/ 20-cm T (50×), well-condensed object (DC = 5) w/ bright inner coma; at 161×, no false nucleus down to mag 13.5 [KAM01]. Jan. 31.07: central cond. w/ dia. ≈ 5″ and mag 13.8; coma somewhat asymmetrical toward p.a. 66°, w/ no tail evident in R, B, or V images [ROQ]. Jan. 31.51: for m_1, used his own software referring to compressed data at Kyoto Univ. [YOS04]. Jan. 31.79: central cond. stronger than on Jan. 27.77; moonlight [LOO01].

◇ *Comet 65P/Gunn* ⟹ 1997 Aug. 5.01: four 60-sec exp.; faint diffuse tail; seeing 3″.5 [GAL03, w/ PRA02].

◇ *Comet 69P/Taylor* ⟹ 1998 Jan. 24.53: "TheSky" was used to extract GSC magnitudes [YOS04]. Jan. 30.86: stellar pseudo-nucleus of mag 14.0; very cold weather conditions [KAR02]. Jan. 31.63: for m_1, used THE SKY J2.00 [YOS04].

◇ *Comet 78P/Gehrels 2* ⟹ 1997 Aug. 9.07: five 40-sec exp.; faint coma about 60° wide in p.a.; tail ∼ 5° wide; coma and tail appear like an arrow; seeing 3″ [GAL03, w/ PRA02]. Sept. 2.08: four 30-sec exp.; coma ∼ 60° wide in p.a.; coma and tail appear like an arrow [GAL03, w/ PRA02]. Oct. 6.05: four 30-sec exposures; seeing 2″; fan coma spans ∼ 40° in p.a. [GAL03, w/ PRA02]. Oct. 29.98: small, diffuse w/ very fuzzy, wide tail 1′.5 long in p.a. 275°; faint central brightening [WAR01]. Nov. 12.16: comet close to star of mag 12 [BOU]. Nov. 22.37: central cond. of mag 13.6 and dia. ≈ 3″; the inner coma showed pronounced asymmetry tailward (p.a. 278°) [ROQ]. Dec. 4.29: central cond. of mag 14.4 and dia. ≈ 3″; the coma was strongly asymmetrical toward the broad, diffuse tail [ROQ]. Dec. 7.09 and 1998 Jan. 17.92: seeing 2″ and 3″.2 [PRA02, w/ L. Kornos and L. Koleny]. Dec. 18.53: m_1 difficult due to its proximity to 30 Gem [MAT08]. Dec. 27.72: distinct starlike central cond. present w/in brighter regions of coma as seen under higher power (180×) [PEA]. Dec. 28.96: fan-like tail [MIK]. Dec. 29.15: central cond. of mag 13.6 and dia. ≈ 3″; general coma strongly asymmetrical toward p.a. 290°, w/ the inner-third portion appearing unexpectedly bright; the tail appeared broad and diffuse w/o obvious sub-structure [ROQ]. Dec. 31.02: seeing 2″.8; tail curving through p.a. 319° at ≈ 1′, continuing through p.a. 249° at ≈ 2′ [PRA02, w/ L. Kornos and L. Koleny]. 1998 Jan. 18.16: central cond. of mag 13.5 and dia. ≈ 2″; the inner coma remains unexpectedly bright; asymmetry toward p.a. 289° is strongly exhibited by all regions of the coma, w/ only a slight indication of a faint, very broad tail [ROQ]. Jan. 21.98: m_1 = 11.5 w/ ref PC [PER01]. Jan. 24.55: "TheSky" used to extract GSC magnitudes [YOS04]. Jan. 31.60: for m_1, used THE SKY J2.00 [YOS04].

◇ *Comet 81P/Wild 2* ⟹ 1997 Mar. 24.19: during partial lunar eclipse [MOR03].

◇ *Comet 103P/Hartley 2* ⟹ 1997 Aug. 23.87: four 60-sec exp.; faint coma [GAL03, w/ PRA02]. Oct. 21.44 and 22.44: w/ 20-cm f/7 L (150×), comet seen, but only with averted vision, and as such too difficult to estimate its brightness, but m_1 was slightly fainter than 12.0 (MM = S; ref = TI); coma dia. 2′, DC = 1 [MAT08]. Oct. 23.04-Dec. 15.97: "comet obviously underwent a 6P/d'Arrest-like photometric outburst; coma rapidly expanded and brightened by a factor of ≈ 50× in just a couple of weeks and then stabilized in brightness; overall physical appearance also very similar to 6P in its outburst phase during this period" [BOR]. Oct. 29.44: "at my telescopic limit", m_1 = 12.0: (MM = S; ref = TI); coma dia. 2′, DC = 1 [MAT08]. Nov. 2-1998 Jan. 16: GUIDE ver. 6 used for m_1 [YOS02]. Nov. 6.08: central cond. of dia. 3″ and mag 14.5; the coma showed pronounced asymmetry toward p.a. 90° w/ only a slight hint of a short tail at that location [ROQ]. Nov. 11.69: four 30-sec exposures; seeing 3″ [GAL03, w/ PRA02]. Nov. 18.24: central cond. of dia. ≈ 3″ and mag 13.8; coma asymmetrical toward p.a. 84° w/ an uncertain indication of a short, diffuse tail at that location [ROQ]. Nov. 18.80: "in 25.3-cm f/5.6 L (58×), looks just about like the typical DC = 4 object, w/ two levels of brightness, the brightness profile being steeper ~ half-way from the center towards the coma edges; 12th-mag embedded star not significantly affecting m_1 estimate" [PER01]. Nov. 19.70: 30-sec exposures; seeing 4″ [PRA02, w/ D. Kalmancok and P. Koleny]. Nov. 19.80: in 25.3-cm f/5.6 L (58×), clearly more diffuse than last night [PER01]. Nov. 20.71: large and diffuse coma containing an 11.2-mag GSC star [OKS]. Nov. 24.10: central cond. w/ m_2 = 13.8 and dia. ≈ 3″; the coma appeared asymmetrical toward p.a. 80° [ROQ]. Nov. 27.52: comet obs. between cloud breaks [PEA]. Nov. 30.81: central cond. of dia. ≈ 3″ and mag 13.7; coma asymmetrical toward p.a. 69° [ROQ]. Nov. 30.83: comet very obvious upon casual sweeping of the field; cirrus elsewhere in the sky, but thought to have not interfered; good transparency in the comet and comp.-star fields [PER01]. Nov. 30.83: comet more easily seen toward the end of the obs., thus staying only w/ the later estimates; uncertainty in m_1 was ~ 0.2 mag; the initial estimates yielded m_1 close to 9.4, w/ DC = 2 [VIT01].

Dec. 1.85: using 8 stars w/in 1.0 mag of the comet's m_1, against only four such stars used during previous evening [PER01]. Dec. 6.08: strong moonlight [SPR]. Dec. 6.70: first-quarter moon interfered [KAR02]. Dec. 7.11: very strong moonlight [SPR]. Dec. 12.67: 20-sec exposures; seeing 3″; very faint tail [PRA02 and GAL03]. Dec. 13.06: central cond. of mag 14.2 and dia. ≈ 3″; coma asymmetrical toward p.a. 74°, which marked the beginning of a very faint, short tail [ROQ]. Dec. 14.54: full Moon ≈ 10° above horizon [PEA]. Dec. 15.44: sky becoming light due to rising moon [SEA]. Dec. 15.97: w/ 40.6-cm f/5 L (70×), coma dia. 3′.8, DC = 5 [BOR]. Dec. 15.98: no nuclear cond. visible at 163× [CRE01]. Dec. 18.68: w/ 20-cm L (71×), disk-like inner coma [BAR06]. Dec. 18.97: w/ 40.6-cm f/5 L (70×), coma dia. 2′.7, DC = 5/ [BOR]. Dec. 22.98 and 23.95: comet brighter w/ Swan-band filter [DEA]. Dec. 23.74: alt. of comet was quite low (15°-20°) [GRA04]. Dec. 26.73: obs. through cloud breaks; well-condensed object w/ a conspicuous false nucleus [KAM01]. Dec. 26.75: "mags deduced from this and my previous obs. (Dec. 25.77) are conflicting, and the reason for this is unclear (possibly due to a poor choice of comparison stars)" [GRA04]. Dec. 26.79: 5 comp. stars w/in 0.4 mag, of the comet's m_1; all above 31° alt.; differential extinction corr. only needed for some of the comp. stars, and never exceeding 0.09 mag; sky not the best, but Milky Way still well visible [PER01]. Dec. 27.06: central cond. of dia. ≈ 3″ and mag 13.7; coma asymmetrical toward the point of tail formation (p.a. 74°); faint, diffuse tail w/ a brighter, narrow linear central core was readily recorded in an unfiltered image [ROQ]. Dec. 28.72: photometry obtained with 36-cm f/6.7 T + V filter + CCD; straight, narrow ion tail [MIK]. Dec. 30.74: visibility of comet was comparable to M1; some interference from aurora borealis [GRA04]. Dec. 31.79: 8 comp. stars w/in 0.5 mag, of the comet's m_1; all w/in ~ 2° of the comet; still rather steep brightness profile, but lacking the nearly-stellar central cond. present in previous obs. [PER01].

1998 Jan. 17.74: at 161×, knot of material ~ 15″ in dia.; no false nucleus down to mag 13.5 [KAM01]. Jan. 20.78: comet only seen w/ difficulty, due to a bright sky background (overlooking Oslo) [GRA04]. Jan. 23.44: "GUIDE ver. 6" used to extract Tycho magnitudes [YOS02]. Jan. 27.72: comet was brighter than on the last five days, with the same sky conditions [BAR06]. Jan. 27.81: hint of a 10th-mag nearly-stellar central cond. [PER01]. Jan. 29.46: HOC2.exe (see Jan. 20.43 note for 55P, above) was used for m_1 [NAG08]. Jan. 30.85: well-condensed object w/ bright inner coma of dia. 1′.5; at 161×, false nucleus of about mag 13.5 [KAM01]. Jan. 31.51: for m_1, used his own software referring to compressed data at Kyoto Univ. [YOS04]. Jan. 31.76: comet involved with star of mag 10.1; brightness of this star was subtracted from total brightness estimate [BOU].

◇ *Comet 104P/Kowal 2* ⟹ 1997 Aug. 5.95: faint tail; seeing 3″.5 [GAL03, w/ PRA02]. Aug. 24.93: four 90-sec exp. [GAL03, w/ PRA02]. Nov. 19.83: "comet strongly condensed with faint coma; small outburst?" [BOU]. Nov. 20.88: three 30-sec exposures; seeing 3″.7 [PRA02, w/ D. Kalmancok and P. Koleny]. Dec. 6.75: first-quarter moon interfered [KAR02]. 1998 Jan. 24.41: "TheSky" was used to extract GSC magnitudes [YOS04].

◇ *Comet 119P/Parker-Hartley* ⟹ 1997 Dec. 31.487: narrow, straight tail [SCO01].

◇ *Comet 128P/Shoemaker-Holt 1* ⟹ 1997 Sept. 2.01: four 90-sec exp.; faint tail; seeing 3″ [GAL03, w/ PRA02].

◇ *Comet 129P/Shoemaker-Levy 3* ⟹ 1998 Jan. 7.08: seeing 2″.8 [PRA02 and GAL03]. Jan. 17.97: seeing 3″.6 [PRA02, w/ L. Kornos and L. Koleny].

◇ *Comet 132P/Helin-Roman-Alu 2* ⟹ 1997 Dec. 31.219: fainter tail extends 0′.57 in p.a. 274° [SCO01].

◇ *Comet P/1997 BA$_6$ (Spacewatch)* ⟹ 1997 Nov. 3.82, Dec. 4.81, and 24.75: "showed an asteroidal appearance at the last opposition, but it has become a REAL comet now — obvious coma and fan-like tail northward" [NAK01]. Dec. 6.19: seeing 3″.7 [PRA02, w/ L. Kornos and L. Koleny]. 1998 Jan. 18.04: seeing 3″; very faint tail [PRA02, w/ L. Kornos and L. Koleny].

◇ *Comet P/1997 C1 (Gehrels)* ⟹ 1997 Dec. 31.520: faint tail; "extraordinarily faint — the nuclear cond. is non-existent, and I really measured the end of the coma/tail region; I'm not sure I believe the 14 ADU (m_2 = 23.7) that I got when doing my traditional nuclear mag measurement"; "in general, I use a normal drift scan to image most comets, [the duration of which] is ~ 143 sec divided by the cosine of the declination; if I take 'stare' frames, they're usually either 150 or 300 sec, unless I need more or less exposure; in the future, unless I [say] otherwise, assume [that] a sidereal drift scan was used, and the exposure [duration] will be $143/\cos(\delta)$" [SCO01; the second quote, regarding exposure duration, is from an e-mail dated 1997 Nov. 19].

◇ *Comet P/1997 T3 (Lagerkvist-Carsenty)* ⟹ 1997 Dec. 28.118: faint tail; on Dec. 28.13, m_1 measured as 20.8 [SCO01].

◇ ◇ ◇

TABULATED DATA

The headings for the tabulated data are as follows: "DATE (UT)" = Date and time to hundredths of a day in Universal Time; "N" = notes [* = correction to observation published in earlier issue of the *ICQ*; an exclamation mark (!) in this same location indicates that the observer has corrected his estimate in some manner for atmospheric extinction (prior to September 1992, this was the standard symbol for noting extinction correction, but following publication of the extinction paper — July 1992 *ICQ* — this symbol is only to be used to denote corrections made using procedures different from that outlined by Green 1992, *ICQ* **14**, 55-59, and in Appendix E of the *ICQ Guide to Observing Comets* — and then only for situations where the observed comet is at altitude > 10°); '&' = comet observed at altitude 20° or less with no atmospheric extinction correction applied; '$' = comet observed at altitude 10° or lower, observations corrected by the observer using procedure of Green (*ibid.*); for a correction applied by the observer using Tables Ia, Ib, or Ic of Green (*ibid.*), the letters 'a', 'w', or 's', respectively, should be used].

"MM" = the method employed for estimating the total (visual) magnitude; see article on page 186 of the Oct. 1996 issue [B = VBM method, M = Morris method, S = VSS or In-Out method, I = in-focus, C = unfiltered CCD, c = same as 'C', but for 'nuclear' magnitudes, V = electronic observations — usually CCD — with Johnson *V* filter, *etc.*]. "MAG." = total (visual) magnitude estimate; a colon indicates that the observation is only approximate, due to bad weather conditions, *etc.*; a left bracket ([) indicates that the comet was not seen, with an estimated limiting magnitude given (if the comet IS seen, and it is simply estimated to be fainter than a certain magnitude, a "greater-than" sign (>) must be used, not a bracket). "RF" = reference for total magnitude estimates (see pages 98-100 of the October 1992 issue, and Appendix C of the *ICQ Guide to Observing Comets*, for all of the 1- and 2-letter codes). "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); note that for CCD observations, in place of magnification is given the exposure time in seconds (see page 11 of the January 1997 issue).

"COMA" = estimated coma diameter 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 (preceded by lower- and upper-case letters S and D to indicate the presence of stellar and disklike central condensations; cf. July 1995 issue, p. 90); 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. Lower-case letters between the tail length and the p.a. indicate that the tail was measured in arcmin ("m") or arcsec ("s"), *in which cases the decimal point is shifted one column to the right.* "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).

A complete list of the Keys to abbrevations used in the *ICQ* is available from the Editor for $4.00 postpaid (available free of charge via e-mail); these Keys are also now available in the new *Guide to Observing Comets* and via the *ICQ*'s World Wide Web site. *Please note that data in archival form, and thus the data to be sent in machine-readable form, use a format that is different from that of the Tabulated data in the printed pages of the ICQ;* see pages 59-61 of the July 1992 issue, p. 10 of the January 1995 issue, and p. 100 of the April 1996 issue for further information [note correction on page 140 of the October 1993 issue]. Further guidelines concerning reporting of data may be found on pages 59-60 of the April 1993 issue, and in the *ICQ Guide to Observing Comets.*

◇ ◇ ◇

Key to observers with observations published in this issue, *with 2-digit numbers between Observer Code and Observer's Name indicating source [07 = Comet Section, British Astronomical Assn.; 16 = Japanese observers (c/o Akimasa Nakamura, Kuma, Japan); 23 = Czech group (c/o P. Pravec and V. Znojil); 32 = Hungarian group (c/o K. Sarneczky); 37 = Ukrainian Comet Section (c/o A. R. Baransky and K. I. Churyumov); 42 = Belarus observers, c/o V. S. Nevski, Vitebsk; 43 = Slovenian observers, c/o Herman Mikuz, Ljubljana; etc.]. Those with asterisks (*) preceding the 5-character code are new additions to the Observer Key:*

AND01		Karl-Gustav Andersson, Sweden
BAL02	33	Ricardas Balciunas, Ignalina, Lithuania
BAR06	37	Alexandr R. Baransky, Okhnovka, Ukraine
BIV		Nicolas Biver, France
BOR		John E. Bortle, NY, U.S.A.
BOU		Reinder J. Bouma, The Netherlands
BUS01	11	E. P. Bus, The Netherlands
CHE03	33	Kazimieras T. Cernis, Lithuania
CHE04	46	Dong Hua Chen, Gulangyu, Xiamen, China
COM	11	Georg Comello, The Netherlands
CRE01		Phillip J. Creed, OH, U.S.A.
DAH	24	Haakon Dahle, Norway
DEA		Vicente Ferreira de Assis Neto, Brazil
DEM	23	Eduard Demencik, Slovak Republic
DES01		Jose Guilherme de Souza Aguiar, Brazil
DID		Richard Robert Didick, MA, U.S.A.
DIE02		Alfons Diepvens, Belgium
DIJ		Edwin van Dijk, The Netherlands
*ERO	42	Alexei Viktorovich Erohin, Kursk, Russia
FIL05	37	Alexander V. Filatov, Kiev, Ukraine
GAL03		Adrián Galád, Modra-Piesok, Slovakia
GAS01	33	Darius Gasiunas, Lithuania
GEE	11	J. J. Geenen, The Netherlands
GIL01	11	G. Gilein, Noordwijk, The Netherlands
GON05		Juan Jose Gonzalez, Asturias, Spain
GRA04	24	Bjoern Haakon Granslo, Norway
GUL01	32	Krisztián Gulyás, Veresegyház, Hungary
HAS02		Werner Hasubick, Germany
HAS08	16	Yuji Hashimoto, Hiroshima, Japan
HAV		Roberto Haver, Italy
HOR02	23	Kamil Hornoch, Czech Republic
JOH01	11	C. Johannink, The Netherlands
JON	09	Albert F. Jones, New Zealand
*JON06	11	L. Jongen, Maastricht, Netherlands
KAM01		Andreas Kammerer, Ettlingen, Germany
KAR02	21	Timo Karhula, Sweden
KIS02	32	László Kiss, Szeged, Hungary
KRO02		Gary W. Kronk, IL, U.S.A.
KRY02		Washington Kryzanowski, Uruguay
KUB	23	Pavel Kubicek, Czech Republic
KUJ	23	Josef Kujal, Hradec Kralove, Czech Rep.
KYS	23	J. Kysely, Czech Republic
LAA	11	T. A. van der Laan, The Netherlands
LAN01	11	M. Langbroek, The Netherlands
LOO01		Frans R. van Loo, Belgium
LOU	35	Romualdo Lourencon, Brazil
MAN02	23	Roman Maňák, Lipov, Czech Republic
MAR02	13	Jose Carvajal Martinez, Spain
*MAT08		Michael Mattiazzo, S. Australia
MIK		Herman Mikuz, Slovenia
MIY01	16	Osamu Miyazaki, Tsukuba, Ibaraki, Japan
MOE		Michael Moeller, Germany
MOR03		Warren C. Morrison, Canada
NAG02	16	Takashi Nagata, Japan
NAG08	16	Yoshimi Nagai, Japan
NAK01	16	Akimasa Nakamura, Kuma, Japan
NEV	42	Vitali S. Nevski, Vitebsk, Belarus
NOW		Gary T. Nowak, VT, U.S.A.
OHM	16	Fumihiko Ohmori, Miyazaki, Japan
OKA05	16	Takuma Oka, Kodaira, Tokyo, Japan
OKS	07	Gabriel Oksa, Slovak Republic
OME	05	Stephen O'Meara, HI, U.S.A.
*OUY	46	Tian-jing Ouyang, China
PEA	14	Andrew R. Pearce, Australia
PER01		Alfredo Jose Serra Pereira, Portugal
PLS	23	Martin Plšek, Czech Republic
POD	23	M. Podzorny, Czech Republic
PRA02		Alexander Pravda, Modra, Slovak Rep.
ROQ		Paul Roques, AZ, U.S.A.
*SAI01	16	Takao Saito, Nagoya, Aichi, Japan
SAN04	38	Juan Manuel San Juan, Madrid, Spain
SAN07	32	Gábor Sánta, Kisujszállás, Hungary
SAR02	32	Krisztián Sárneczky, Hungary
SCH04	11	Alex H. Scholten, The Netherlands
SCO01		James V. Scotti, AZ, U.S.A.
SCO04	37	Borys Skorichenko, Ukraine
SEA	14	David A. J. Seargent, Australia
SEA01	14	John Seach, Australia
SHA02	07	Jonathan D. Shanklin, England
SHA04		Gregory T. Shanos, FL, U.S.A.
SHI	16	Hiroyuki Shioi, Japan
SHU	42	Sergey E. Shurpakov, Baran, Belarus
SIE	33	Henryk Sielewicz, Lithuania
SIM		Karl Simmons, FL, U.S.A.
SON	46	Wan-fang Song, China
SPR		Christopher E. Spratt, BC, Canada
*SUZ02	16	Masayuki Suzuki, Utsunomiya, Japan
*SVE	23	Milan Švehla, Czech Rep.
SZE02	32	László Szentaskó, Hungary
TOL	07	Alin-Catalin Tolea, Romania
*TOT03	32	Zoltán Tóth, Hungary
TSU02	16	Mitsunori Tsumura, Wakayama, Japan
VEL03	37	Peter Velestschuk, Ukraine
VIT01	40	Catarina Vitorino, Portugal
WAR01		Johan Warell, Sweden
YAS	06	Masanori Yasuki, Tottori, Japan
YOS02	16	Katsumi Yoshimoto, Japan
YOS04	16	Seiichi Yoshida, Ibaraki, Japan
ZAN01		W. T. Zanstra, The Netherlands
ZHO	46	Xin-ming Zhou, China
ZNO	23	Vladimír Znojil, Czech Republic

◇ ◇ ◇

Comet C/1995 O1 (Hale-Bopp)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 05 18.27		S	7.6	SC	33.3	L	4	58	5	5			KR002
1996 05 20.83		S	7.8	AA	6.0	R	12	20	4	3			SON
1996 05 20.84		S	8.0	AA	10.0	R	12	35	2	3			OUY
1996 05 23.24		S	6.9	SC	8.0	B		20	11	3	?		KR002
1996 06 11.28		S	6.7	SC	8.0	B		20	13	2	?		KR002
1996 06 12.71		S	7.6	AA	10.0	R	12	35	3	3			OUY
1996 06 12.79		S	7.5	AA	6.0	R	12	20	5	4			SON
1996 06 13.21		S	6.5:	AA	20.0	T	10	50	2.7	s5	&1	345	SHA04
1996 06 13.76		S	7.3	AA	6.0	R	12	20	7	5			SON
1996 06 13.85		S	7.4	AA	10.0	R	12	35	4	4			OUY
1996 06 14.22		S	6.6	SC	3.5	B		7	14	3	?		KR002
1996 06 14.71		S	7.2	AA	10.0	R	12	35	5	5			OUY
1996 06 15.31		S	6.5	SC	8.0	B		20	14	3			KR002
1996 06 16.23		S	6.2	AA	20.0	T	10	50	4.4	s5	&1	350	SHA04
1996 06 16.69		S	7.7	AA	10.0	R	12	35	3	3			OUY
1996 06 18.72		S	7.4	AA	10.0	R	12	35	5	4			OUY
1996 06 20.24		S	6.2	SC	8.0	B		20	13	3			KR002
1996 06 20.78		S	7.0	AA	6.0	R	12	20	9	5			SON
1996 06 20.78		S	7.0	AA	10.0	R	12	35	5	5			OUY
1996 06 21.22		S	6.2	SC	8.0	B		20	13	3			KR002
1996 06 21.79		S	7.0	AA	10.0	R	12	35	5	5			OUY
1996 06 22.23		S	6.1	SC	8.0	B		20	15	3			KR002
1996 06 22.64		S	7.0	AA	10.0	R	12	35	5	3			OUY
1996 06 25.73		S	7.1	AA	10.0	R	12	35	5	3			OUY
1996 07 05.64		S	7.1	AA	10.0	R	12	35	4	3			OUY
1996 07 06.62		S	7.1	AA	10.0	R	12	35	5	4			OUY
1996 07 06.66		S	6.2	AA	6.0	R	12	20	10	5	0.03	0	SON
1996 07 10.23		S	5.7	SC	3.5	B		7	15	4			KR002
1996 07 11.64		S	6.8	AA	10.0	R	12	35	7	5			OUY
1996 07 12.15		S	5.6	SC	3.5	B		7	18	4			KR002
1996 07 13.63		S	6.8	AA	10.0	R	12	35	7	6			OUY
1996 07 14.19		S	5.6	SC	5.0	B		10	18	4			KR002
1996 07 15.16		S	5.6	SC	3.5	B		7	18	4			KR002
1996 07 16.14		S	5.6	SC	3.5	B		7	18	4			KR002
1996 07 18.20		S	5.6	SC	3.5	B		7	18	3			KR002
1996 07 18.57		S	6.0	AA	6.0	R	12	20	11	5			SON
1996 07 22.58		S	6.7	AA	10.0	R	12	35	7	5			OUY
1996 07 23.20		S	5.6	SC	3.5	B		7	17	3			KR002
1996 07 24.70		S	5.9	AA	6.0	R	12	20	12	6	0.03	350	SON
1996 08 01.11		S	5.7	SC	3.5	B		7	15	2			KR002
1996 08 05.54		S	6.5	AA	10.0	R	12	35	7	4			OUY
1996 08 06.16		S	5.7	SC	3.5	B		7	15	4			KR002
1996 08 07.16		S	5.7	SC	3.5	B		7	13	4			KR002
1996 08 07.56		B	5.8	AA	6.0	R	12	20	12	6			SON
1996 08 09.14		S	5.5	SC	0.0	E		1					KR002
1996 08 09.14		S	5.7	SC	3.5	B		7	14	4			KR002
1996 08 13.60		S	7.0	AA	10.0	R	12	35	6	4			OUY
1996 08 19.14		S	5.6	SC	3.5	B		7	15	3	?	280	KR002
1996 08 31.55		S	7.0	AA	10.0	R	12	35	5	4			OUY
1996 09 01.53		B	6.5	AA	6.0	R	12	20	8	6			SON
1996 09 01.58		S	6.8	AA	10.0	R	12	35	6	5			OUY
1996 09 02.52		S	6.8	AA	10.0	R	12	35	6	5			OUY
1996 09 05.86		S	7.0	AA	10.0	R	12	35	4				OUY
1996 09 10.12		S	5.7	SC	3.5	B		7	11	3			KR002
1996 09 11.11		S	5.7	SC	3.5	B		7	11	3			KR002
1996 09 11.55		B	6.5	AA	5.0	B		20	8	6			SON
1996 09 12.86		S	6.6	AA	10.0	R	12	35	3				OUY
1996 09 13.04		S	5.4	AA	20.0	T	10	50	4.3	8	&1	350	SHA04
1996 09 13.11		S	5.7	SC	3.5	B		7	13	3			KR002
1996 09 14.09		S	5.7	SC	3.5	B		7	14	3			KR002
1996 09 15.10		S	5.7	SC	3.5	B		7	13	4			KR002
1996 09 16.81		S	6.5	SC	6.3	B		8	19	2			GEE
1996 09 16.90		S	6.6	AA	10.0	R	12	35	3				OUY
1996 09 17.11		S	5.7	SC	3.5	B		7	13	4			KR002
1996 09 23.86		S	6.5	AA	10.0	R	12	35	3				OUY

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 24.86		S	6.6	AA	10.0	R	12	35	3				OUY
1996 09 28.86		S	6.5	AA	10.0	R	12	35	4				OUY
1996 09 29.04		S	5.6	SC	3.5	B		7	15	3			KR002
1996 09 30.04		S	5.5	SC	3.5	B		7	15	4			KR002
1996 10 01.07		S	5.5	SC	3.5	B		7	15	4			KR002
1996 10 02.06		S	5.5	SC	3.5	B		7	15	4			KR002
1996 10 02.06		S	5.6	SC	8.0	B		20	12	4			KR002
1996 10 02.81		S	6.3	AA	10.0	R	12	35	& 5.5				OUY
1996 10 04.06		S	5.6	SC	3.5	B		7	14	4			KR002
1996 10 04.84		S	6.5	AA	10.0	R	12	35	5				OUY
1996 10 07.05		S	5.6	SC	3.5	B		7	14	4			KR002
1996 10 09.07		S	5.6	SC	3.5	B		7	14	4			KR002
1996 10 11.04		S	5.3	AA	20.0	T	10	50	6.5	9	&1	110	SHA04
1996 10 13.83		S	6.3	AA	10.0	R	12	35	5	4			OUY
1996 10 15.05		S	5.6	SC	3.5	B		7	14	4			KR002
1996 10 15.49		B	6.0	AA	6.0	R	12	20	8	6			SON
1996 10 16.04		S	5.2	AA	20.0	T	10	50	6.1	9	&1		SHA04
1996 10 16.05		S	5.3	SC	3.5	B		7	15	3			KR002
1996 10 17.05		S	5.1	SC	3.5	B		7	15	3			KR002
1996 10 19.05		S	5.5	SC	3.5	B		7	14	4			KR002
1996 10 19.79		S	6.2	AA	10.0	R	12	35	5	7			OUY
1996 10 20.79		S	6.2	AA	10.0	R	12	35	5	6			OUY
1996 10 30.05		S	5.3	SC	3.5	B		7	16	4			KR002
1996 10 31.01		S	5.2	SC	3.5	B		7	18	5			KR002
1996 11 01.00		S	5.0	AA	20.0	T	10	50	5.3	9	&1		SHA04
1996 11 02.04		S	5.2	SC	8.0	B		20	16	5			KR002
1996 11 02.77		N	10.5	VB	20.3	T	10	80		6/		85	GRA04
1996 11 03.01		S	5.1	SC	3.5	B		7	19	6			KR002
1996 11 06.01		S	5.1	SC	3.5	B		7	18	5			KR002
1996 11 07.00		S	5.0	AA	20.0	T	10	50	6.2	9			SHA04
1996 11 07.71		M	5.2	HI	5.0	B		10	10	6	0.4	90	GRA04
1996 11 09.45		B	4.6	AA	4.0	B		8	8	7	0.17	90	SON
1996 11 10.02		S	4.9	AA	20.0	T	10	50	5.5	9	2		SHA04
1996 11 14.73		S	5.0	AA	5.0	B		7	9	7/	0.2		DIJ
1996 11 15.76		S	4.4	AA	5.0	B		10	5	6	2	230	LAA
1996 11 17.44		B	6.0	AA	10.0	R	12	35	5	3			OUY
1996 11 20.44		B	6.2	AA	10.0	R	12	35	6	4			OUY
1996 11 20.45		B	4.8	AA	4.0	B		8	8	6			SON
1996 11 27.02		S	4.7	SC	3.5	B		7	17	4			KR002
1996 11 28.99		S	4.6	AA	20.0	T	10	50	4.1	9			SHA04
1996 11 30.43		B	5.8	AA	10.0	R	12	35	5	6			OUY
1996 12 02.01		S	4.3	SC	3.5	B		7	16	6			KR002
1996 12 03.01		S	4.3	SC	3.5	B		7	16	6	0.8	40	KR002
1996 12 04.01		S	4.3	SC	3.5	B		7	15	5	0.8	40	KR002
1996 12 05.43		B	5.9	AA	10.0	R	12	35	4	6			OUY
1996 12 06.01		S	4.2	SC	3.5	B		7	17	6	0.7		KR002
1996 12 08.99	&	S	4.2	AA	20.0	T	10	50	6.2				SHA04
1996 12 09.00		S	4.3	SC	3.5	B		7	15	4	0.5		KR002
1996 12 14.00		S	4.2	SC	3.5	B		7	14	4	0.3		KR002
1996 12 14.70		S	4.0	AA	4.0	B		8	10	6/	1	30	SCH04
1996 12 20.72		S	4.5	AA	5.0	B		10	8	5			ZAN01
1996 12 21.70	a	S	3.6	S	6.7	R		14	>12	7	>1.5	20	BUS01
1996 12 21.71	a	S	3.7	AA	4.0	B		8	& 8	6	0.6	30	SCH04
1996 12 22.70	a	S	3.5	S	6.7	R		14	>12	7	>1.5	20	BUS01
1996 12 22.71		M	4.2	AA	5.0	B		7	10	7	2.2	30	DIJ
1996 12 22.71	a	S	3.7	AA	4.0	B		8	10	6	1	35	SCH04
1996 12 23.70	a	S	3.7	AA	4.0	B		8	10	6		15	SCH04
1996 12 23.71	a	S	3.7	S	6.7	R		14	>10	7	>1	20	BUS01
1996 12 23.71	a	S	4.1	AA	5.0	B		10		5	1		COM
1996 12 24.71	a	S	3.6	AA	4.0	B		8	12	6/	0.8	45	SCH04
1996 12 25.00		S	3.8	SC	3.5	B		7	12	5	?		KR002
1996 12 25.70	a	S	3.6	S	6.7	R		14	>10	7	>1	20	BUS01
1996 12 25.71		M	4.1	AA	5.0	B		7	10	8	1.8	29	DIJ
1996 12 26.90		M	4.3	AA	5.0	B		10	8	S5	0.27	40	MOR03
1996 12 27.89		M	4.3	AA	5.0	B		10	7	S5	0.31	35	MOR03

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 28.71		M	3.9	AA	5.0	B		7	12	8	2.2	38	DIJ
1996 12 28.71	a	S	3.7	AA	4.0	B		8	12	6	1.2	27	SCH04
1996 12 28.73	a	S	3.7	AA	5.0	B		10	15	5	1	20	ZAN01
1996 12 31.71		M	3.9	AA	5.0	B		7	12	8	1.7	36	DIJ
1996 12 31.72	a	S	3.8	AA	5.0	B		10	15	5	1	20	ZAN01
1997 01 01.72	a	S	3.8	AA	5.0	B		10	15	5	1	20	ZAN01
1997 01 12.51		S	3.2:	SC	8.0	B		20	10	6	?		KR002
1997 01 13.21	*!	S	2.8	AA	0.0	E		1	12				HAV
1997 01 13.53		S	2.8	SC	3.5	B		7	14	7			KR002
1997 01 14.25		M	3.2	AA	5.0	B		7	11	7	1.4	5	DIJ
1997 01 14.25	a	S	3.2	AA	5.0	B		10	& 8	6/	&1	0	COM
1997 01 14.25	a	S	3.3	AA	0.0	E		1	12	8			SCH04
1997 01 15.21	*!	S	2.6	AA	0.0	E		1	18				HAV
1997 01 15.21	*!	S	2.8	AA	5.0	B		10	10	7/	3.0	336	HAV
1997 01 15.24		M	3.1	AA	5.0	B		7	12	7			DIJ
1997 01 15.24	a	S	3.4	AA	0.0	E		1		8			SCH04
1997 01 15.25	a	S	3.2	AA	5.0	B		10	& 8	6/	&2	0	COM
1997 01 15.25	a	S	3.3	AA	4.0	B		8	12	7	&2	335	SCH04
1997 01 16.24	a	S	3.0	AA	5.0	B		7	&20		&2	340	JOH01
1997 01 16.24	a	S	3.2	AA	4.0	B		8	15	7	2	335	SCH04
1997 01 16.24	a	S	3.3	AA	0.0	E		1		7/			SCH04
1997 01 16.24	a	S	3.4	AA	5.0	B		10	& 8	7	&1	250	COM
1997 01 16.25		M	3.0	AA	5.0	B		7	12	8			DIJ
1997 01 17.24		M	3.0	AA	5.0	B		7	13	8	1.4	332	DIJ
1997 01 17.24	a	S	3.3	AA	0.0	E		1	13	6			SCH04
1997 01 17.25	a	S	3.0	AA	5.0	B		10	10	6	0.6	30	ZAN01
1997 01 18.46	w	M	3.5	AA	3.5	B		7	4.5	S8	0.43	345	MOR03
1997 01 21.49		S	2.7	SC	3.5	B		7	10	7	1.0	315	KR002
1997 01 21.50		S	2.5	SC	0.0	E		1					KR002
1997 01 27.22	a	S	3.1	AA	5.0	B		10	8	6	0.5	30	ZAN01
1997 01 27.23		M	2.7	AA	5.0	B		7		8			DIJ
1997 01 27.45	w	M	3.2	AA	3.5	B		7	4	S8	0.72	335	MOR03
1997 01 28.23		M	2.7	AA	5.0	B		7		8			DIJ
1997 01 28.49		S	2.5	SC	0.0	E		1					KR002
1997 01 28.49		S	2.6	SC	3.5	B		7	14	8	2.5	325	KR002
1997 01 29.47	w	M	2.9	AA	3.5	B		7	4	S8	1.0	330	MOR03
1997 01 30.49		S	2.6	SC	0.0	E		1					KR002
1997 01 30.92		B	3.0	AA	4.0	B		8	10	7			SON
1997 02 01.22	a	S	2.3	AA	5.0	B		10	15	6	1	30	ZAN01
1997 02 02.22		S	2.0	AA	5.0	B		10	15	6	0.9	30	ZAN01
1997 02 02.22	a	S	2.5	AA	0.0	E		1	&12		&0.7		JOH01
1997 02 02.23		M	2.2	AA	0.7	E		1		8			DIJ
1997 02 02.24	a	S	2.7	AA	0.0	E		1	& 7	3/	1.3	310	SCH04
1997 02 02.25		B	2.5	AA	5.0	B		7					JON06
1997 02 03.45		K	3.0	AA	5.0	B		8	4.2		&2	315	SHA04
1997 02 04.48		K	2.8	AA	5.0	B		8			&2	315	SHA04
1997 02 07.21		B	2.4	AA	5.0	B		7					JON06
1997 02 08.21		S	2.0	AA	5.0	B		10	10	7	2.5	45	ZAN01
1997 02 08.22		M	2.2	AA	0.0	E		1		8	&5	320	COM
1997 02 08.22	a	M	1.6	AA	0.7	E		1		8	5.3	323	DIJ
1997 02 08.23		S	3.0	AA	5.0	B		10		7	4	300	LAA
1997 02 08.43		K	2.5:	AA	5.0	B		8	12.7		5	300	SHA04
1997 02 08.45		B	2.1	AA	3.5	B		7			3	310	MOR03
1997 02 09.45		B	2.1	AA	3.5	B		7			3	310	MOR03
1997 02 10.44		B	2.0	AA	3.5	B		7			5	315	MOR03
1997 02 11.21		M	2.3	AA	0.0	E		1		7/	&4		COM
1997 02 11.21	a	M	1.5	AA	0.7	E		1		9			DIJ
1997 02 11.22		B	1.6	AA	0.0	E		1	&30		&5	310	JOH01
1997 02 11.22		S	1.8	AA	0.0	E		1	&15	7	&3	320	SCH04
1997 02 11.22		S	2.0	AA	5.0	B		10	9	7	1.5	70	ZAN01
1997 02 11.22	a	S	1.6	AA	0.0	E		1	&20	7/	4		BUS01
1997 02 13.44		B	1.8	AA	3.5	B		7	9	D8	4	320	MOR03
1997 02 13.53		S	1.3:	SC	0.0	E		1	15		3		KR002
1997 02 14.21		B	2.2	AA	5.0	B		7			1.5		JON06
1997 02 14.21		S	1.5	AA	0.0	E		1	14	7	4	330	SCH04

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 14.21		S	2.4	AA	0.0	E		1		7/	4	308	LAN01
1997 02 14.43			1.5	AA	0.0	E		1			&5		SHA04
1997 02 14.43		K	1.6	AA	5.0	B		8			&5	300	SHA04
1997 02 15.18	a	M	1.7	AA	0.0	E		1		8			COM
1997 02 15.48		S	1.1	SC	0.0	E		1		8	7	35	KRO02
1997 02 15.90		M	1.5	AA	6.0	R	12	20	&11	6	1.5	230	SON
1997 02 17.48		S	1.1	SC	0.0	E		1		8	6		KRO02
1997 02 17.91		M	1.4	AA	6.0	R	12	20	&11	6	1.8	260	SON
1997 02 18.47			1.3	AA	0.0	E		1					SHA04
1997 02 18.47		K	1.3	AA	5.0	B		8	8.4		10	308	SHA04
1997 02 18.48		S	1.1	SC	0.0	E		1		8	4		KRO02
1997 02 18.91		M	1.3	AA	6.0	R	12	20	&13	6	2.0	270	SON
1997 02 19.21		S	1.2	AA	0.0	E		1	15	6/	5	320	SCH04
1997 02 19.21		S	1.6	AA	2.8	R	2	2	15	6/	7	324	LAN01
1997 02 19.84	*a	B	1.1	AA	0.0	E		1					OKA05
1997 02 20.20		B	1.9	AA	5.0	B		7			2		JON06
1997 02 20.22		M	1.0	AA	0.7	E		1		9			DIJ
1997 02 20.22	a	S	1.2	AA	0.0	E		1	&20	7/	4.5		BUS01
1997 02 20.23		S	1.3	AA	0.0	E		1	&15	6/	4	325	SCH04
1997 02 20.45		B	1.5	AA	3.5	B		7	13	D8	4	320	MOR03
1997 02 20.84	*a	B	1.3	AA	0.0	E		1					OKA05
1997 02 21.83	*a	B	1.1	AA	0.0	E		1					OKA05
1997 02 22.18		M	0.9	AA	0.7	E		1		9			DIJ
1997 02 22.19	a	S	1.5	AA	0.0	E		1		8	&4		COM
1997 02 22.20		S	1.0	AA	0.0	E		1	10	7	4	290	LAA
1997 02 22.20		S	1.5	AA	5.0	B		10	10	7	1	60	ZAN01
1997 02 22.47		K	1.2	AA	5.0	B		8	7.8		&5	300	SHA04
1997 02 23.47		S	0.8	SC	0.0	E		1		8	2		KRO02
1997 02 24.48		S	0.9:	SC	0.0	E		1		8	0.5		KRO02
1997 02 25.48		S	0.7	SC	0.0	E		1		8	2		KRO02
1997 02 25.83	*a	B	0.9	AA	0.0	E		1		8	1		OKA05
1997 02 26.42	w	B	1.1	AA	3.5	B		7	6	D8	2	300	MOR03
1997 02 27.22		S	0.9	AA	0.0	E		1		7	&5		SCH04
1997 02 27.22	a	S	1.0	AA	0.0	E		1		8	4	370	COM
1997 02 28.17		B	1.0	AA	5.0	B		7					JON06
1997 02 28.18	a	S	1.1	AA	0.0	E		1		8	4	370	COM
1997 02 28.46		K	1.0	AA	5.0	B		8	7.0		10	300	SHA04
1997 02 28.46		S	0.6	SC	0.0	E		1		8	2		KRO02
1997 03 01.19		S	0.5	AA	0.0	E		1	10	7	>5	285	LAA
1997 03 01.19		S	0.6	AA	0.0	E		1	&10	7/	3.5	324	SCH04
1997 03 01.19	a	S	0.6	AA	0.0	E		1	&20	7/	>6		BUS01
1997 03 01.21		M	0.5	AA	0.7	E		1		9	6.0	324	DIJ
1997 03 01.81	*a	B	0.7	AA	0.0	E		1		9	4		OKA05
1997 03 01.91		B	0.9	AA	4.0	B		8	10	7	2.5	330	SON
1997 03 02.78		S	1.0	AA	0.0	E		1		7	4	285	LAA
1997 03 02.90		B	0.8	AA	4.0	B		8	10	7	2.8	330	SON
1997 03 03.17		M	0.4	AA	0.7	E		1		9	10	323	DIJ
1997 03 03.17		S	0.7	AA	0.0	E		1	&30	8	&8	315	COM
1997 03 03.18		S	0.6	AA	0.0	E		1		7	5	325	SCH04
1997 03 03.18		S	0.6	AA	0.0	E		1		8	4		JOH01
1997 03 03.18	a	S	0.5	AA	0.0	E		1		7/	>8		BUS01
1997 03 03.19		S	0.2	AA	0.0	E		1	12	7	4	42	ZAN01
1997 03 03.43		B	0.9	AA	3.5	B		7	6.5	D8	5	325	MOR03
1997 03 05.17		S	0.6	AA	0.0	E		1		8	&7	315	COM
1997 03 05.18		S	0.3	AA	0.0	E		1	10	7	3	320	LAA
1997 03 05.18		S	0.5:	AA	0.0	E		1		7/	&4	335	SCH04
1997 03 05.84	a	B	0.7	AA	0.0	E		1		9	2		OKA05
1997 03 06.77		S	0.5:	AA	0.0	E		1		7/	&2		SCH04
1997 03 06.79		S	-0.1	AA	0.0	E		1	12	7	6	20	ZAN01
1997 03 06.82		S	0.0:	AA	0.0	E		1	10	7	5	320	LAA
1997 03 07.16		M	0.2	AA	0.7	E		1		9	12	325	DIJ
1997 03 07.16		S	0.5	AA	0.0	E		1		8	&8	330	COM
1997 03 07.19	a	S	0.2	AA	0.0	E		1	&15	7/	5		BUS01
1997 03 07.42		B	0.6	AA	3.5	B		7	10.5	D8	7	335	MOR03
1997 03 07.81	a	B	0.5	AA	0.0	E		1		9	8		OKA05

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 03 08.86	a	B	0.7	AA	0.0	E		1		9	8		OKA05
1997 03 09.03		S	0.0	AA	0.0	E		1	12	7	7	27	ZAN01
1997 03 09.17		B	0.8	AA	5.0	B		7					JON06
1997 03 09.18		S	0.0:	AA	0.0	E		1	15	7	5	225	LAA
1997 03 09.42		B	0.5	AA	3.5	B		7	7.5	D8	8	335	MOR03
1997 03 10.16	a	S	0.0	AA	0.0	E		1	&20	7	12	355	SCH04
1997 03 10.16	a	S	0.3	AA	0.0	E		1		8/	&10	300	COM
1997 03 10.17		M	-0.1	AA	0.7	E		1		8	12		DIJ
1997 03 10.18		B	0.6	AA	5.0	B		7			4.5		JON06
1997 03 10.18	a	S	0.0	AA	0.0	E		1			>5		BUS01
1997 03 12.42		B	0.5	AA	3.5	B		7	13	D8	8	335	MOR03
1997 03 13.42		B	0.5	AA	3.5	B		7	8	D8	8	335	MOR03
1997 03 15.41		B	0.5	AA	3.5	B		7	9	D8	8	345	MOR03
1997 03 18.83	a	S	-0.4	AA	0.0	E		1		7	&2	335	SCH04
1997 03 20.43	a	B	-0.6	AA	0.0	E		1		9	3		OKA05
1997 03 20.80	a	B	-0.5	AA	0.0	E		1		9	8		OKA05
1997 03 21.42	a	B	-0.2	AA	0.0	E		1		9	2		OKA05
1997 03 21.80		B	0.6	AA	5.0	B		7					JON06
1997 03 21.80	a	S	-0.5	AA	0.0	E		1		7/	6		BUS01
1997 03 21.81		S	-1.4	AA	0.0	E		1		6	6	30	ZAN01
1997 03 21.81	a	M	-0.4	AA	0.7	E		1		9			DIJ
1997 03 21.84		S	0.0:	AA	0.0	E		1	20	7	5	340	LAA
1997 03 22.01			0.0:	AA	0.0	E		1			10		SHA04
1997 03 22.14	a	M	-0.7	AA	0.7	E		1		9	11.6	328	DIJ
1997 03 22.17	a	S	-0.3	AA	0.0	E		1		7	&8	350	SCH04
1997 03 22.78		B	0.5	AA	5.0	B		7					JON06
1997 03 23.15		S	-0.3	AA	0.0	E		1		8	&8	5	COM
1997 03 27.05	G	B	-0.2	AA	0.6	E		1			9	0	MOR03
1997 03 28.43	a	B	-0.2	AA	0.0	E		1		9	3		OKA05
1997 03 28.49		B	0.5	AA	4.0	B		8	10	7	5.0	10	SON
1997 03 28.80		B	0.3	AA	5.0	B		7			6.5		JON06
1997 03 28.85		S	-0.4	AA	0.0	E		1			&10	5	COM
1997 03 28.85	a	M	-0.9	AA	0.7	E		1		9			DIJ
1997 03 28.87		S	-0.3:	AA	0.0	E		1		8	17	7	LAN01
1997 03 28.88		S	-2.0	AA	0.0	E		1		5	15	356	ZAN01
1997 03 29.00	a	S	-0.5	AA	0.0	E		1		7	&8	5	SCH04
1997 03 29.04			-0.2:	AA	0.0	E		1			15		SHA04
1997 03 30.44	a	B	-0.7	AA	0.0	E		1		9	15		OKA05
1997 03 30.80		B	0.3	AA	5.0	B		7					JON06
1997 03 30.81	a	S	-0.7	AA	0.0	E		1	18	7/	11		BUS01
1997 03 30.82	a	M	-0.9	AA	0.7	E		1		8	21	12	DIJ
1997 03 30.83	a	S	-0.7	AA	0.0	E		1		8	10	10	SCH04
1997 03 30.84		S	0.0:	AA	0.0	E		1	15	7	5	80	LAA
1997 03 30.85		S	-2.0	AA	0.0	E		1		5	19	345	ZAN01
1997 03 30.87		S	-0.5	AA	0.0	E		1		8	&14	5	COM
1997 03 30.89		S	-0.3:	AA	0.0	E		1		7/	16	14	LAN01
1997 03 31.44	a	B	0.0	AA	0.0	E		1		9	8		OKA05
1997 03 31.80		B	0.2	AA	5.0	B		7					JON06
1997 03 31.82	a	S	-0.7	AA	0.0	E		1	18		>10		BUS01
1997 03 31.83		S	0.0:	AA	0.0	E		1	15	7	8	90	LAA
1997 03 31.84	a	M	-0.9	AA	0.7	E		1		8/	14	14	DIJ
1997 03 31.85		S	-0.4	AA	0.0	E		1		8	&10	350	COM
1997 03 31.87	a	S	-0.3	AA	0.0	E		1	&10	8	4	10	SCH04
1997 03 31.91		S	-2.0	AA	0.0	E		1		5	10	345	ZAN01
1997 04 01.05			-0.6:	AA	0.0	E		1			15		SHA04
1997 04 01.10	G	B	-0.2	AA	0.6	E		1			11	5	MOR03
1997 04 01.82	a	S	-0.7	AA	0.0	E		1	18	8	13		BUS01
1997 04 01.83		S	0.0:	AA	0.0	E		1	15	7	10	0	LAA
1997 04 01.84		S	-0.4	AA	0.0	E		1		8	&15	10	COM
1997 04 01.84	a	M	-0.9	AA	0.7	E		1		8	19	15	DIJ
1997 04 01.85	a	S	-0.5	AA	0.0	E		1	7	8	6	5	SCH04
1997 04 01.87		S	-2.0	AA	0.0	E		1		5	10	340	ZAN01
1997 04 02.06	G	B	-0.4	AA	0.6	E		1			12	10	MOR03
1997 04 02.85	a	S	-0.5	AA	0.0	E		1		8	&6		SCH04
1997 04 03.83	a	S	-0.8	AA	0.0	E		1	18	8	15		BUS01

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 03.84		B	0.2	AA	5.0	B		7					JON06
1997 04 03.84		S	-0.4	AA	0.0	E		1		8	&10	10	COM
1997 04 03.85	a	S	-0.4	AA	0.0	E		1	&10	7/	11	15	SCH04
1997 04 03.87		S	-1.5	AA	0.0	E		1		5	15	345	ZAN01
1997 04 03.87	a	M	-0.7	AA	0.7	E		1		8	15	16	DIJ
1997 04 04.85		B	0.5	AA	5.0	B		7					JON06
1997 04 05.85	a	S	-0.4	AA	0.0	E		1		8	13	25	SCH04
1997 04 06.84	a	M	-0.5	AA	0.7	E		1		8	19	29	DIJ
1997 04 06.85		S	-0.5	AA	0.0	E		1			&18	40	COM
1997 04 06.85		S	-0.5:	AA	0.0	E		1	15	7	5	15	LAA
1997 04 06.85	a	S	-0.8	AA	0.0	E		1					BUS01
1997 04 06.86		S	-0.3:	AA	0.0	E		1		7	23	33	LAN01
1997 04 06.86	a	S	-0.4	AA	0.0	E		1		7/	11	35	SCH04
1997 04 06.92		S	-1.5	AA	0.0	E		1		5	7.5	343	ZAN01
1997 04 07.85		S	-0.2:	AA	0.0	E		1		8	16	35	LAN01
1997 04 07.85		S	-0.3	AA	0.0	E		1		8	&15	40	COM
1997 04 07.85		S	-0.5:	AA	0.0	E		1	15	7	10	0	LAA
1997 04 07.85		S	-1.5	AA	0.0	E		1		5	8	337	ZAN01
1997 04 07.85	a	M	-0.5	AA	0.7	E		1		8	16	30	DIJ
1997 04 07.85	a	S	-0.8	AA	0.0	E		1		8			BUS01
1997 04 07.87	a	S	-0.5	AA	0.0	E		1		8	10	25	SCH04
1997 04 08.07			-0.6:	AA	0.0	E		1			15		SHA04
1997 04 09.84		S	0.0:	AA	0.0	E		1	15	7	15	15	LAA
1997 04 09.84	a	M	-0.4	AA	0.7	E		1		8	13	343	DIJ
1997 04 09.85		S	-0.2	AA	0.0	E		1		8	&10	40	COM
1997 04 09.86	a	S	-0.2	AA	0.0	E		1	&20	8	5	22	SCH04
1997 04 09.92		S	-1.0	AA	0.0	E		1		5	8	335	ZAN01
1997 04 10.07	Gw	B	-0.2	AA	0.6	E		1			8	0	MOR03
1997 04 10.43	a	B	0.0	AA	0.0	E		1		9	2		OKA05
1997 04 10.82		S	0.0:	AA	0.0	E		1	10	7	4	20	LAA
1997 04 10.85		S	-1.0	AA	0.0	E		1		5	6	350	ZAN01
1997 04 10.85	a	M	-0.4	AA	0.7	E		1		8	10	348	DIJ
1997 04 10.85	a	S	-0.1	AA	0.0	E		1		8			SCH04
1997 04 11.06	Gw	B	0.0	AA	0.6	E		1			8	0	MOR03
1997 04 11.86		S	-0.2	AA	0.0	E		1		7/			COM
1997 04 11.87	a	S	-0.6	AA	0.0	E		1		8	&10		BUS01
1997 04 11.89		S	-1.0	AA	0.0	E		1		5	8	325	ZAN01
1997 04 11.92	a	S	0.0	AA	0.0	E		1		7/	&9	355	SCH04
1997 04 12.44	a	B	-0.2	AA	0.0	E		1		9	10		OKA05
1997 04 12.89		S	-0.1	AA	0.0	E		1		8			COM
1997 04 12.92	a	S	-0.5:	AA	0.0	E		1		7	&4	25	SCH04
1997 04 12.99	a	M	-0.4	AA	0.7	E		1		8	6.5	38	DIJ
1997 04 13.45	a	B	0.0	AA	0.0	E		1		9	3		OKA05
1997 04 14.07	Gw	B	-0.2	AA	0.6	E		1			5	5	MOR03
1997 04 16.85		S	0.5:	AA	0.0	E		1	10	7	5	40	LAA
1997 04 16.85		S	-0.1	AA	0.0	E		1		8	&6	30	COM
1997 04 16.85		S	-0.5	AA	0.0	E		1		5	3	320	ZAN01
1997 04 16.85	a	S	-0.4	AA	0.0	E		1		8	10		BUS01
1997 04 16.86	a	M	-0.2	AA	0.7	E		1		8	7	31	DIJ
1997 04 17.85		S	-0.2	AA	0.0	E		1		8	&8	25	COM
1997 04 17.85	a	S	-0.4	AA	0.0	E		1			&8		BUS01
1997 04 17.86		S	0.5:	AA	0.0	E		1	10	7	4	45	LAA
1997 04 17.86	a	M	-0.2	AA	0.7	E		1		8			DIJ
1997 04 17.93	a	S	-0.4:	AA	0.0	E		1		7	&4	25	SCH04
1997 04 19.07			-0.6	AA	0.0	E		1			10		SHA04
1997 04 20.07			-0.6	AA	0.0	E		1			10		SHA04
1997 04 20.85		S	0.0	AA	0.0	E		1		5	1	295	ZAN01
1997 04 20.86		S	0.8:	AA	0.0	E		1	10	8	3	45	LAA
1997 04 20.86		S	-0.1	AA	0.0	E		1		8	&6		COM
1997 04 20.86	a	M	-0.3	AA	0.7	E		1		8	9	21	DIJ
1997 04 20.86	a	S	0.2	AA	0.0	E		1	&10	7	&5	30	SCH04
1997 04 20.86	a	S	-0.5	AA	0.0	E		1		7/	>8		BUS01
1997 04 21.07			-0.6	AA	0.0	E		1			10		SHA04
1997 04 22.44	a	B	-0.1	AA	0.0	E		1		9	1		OKA05
1997 04 22.87	a	S	-0.2	AA	0.0	E		1	&10	7	&4	45	SCH04

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 04 23.85	a	S	0.0	AA	0.0	E		1		7	&2	40	SCH04
1997 04 26.08	Gw	B	0.2	AA	0.6	E		1			9	15	MOR03
1997 04 26.45	a	B	1.0	AA	0.0	E		1		9	10		OKA05
1997 04 27.08	Gw	B	0.1	AA	0.6	E		1			10	15	MOR03
1997 04 27.44	a	B	0.8	AA	0.0	E		1		9	7		OKA05
1997 04 28.05			0.2	AA	0.0	E		1			10		SHA04
1997 04 29.04	Gw	B	-0.2	AA	0.6	E		1			10	10	MOR03
1997 04 29.05			0.2	AA	0.0	E		1			10		SHA04
1997 04 29.45	a	B	0.4	AA	0.0	E		1		9	10		OKA05
1997 04 30.88	a	S	0.2	AA	0.0	E		1		6/	&6	55	SCH04
1997 05 01.06			0.3	AA	0.0	E		1			10		SHA04
1997 05 01.06		B	1.9	AA	0.0	E		1	8	7			SIM
1997 05 01.87		S	1.5:	AA	0.0	E		1		5	2	295	ZAN01
1997 05 01.87	a	S	0.1	AA	0.0	E		1		7/	&5		COM
1997 05 03.06			0.3	AA	0.0	E		1			10		SHA04
1997 05 04.46	a	B	0.6	AA	0.0	E		1		9	8		OKA05
1997 05 05.07			0.6	AA	0.0	E		1			10		SHA04
1997 05 05.09	Gw	B	0.5	AA	0.6	E		1			9	5	MOR03
1997 05 07.07			0.8	AA	0.0	E		1			&7		SHA04
1997 05 07.85		S	0.5:	AA	0.0	E		1		8			BUS01
1997 05 08.06			0.8	AA	0.0	E		1			&7		SHA04
1997 05 11.07			0.8:	AA	0.0	E		1			&5		SHA04
1997 05 11.08	w	M	1.0	AA	3.5	B		7	5		2	45	MOR03
1997 05 13.06			1.0:	AA	0.0	E		1			&5		SHA04
1997 05 15.06			1.0:	AA	0.0	E		1					SHA04
1997 08 01.12		S	4.8	AA	4.0	B		8	&18	6	0.8	235	SCH04
1997 08 07.35		S	4.1	AA	5.0	B		7	15	5/	3	225	LOU
1997 08 12.35			4.1	AA	0.0	E		1	10	7			LOU
1997 08 12.35		S	4.1	AA	5.0	B		7	15	6	3	225	LOU
1997 08 13.35			4.1	AT	0.0	E		1	10	6			LOU
1997 08 13.35		S	4.1	AT	5.0	B		7	15	6	3	225	LOU
1997 08 14.34			4.1	AT	0.0	E		1	10	6			LOU
1997 08 14.34		S	4.1	AT	5.0	B		7	13	6	3	225	LOU
1997 08 15.34			4.2	AT	0.0	E		1	10	6/			LOU
1997 08 15.34		S	4.2	AT	5.0	B		7	13	6/	3	225	LOU
1997 08 16.34			4.2	AT	0.0	E		1	10	5			LOU
1997 08 16.34		S	4.2	AT	5.0	B		7	13	6/	3	225	LOU
1997 08 17.34			4.2	AT	0.0	E		1	10	5/			LOU
1997 08 17.34		S	4.2	AT	5.0	B		7	15	6/	3	225	LOU
1997 08 21.74		S	4.4	SC	2.3	B		2	10				JON
1997 08 27.74		S	4.5	SC	2.3	B		2					JON
1997 08 28.74		S	4.5	SC	2.3	B		2					JON
1997 08 29.74		S	4.6	SC	2.3	B		2					JON
1997 08 30.74		S	4.6	SC	2.3	B		2	12				JON
1997 09 01.63		B	5.4	SC	5.0	B		7	15	5	0.9	250	BIV
1997 09 02.63		B	5.3	SC	5.0	B		7	15	5	0.7	245	BIV
1997 09 02.72		S	4.6	SC	4.9	B		2					JON
1997 09 03.63		B	5.5	SC	5.0	B		7	15	5	1.0	255	BIV
1997 09 04.64		B	5.4	SC	5.0	B		7	15	4	0.8	260	BIV
1997 09 05.64		B	5.5	SC	5.0	B		7	10	5	0.6	245	BIV
1997 09 05.72		S	4.8	SC	4.9	B		2					JON
1997 09 07.73		S	5.1	SC	4.9	B		2					JON
1997 09 08.64		B	5.6	SC	5.0	B		7	10	5			BIV
1997 09 09.64		B	5.3	SC	5.0	B		7	15	5	1.0	245	BIV
1997 09 10.64		B	5.4	SC	5.0	B		7	15	5	1.5	270	BIV
1997 09 11.64		B	5.3	SC	5.0	B		7	15	5	1.4	270	BIV
1997 09 12.72		S	5.2	SC	4.9	B		2					JON
1997 09 13.60		B	5.2	SC	5.0	B		7	15	5	1.8	300	BIV
1997 09 14.61		B	5.2	SC	5.0	B		7	15	5	1.5	300	BIV
1997 09 14.72		S	5.4	SC	4.9	B		2					JON
1997 09 21.63		B	5.7	SC	5.0	B		7	15	5			BIV
1997 09 22.65		S	5.8	SC	5.0	B		7	10	4			BIV
1997 09 24.64		B	5.8	SC	5.0	B		7	10	4			BIV
1997 09 25.63		B	5.8	SC	5.0	B		7	15	5	0.6	220	BIV
1997 09 25.69		S	6.7	SC	5.0	B		7					JON

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 26.61		M	4.8	YG	6.3	B		9	22	5	2.5	292	DAH
1997 09 26.64		B	5.9	SC	5.0	B		7	15	4	0.7	240	BIV
1997 09 27.65		B	6.0	SC	5.0	B		7	15	4			BIV
1997 09 28.63		B	6.1	SC	5.0	B		7	13	4	0.5	255	BIV
1997 09 29.64		B	5.9	SC	5.0	B		7	12	4			BIV
1997 09 30.63		M	4.9	YG	6.3	B		9	19	4	3.0	292	DAH
1997 10 01.64		B	6.2	SC	5.0	B		7	10	5			BIV
1997 10 01.68		S	6.0	SC	5.0	B		7					JON
1997 10 05.63		B	6.1	SC	5.0	B		7	15	5	0.6	290	BIV
1997 10 06.63		B	6.2	SC	5.0	B		7	10	4			BIV
1997 10 08.21		S	4.9:	YG	7.0	R	7	24	14	5			GRA04
1997 10 08.65		B	6.2	SC	5.0	B		7	10	4			BIV
1997 10 08.81		S	6.0	TJ	25.4	T	6	60	9	6			YOS04
1997 10 08.82		M	5.8	S	3.5	B		7					TSU02
1997 10 08.83		S	6.1	S	15.0	R	5	25	6	4/			NAG02
1997 10 09.23		M	5.1	YG	5.0	B		10	18	5			GRA04
1997 10 09.66		S	6.0	SC	5.0	B		7					JON
1997 10 09.83		S	6.5	S	10.0	B		20	7	6			YOS02
1997 10 10.24		M	5.2	YG	5.0	B		10	19	5			GRA04
1997 10 10.81		B	6.1	Y	5.6	B		8	11	4			OKA05
1997 10 11.25		S	5.1	YG	5.0	B		10	18	4			GRA04
1997 10 12.63		B	6.1	SC	5.0	B		7	10	5			BIV
1997 10 13.25		M	5.2	YG	5.0	B		10	14	5			GRA04
1997 10 13.65		B	6.1	SC	5.0	B		7	10	5	0.3	290	BIV
1997 10 14.64		B	6.2	SC	5.0	B		7	10	5			BIV
1997 10 19.65		B	6.4	SC	5.0	B		7	8	4			BIV
1997 10 21.65		B	6.2	SC	5.0	B		7	10	4			BIV
1997 10 21.68		S	6.5	VN	4.5	R	6	13	2.5				JON
1997 10 22.64		S	6.6	VN	5.0	B		7					JON
1997 10 25.61		S	6.3	SC	5.0	B		7	9	5			BIV
1997 10 25.64		I	6.2	AA	0.0	E		1					SEA01
1997 10 25.64		M	6.7	AA	5.0	B		10	5	3	0.75	290	SEA01
1997 10 26.59		B	6.4	SC	5.0	B		7	10	6			BIV
1997 10 26.61		I	6.3	AA	0.0	E		1					SEA01
1997 10 26.61		S	6.7	AA	5.0	B		10	6	4	20 m	275	SEA01
1997 10 27.62		B	6.4	SC	5.0	B		7	9	5			BIV
1997 10 27.65		S	5.8	VN	4.5	R	6	13	3				JON
1997 10 27.65		S	6.7	AA	5.0	B		10	7	2			SEA01
1997 10 28.63		I	6.4	AA	0.0	E		1			12 m	275	SEA01
1997 10 28.63		S	6.7	AA	5.0	B		10	6	2	1.2	275	SEA01
1997 10 28.82		M	6.9	AA	12.5	L	6	31	8	5			TSU02
1997 10 29.63		M	5.8	YG	6.3	B		9	17	5	1.0	315	DAH
1997 10 29.65		B	6.6	SC	5.0	B		7	6	5			BIV
1997 10 29.70		S	5.9	SC	8.0	B		20	6	7	0.3	290	KAR02
1997 10 29.72		M	6.8	AA	5.0	B		10	6	4	0.9	280	SEA01
1997 10 29.74		I	6.4	AA	0.0	E		1			0.6	280	SEA01
1997 10 30.64		B	6.6	SC	5.0	B		7	7	6			BIV
1997 10 30.65		I	6.4	AA	0.0	E		1					SEA01
1997 10 30.65		M	6.7	AA	5.0	B		10	7	4	1.2	295	SEA01
1997 10 31.63		M	6.0	YG	6.3	B		9	16	5	1.4	325	DAH
1997 10 31.70		I	6.4	AA	0.0	E		1			0.8	290	SEA01
1997 10 31.70		M	6.8	AA	5.0	B		10	7	4	1.4	290	SEA01
1997 11 01.28		S	6.1	YG	8.0	B		11	8	6/	>0.5		DES01
1997 11 01.28		S	6.3	AA	8.0	B		20	5	5			LOU
1997 11 01.61		B	6.6	SC	5.0	B		7	6	6			BIV
1997 11 01.63		S	5.8	YG	6.3	B		9	16	5	1.9	315	DAH
1997 11 01.66		I	6.4	AA	0.0	E		1			20 m	290	SEA01
1997 11 01.66		M	6.8	AA	5.0	B		10	7	4	0.9	290	SEA01
1997 11 01.66		S	6.6	VN	7.8	R	8	30	3				JON
1997 11 01.80		S	6.5	TI	8.0	B		20	7	6			PEA
1997 11 02.60		I	6.4	AA	0.0	E		1					SEA01
1997 11 02.60		M	6.8	AA	5.0	B		10	8	4	3.2	285	SEA01
1997 11 02.74		I	5.9	SC	0.0	E		1					KAR02
1997 11 02.74		S	6.0	SC	8.0	B		20	&20	6	1.5	290	KAR02
1997 11 02.80		S	6.3	TI	8.0	B		20	8	6	0.17	290	PEA

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 03.63		B	6.6	SC	5.0	B		7	7	5			BIV
1997 11 03.64		S	6.6	VN	4.5	R	6	13	4.5				JON
1997 11 03.67		M	6.7	AA	5.0	B		10	7	3	40 m	295	SEA01
1997 11 04.28		S	6.2	YG	8.0	B		11	8	6/	>0.5		DES01
1997 11 04.64		S	6.7	SC	5.0	B		7	7	6			BIV
1997 11 04.66		M	6.8	AA	5.0	B		10	6	3	0.8	295	SEA01
1997 11 04.80		S	6.4	TI	8.0	B		20		6			PEA
1997 11 05.29		S	6.2	YG	8.0	B		11	8	6	>0.5		DES01
1997 11 05.54		I	6.2	AA	0.0	E		1					SEA01
1997 11 05.54		M	6.7	AA	5.0	B		10	8	3	0.7	290	SEA01
1997 11 05.58		B	6.6	AA	5.0	B		10					SEA
1997 11 05.80		S	6.4	TI	8.0	B		20	8	6	0.1	295	PEA
1997 11 06.62		S	6.5	VN	4.5	R	6	13	4.5				JON
1997 11 06.63		I	6.4	AA	0.0	E		1					SEA01
1997 11 06.63		M	6.7	AA	5.0	B		10	7	3	1.8	280	SEA01
1997 11 06.80		S	6.5	TI	8.0	B		20	8	5/			PEA
1997 11 07.56		B	6.6	AA	5.0	B		10					SEA
1997 11 07.68		I	6.4	AA	0.0	E		1			1.0	285	SEA01
1997 11 07.68		M	6.7	AA	5.0	B		10	7	3	1.2	285	SEA01
1997 11 07.70		S	6.5	TI	8.0	B		20	7.5	5	0.1	310	PEA
1997 11 08.25		S	6.3	YG	8.0	B		11	6	5/	>0.5		DES01
1997 11 08.58		M	7.1	AA	5.0	B		10	8	2	0.7	285	SEA01
1997 11 08.64		B	6.5	SC	5.0	B		7	12	5	0.4	330	BIV
1997 11 08.72		S	6.5	TI	8.0	B		20	7.5	5/	0.25	315	PEA
1997 11 09.22		S	6.5	AA	8.0	B		20	5	5/			LOU
1997 11 09.25		S	6.3	YG	8.0	B		11	6	5/	>0.4		DES01
1997 11 09.80		S	6.6	TI	8.0	B		20	7	5/			PEA
1997 11 10.28		S	6.4	AA	8.0	B		11	6	6			DES01
1997 11 10.29		S	6.5	AA	8.0	B		20	5	5/			LOU
1997 11 10.58		S	7.1	AA	5.0	B		10	5				SEA01
1997 11 10.80		S	6.5	TI	8.0	B		20	8	5			PEA
1997 11 11.72		M	6.6	AA	5.0	B		10	8	3			SEA01
1997 11 11.80		S	6.6	TI	8.0	B		20	7	5			PEA
1997 11 12.51		S	7.1	AA	8.0	B		15	3	2			SEA01
1997 11 13.51		S	7.2	AA	8.0	B		15	2.5	1			SEA01
1997 11 13.80		S	6.1	SC	8.0	B		20	5	5			KAR02
1997 11 15.52		S	7.2	AA	5.0	B		10	5	2			SEA01
1997 11 18.52		S	6.6	AA	5.0	B		10					SEA
1997 11 18.69		M	7.2	AA	5.0	B		10	5	3	10 m	315	SEA01
1997 11 20.28		S	6.5	AA	8.0	B		11	6	5/			DES01
1997 11 20.47		M	7.2	AA	5.0	B		10	6	4	1.0	315	SEA01
1997 11 20.51		I	6.7	AA	0.0	E		1					SEA01
1997 11 21.29		S	6.5	AA	8.0	B		11	6	5/			DES01
1997 11 21.45		M	7.2	AA	5.0	B		10	6	4	0.8	315	SEA01
1997 11 21.62		S	7.1	SC	4.5	R	6	13	2				JON
1997 11 22.19		S	7.2:	SC	8.0	B		11	6	5			WAR01
1997 11 22.45		S	7.1	SC	4.5	R	6	13					JON
1997 11 22.57		I	6.7	AA	0.0	E		1			15 m	300	SEA01
1997 11 22.57		M	7.3	AA	5.0	B		10	6	4	1.8	300	SEA01
1997 11 23.19		S	7.5:	SC	8.0	B		11	7	4			WAR01
1997 11 23.47		S	7.2	AA	5.0	B		10	4	2	3.1	325	SEA01
1997 11 23.53		I	6.7	AA	0.0	E		1			0.8	325	SEA01
1997 11 23.58		S	6.8	SC	5.0	B		7	7	5			BIV
1997 11 24.47		I	6.5	AA	0.0	E		1			1.0	320	SEA01
1997 11 24.47		M	7.4	AA	5.0	B		10	5	6	3.5	320	SEA01
1997 11 25.50		M	7.4	AA	5.0	B		10	5	5	1.2	315	SEA01
1997 11 25.50		S	6.9	AA	5.0	B		10					SEA
1997 11 26.45	x	S	6.4	TT	4.5	R	6	13	4				JON
1997 11 26.59		M	7.5	AA	5.0	B		10	6	6	1.8	317	SEA01
1997 11 26.80		S	6.9	TI	8.0	B		20	6.2	5/	0.17	325	PEA
1997 11 27.20		S	6.9	SC	8.0	B		11	6	5	0.3	25	WAR01
1997 11 27.23		S	6.9	AA	8.0	B		20	5	5			LOU
1997 11 27.59		M	7.4	AA	5.0	B		10	6	3	1.0	327	SEA01
1997 11 28.22		S	6.9	AA	8.0	B		20	5	5			LOU
1997 11 28.27		S	6.8	AA	8.0	B		11	5	6			DES01

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 28.48		M	7.5	AA	5.0	B		10	6	1			SEA01
1997 11 29.08		S	7.0	AA	25.0	L		46	7	1			KRY02
1997 11 29.27		S	6.8	AA	8.0	B		11	5	6			DES01
1997 11 29.47	x	S	7.0	TT	4.5	R	6	13	3				JON
1997 11 29.53		M	7.5	AA	5.0	B		10	5	5	2.5	335	SEA01
1997 11 29.56		B	6.9	SC	5.0	B		7	10	5	0.3	340	BIV
1997 11 29.60		S	6.9	TI	8.0	B		20	6	5			PEA
1997 11 30.26		S	6.9	AA	8.0	B		11	5	6			DES01
1997 11 30.65		S	6.9	TI	8.0	B		20	6	5			PEA
1997 12 01.06		S	7.0	AA	25.0	L		46	6	1			KRY02
1997 12 01.49		M	7.5	AA	5.0	B		10	5	5	2.6	333	SEA01
1997 12 01.50		S	6.1	AA	2.5	B		2					SEA
1997 12 01.78		B	7.1	TI	8.0	B		20	7	5			PEA
1997 12 02.09		S	7.0	AA	25.0	L		46	8	2			KRY02
1997 12 02.47		M	7.5	AA	5.0	B		10	5	3	0.8	335	SEA01
1997 12 02.58		M	7.0	HI	20	L	7	45	5	6	0.75	340	MAT08
1997 12 02.80		B	7.0	TI	8.0	B		20	5.8	7	0.33	328	PEA
1997 12 03.47	x	S	6.6	TT	5.0	B		7	9				JON
1997 12 03.50		S	6.1	AA	2.5	B		2					SEA
1997 12 03.80		B	7.1	TI	8.0	B		20	5.2	6/			PEA
1997 12 04.25		S	7.0	AA	8.0	B		11	5	5			DES01
1997 12 04.42		M	7.5	AA	5.0	B		10	5	3			SEA01
1997 12 04.45	x	S	6.8	TT	5.0	B		7	6				JON
1997 12 05.06		S	7.3	AA	25.0	L		46	5	1			KRY02
1997 12 05.25		S	7.0	AA	8.0	B		11	5	5/			DES01
1997 12 05.44	x	S	6.8	TT	5.0	B		7					JON
1997 12 05.53		B	7.0	SC	5.0	B		7	7	5			BIV
1997 12 05.81		B	7.2	TI	8.0	B		20	6	7			PEA
1997 12 06.26		S	7.1	AA	8.0	B		20	5	5			LOU
1997 12 06.54		B	7.1	SC	5.0	B		7	8	5	0.5	340	BIV
1997 12 06.58		M	7.4	AA	5.0	B		10	6	3	1.9	355	SEA01
1997 12 06.81		B	7.2	TI	8.0	B		20	5.5	7			PEA
1997 12 07.80		B	7.1	TI	8.0	B		20	5	7	0.5	340	PEA
1997 12 08.05		S	7.4	AA	25.0	L		46	5	1			KRY02
1997 12 08.20		S	7.1	AA	8.0	B		11	6	6			DES01
1997 12 08.55		B	7.1	SC	5.0	B		7	7	5			BIV
1997 12 08.75		B	7.1	TI	8.0	B		20	6	6/	0.33	344	PEA
1997 12 09.25		S	7.1	AA	8.0	B		11	6	5/			DES01
1997 12 09.48		S	7.5	AA	8.0	B		15	5	3			SEA01
1997 12 09.74		B	7.1	TI	8.0	B		20	6	6/	0.18	350	PEA
1997 12 10.25		S	7.1	AA	8.0	B		11	6	5/			DES01
1997 12 10.26		S	7.1	AA	8.0	B		20	5	5			LOU
1997 12 11.25		S	7.1	AA	8.0	B		11					DES01
1997 12 11.26		S	7.1	AA	8.0	B		20	5	5			LOU
1997 12 11.43		S	7.4	AA	8.0	B		15	4.5	2			SEA01
1997 12 11.79		B	7.2	TI	8.0	B		20	5.5	6			PEA
1997 12 12.25		S	7.1	AA	8.0	B		11					DES01
1997 12 12.52		S	7.4	AA	8.0	B		15	4.5	2			SEA01
1997 12 13.42		S	7.5	AA	8.0	B		15	4	1			SEA01
1997 12 13.61		B	7.5	TI	8.0	B		20	5	6			PEA
1997 12 14.56		B	7.4	TI	8.0	B		20	5.5	6			PEA
1997 12 15.41		M	7.5	AA	8.0	B		15	4.5	3	0.5	0	SEA01
1997 12 16.42		M	7.4	AA	5.0	B		10	3.5	6/	1.5	0	SEA01
1997 12 16.42		M	7.4	AA	8.0	B		15	4	6	1.2	0	SEA01
1997 12 16.46		M	7.4	HI	20	L	7	45	5	6	0.75	350	MAT08
1997 12 16.54		S	7.5	TI	8.0	B		20	5.5	5			PEA
1997 12 17.43		M	7.4	AA	5.0	B		10	3	7	3.0	0	SEA01
1997 12 17.47		S	6.4:	AA	2.5	B		2					SEA
1997 12 17.53		S	7.5	TI	8.0	B		20	5	5/			PEA
1997 12 18.48		M	7.4	HI	20	L	7	45	5	6	0.75	355	MAT08
1997 12 18.55		S	7.3	TI	8.0	B		20	5	6	0.30	355	PEA
1997 12 19.24		S	7.3	AA	8.0	B		11	5	6			DES01
1997 12 19.71		M	7.4	AA	5.0	B		10	4	6			SEA01
1997 12 20.24		S	7.3	AA	8.0	B		11	5	6			DES01
1997 12 20.50		M	7.4	AA	5.0	B		10	5	6	1.6	355	SEA01

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 21.01		S	7.4	AA	8.0	B		11	6	5			DES01
1997 12 21.64		M	7.5	AA	8.0	B		15	3.5	5	20 m	0	SEA01
1997 12 21.69		S	7.4	TT	8.0	B		20	5	6	0.30	352	PEA
1997 12 22.55		S	6.5	AA	2.5	B		2					SEA
1997 12 22.66		M	7.5	AA	8.0	B		15	3.5	5	10 m	0	SEA01
1997 12 22.68		S	7.5	TT	8.0	B		20	5	5/	0.30	355	PEA
1997 12 22.99		S	7.4	AA	8.0	B		11	6	5			DES01
1997 12 23.04		S	7.6	AA	23.0	L	5	68	8	4	>0.2		DES01
1997 12 23.54		S	7.5	AA	8.0	B		15	3.5	3			SEA01
1997 12 23.69		S	7.5	TT	8.0	B		20	4.8	6	0.22	358	PEA
1997 12 24.45		B	7.8:	TJ	25.6	L	5	42	5	4			BIV
1997 12 25.44		B	7.9	TJ	25.6	L	5	42	5	4	0.3	350	BIV
1997 12 25.44		S	7.6	TJ	5.0	B		7	7	4			BIV
1997 12 25.45	x	S	7.0	TT	4.5	R	6	13	3.5				JON
1997 12 25.52		M	7.6	AA	10.0	B		25			1	355	SEA
1997 12 25.55		S	7.5	TT	8.0	B		20	5	5/	0.60	0	PEA
1997 12 26.05		S	7.5	AA	25.0	L		46	6	1			KRY02
1997 12 26.72		S	7.3	TT	8.0	B		20	5	6	2.22	0	PEA
1997 12 27.24		S	7.6	AA	23.0	L	5	68	6	4	>0.2		DES01
1997 12 27.73		S	7.5	TT	8.0	B		20	4.6	6	2.1	2	PEA
1997 12 28.06		S	7.6	AA	25.0	L		46	5	1			KRY02
1997 12 28.20		S	7.6	AA	23.0	L	5	68	6	4	>0.2		DES01
1997 12 28.74		S	7.5	TT	8.0	B		20	4.7	6	2.3	4	PEA
1997 12 29.08		S	7.8	AA	25.0	L		46	6	1			KRY02
1997 12 29.42		M	7.5	AA	5.0	B		10	4	5	1.0	7	SEA01
1997 12 29.52		S	7.3	AA	5.0	B		10					SEA
1997 12 29.53		S	7.6	TT	8.0	B		20					PEA
1997 12 30.05		S	7.7	AA	23.0	L	5	68	8	4	>0.2		DES01
1997 12 30.42		M	7.5	AA	5.0	B		10	3.7	7	4.2	10	SEA01
1997 12 30.52		S	7.3	AA	5.0	B		10					SEA
1997 12 31.20		S	7.7	AA	23.0	L	5	68	8	4	>0.25		DES01
1997 12 31.44		M	7.5	AA	5.0	B		10	4	6	3.0	10	SEA01
1997 12 31.65		S	7.6	TT	8.0	B		20	6.2	5	1.9	8	PEA
1998 01 01.43	x	S	8.0	TT	7.8	R	8	30	2.5				JON
1998 01 01.58		S	7.6	TT	8.0	B		20	7.0	5/	2.1	10	PEA
1998 01 01.63		M	7.3	AA	5.0	B		10	6	7	2.6	0	SEA01
1998 01 02.46		M	7.4	AA	5.0	B		10	5	7	1.5	5	SEA01
1998 01 02.64		S	7.6	TT	8.0	B		20	7.0	5/	2.0	10	PEA
1998 01 03.43	x	S	8.2	TT	7.8	R	8	30	2.5				JON
1998 01 03.47		M	7.4	AA	5.0	B		10	8	6	2.5	0	SEA01
1998 01 03.63		S	7.6	TT	8.0	B		20	6.5	5	2.4	15	PEA
1998 01 04.46	x	S	8.1	TT	7.8	R	8	30	3				JON
1998 01 04.59		M	7.4	AA	5.0	B		10	7	8	3.0	20	SEA01
1998 01 04.76		S	7.7	TT	8.0	B		20	5.5	5/	1.0	15	PEA
1998 01 05.45		M	7.5	AA	5.0	B		10	7	3			SEA01
1998 01 05.61		S	7.2	AA	2.5	B		2					SEA
1998 01 06.72		M	7.5	AA	5.0	B		10	4.5	7	4.5	5	SEA01
1998 01 06.76		S	7.8	TT	8.0	B		20	6	5	1.0	18	PEA
1998 01 07.47		M	7.5	AA	5.0	B		10	5	4			SEA01
1998 01 07.79		S	7.8	TT	8.0	B		20	6.5	5			PEA
1998 01 08.72		M	7.3	SC	5.0	B		10	4.5	7			SEA01
1998 01 08.79		S	7.8	TT	8.0	B		20	6	5	0.33	25	PEA
1998 01 09.80		S	7.8	TT	8.0	B		20	6	5	0.3	27	PEA
1998 01 10.70		M	7.4	AA	5.0	B		10	5	3			SEA01
1998 01 11.54		M	7.4	AA	8.0	B		15	3.5	4			SEA01
1998 01 15.44		M	7.4	AA	5.0	B		10	5	7	2.6	15	SEA01
1998 01 16.46		S	7.3	AA	5.0	B		10			3		SEA
1998 01 16.69		M	7.0	SC	8.0	B		15	5	3			SEA01
1998 01 17.06		S	8.0	AA	8.0	B		20	4	5			LOU
1998 01 17.48		S	7.4	AA	5.0	B		10			5		SEA
1998 01 18.42		M	7.6	AA	5.0	B		10	4.5	7/	2.0	20	SEA01
1998 01 19.46		M	7.4	AA	5.0	B		10	4	7	2.3	25	SEA01
1998 01 19.49		M	8.1	HI	20	L	7	45	4	6	0.50	35	MAT08
1998 01 20.49		M	8.1	HI	20	L	7	45	4	6	0.50	35	MAT08
1998 01 20.71		S	7.6	SC	5.0	B		10	3.5	2			SEA01

Comet C/1995 O1 (Hale-Bopp) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 21.4	w	M	7.7	SC	5.0	B		10	8		1.5	28	OME
1998 01 21.63		S	7.6	SC	5.0	B		10	4	3			SEA01
1998 01 22.42		M	7.6	AA	5.0	B		10	4.5	7	1.2	25	SEA01
1998 01 23.45		M	7.7	AA	5.0	B		10	3	7/	2.0	28	SEA01
1998 01 24.47		M	7.6	AA	5.0	B		10	3	8	1.9	30	SEA01
1998 01 25.71		M	8.0	AA	5.0	B		10	2.5	8	1.2	30	SEA01
1998 01 26.48		M	7.6	AA	5.0	B		10	3	8	2.0	27	SEA01
1998 01 27.53		M	7.6	AA	5.0	B		10	3	8			SEA01
1998 01 28.49		M	7.7	AA	5.0	B		10	2.5	8	0.6	30	SEA01
1998 01 29.42		M	7.6	AA	5.0	B		10	3	8	0.6	30	SEA01
1998 01 30.47		M	7.6	AA	8.0	B		15	4.5	6			SEA01
1998 02 01.49		M	7.7	AA	5.0	B		10	3	8	1.2	45	SEA01
1998 02 02.64		M	7.6	AA	5.0	B		10	3.5	7	1.9	22	SEA01
1998 02 03.59		M	7.6	AA	5.0	B		10	4	8	2.5	25	SEA01
1998 02 04.42		M	7.7	AA	8.0	B		15	3.5	6	20 m	25	SEA01
1998 02 05.65		M	7.7	AA	5.0	B		10	4	7	1.2	25	SEA01

Comet C/1996 E1 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 15.13		S	12.0	HS	33.3	L	4	200	1.0	1			KR002
1996 09 17.13		S	12.2	HS	33.3	L	4	200	1.0	1			KR002

Comet C/1996 J1 (Evans-Drinkwater)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 05.85		S	[14.0	HS	44.5	L	5	100					KAR02

Comet C/1996 J1 (Evans-Drinkwater) [component A]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 23.44		C	18.7	GA	60.0	Y	6	a240	0.35				NAK01
1997 12 24.50		C	18.9	GA	60.0	Y	6	a240	0.35	1			NAK01

Comet C/1996 J1 (Evans-Drinkwater) [component B]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 23.44		C	15.6	GA	60.0	Y	6	a240	1.2				NAK01
1997 12 06.94		C	16.3	HS	60	P	6	a 60	< 0.16	d7/			PRA02
1997 12 24.50		C	15.8	GA	60.0	Y	6	a240	0.9				NAK01
1998 01 15.76		C	16.2	HS	60	P	6	a120	< 0.16	d8			PRA02
1998 01 16.48		C	16.3	GA	60.0	Y	6	a240	0.9				NAK01

Comet C/1996 N1 (Brewington)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 07 12.13		S	9.6	HS	33.3	L	4	58	8	1			KR002
1996 07 16.13		S	9.6	HS	33.3	L	4	58	5	2			KR002
1996 08 09.13		S	8.6	SC	33.3	L	4	58	3.5	4			KR002
1996 09 11.10		S	9.0	SC	33.3	L	4	58	4	2			KR002
1996 09 13.13		S	9.2:	SC	33.3	L	4	58	4	2			KR002
1996 09 14.08		S	9.2	HS	33.3	L	4	58	5	2			KR002
1996 09 15.08		S	9.3	HS	33.3	L	4	58	4	2			KR002
1996 09 17.10		S	9.2	HS	33.3	L	4	58	4	1			KR002

Comet C/1996 P2 (Russell-Watson)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 31.78		C	18.6	GA	60.0	Y	6	a240	0.3			250	NAK01
1997 11 02.66		C	18.0	GA	60.0	Y	6	a240	0.35			255	NAK01
1997 12 31.21		c	22.1	FA	91.4	L	5						SC001
1997 12 31.23		C	19.9	FA	91.4	L	5		0.20		13.8s	329	SC001

Comet C/1996 Q1 (Tabur)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 13.93		B	8.0	AA	15.0	R	5	25	5	5			ZHO
1996 09 14.29		S	7.6	SC	8.0	B		20	6	2			KR002
1996 09 15.30		S	7.4	SC	8.0	B		20	8	2			KR002
1996 09 16.83		B	7.5	AA	6.0	B		20	4	5			CHE04
1996 09 17.28		S	7.5	SC	33.3	L	4	58	5.5	5			KR002
1996 09 17.29		S	7.3	SC	8.0	B		20	11	3			KR002
1996 09 17.93		B	7.0:	AA	15.0	R	5	25	7	4			ZHO
1996 09 19.30		S	6.9	SC	8.0	B		20	10	3			KR002
1996 09 19.81		B	7.3	AA	6.0	B		20	6	5			CHE04
1996 09 19.93		B	7.0:	AA	15.0	R	5	25	7	4			ZHO
1996 09 26.81		B	6.3	AA	6.0	B		20	6	6			CHE04
1996 09 29.30		S	6.5	SC	8.0	B		20	9	4			KR002
1996 10 04.45		S	5.3	SC	3.5	B		7	14	4			KR002
1996 10 07.44		S	5.0	SC	0.0	E		1					KR002
1996 10 07.44		S	5.2	SC	3.5	B		7	17	5			KR002
1996 10 09.23		S	5.3:	SC	3.5	B		7	14	4			KR002
1996 10 11.59		B	6.0:	AA	15.0	R	5	25	10	5			ZHO
1996 10 11.94		B	5.8	AA	15.0	R	5	25	12	5	1.0		ZHO
1996 10 14.45		S	5.3	SC	3.5	B		7	12	4			KR002
1996 10 14.76		S	5.7	AA	5.0	B		7	20	7			DIJ
1996 10 15.03		S	5.5	SC	8.0	B		20	9	4			KR002
1996 10 15.45		S	5.4	SC	3.5	B		7	13	5	0.5	340	KR002
1996 10 19.04		S	6.3	SC	3.5	B		7	12	4			KR002
1996 10 19.45		S	6.1	SC	3.5	B		7	14	5	0.5	350	KR002
1996 10 29.58		B	7.0	AA	15.0	R	5	25	15	4			ZHO
1996 10 31.04		S	7.8:	SC	8.0	B		20	9	1			KR002
1996 11 02.05		S	8.5:	SC	33.3	L	4	58	5	0			KR002
1996 11 03.02		S	9 :	SC	33.3	L	4	58	5	0			KR002
1996 11 06.02		S	9 :	SC	33.3	L	4	58	4	0			KR002

Comet C/1996 R1 (Hergenrother-Spahr)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 09 11.12		S	12.3	HS	33.3	L	4	200	1.5	3			KR002
1996 09 13.13		S	12.2	HS	33.3	L	4	200	1.3	3			KR002
1996 09 14.18		S	12.0	HS	33.3	L	4	200	1.4	4			KR002
1996 09 15.15		S	12.1	HS	33.3	L	4	200	1.4	4			KR002

Comet C/1997 A1 (NEAT)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 12.78		C	18.1	GA	60.0	Y	6	a240	0.35				NAK01
1997 11 09.73		C	18.0	GA	60.0	Y	6	a240	0.4				NAK01
1997 12 24.49		C	18.7	GA	60.0	Y	6	a240	0.35				NAK01

Comet C/1997 BA6 (Spacewatch)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 03.82	a	C	18.4	GA	60.0	Y	6	a240	0.25				NAK01
1997 12 04.81		C	18.0	GA	60.0	Y	6	a240	0.28				NAK01
1997 12 05.53		c	20.1	FA	91.4	L	5						SC001
1997 12 05.54		C	18.1	FA	91.4	L	5		0.25		10.8s	358	SC001
1997 12 06.19		C	18.2	HS	60	P	6	a120	< 0.16	d7/			PRA02
1997 12 24.75		C	17.6	GA	60.0	Y	6	a240	0.45				NAK01
1998 01 18.04		C	16.7	HS	60	P	6	a 60	& 0.16	d7	<15 s	352	PRA02
1998 01 29.72		C	17.1	GA	60.0	Y	6	a240	0.4				NAK01

Comet C/1997 D1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 05.15		C	13.2	HS	60	P	6	a120	& 0.5	d3/	1 m	345	PRA02
1997 10 12.81		C	13.1	GA	60.0	Y	6	a120	1.7		> 5.6m	42	NAK01
1997 11 01.68		S	11.5	HS	25.4	T	6	60	1.2	3			YOS04
1997 11 02.17		O[	11.9	TI	20	L	4	57	! 1.0				KYS
1997 11 02.72		C	13.1	GA	60.0	Y	6	a120	1.9		> 5.5m	35	NAK01

Comet C/1997 D1 (Mueller) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 04.14		S	12.4:	TI	20	L	4	57	1.0	2/			KYS
1997 11 04.22		S	[13.0:	VB	30	R	18	210					SHA02
1997 11 06.06		S	[12.2	VF	20	L	5	71	! 1				BAR06
1997 11 08.11		S	[11.8	VF	20	L	5	71	! 1.5				BAR06
1997 11 09.04		S	12.8:	VB	20	T	10	135	0.7	2			SHA02
1997 11 09.77		C	12.9	GA	60.0	Y	6	a120	1.8		> 6.0m	37	NAK01
1997 11 12.20		S	12.7	AC	25.4	J	6	100	1.5	1/			BOU
1997 11 21.97		S	13.8	VB	30	R	18	170	0.5	3			SHA02
1997 11 22.40		J	12.3	SC	25.4	T	5		1.53	s5			ROQ
1997 11 24.66		C	12.7	GA	60.0	Y	6	a120	1.8		> 5.0m	42	NAK01
1997 11 30.41		B	12.6	HS	25.6	L	5	84	1.4	4			BIV
1997 12 01.03		S	13.2	VB	30	R	18	170	0.6	s3			SHA02
1997 12 01.48		S	11.9	GA	25.4	L	4	71					SEA
1997 12 01.56		S	12.5	HS	20	L	7	158	1	2			MAT08
1997 12 02.56		S	12.4	HS	20	L	7	158	1	2			MAT08
1997 12 02.78		S	13.0:	VN	20.0	L	4	190		3			PEA
1997 12 03.48		S	11.8	GA	25.4	L	4	71					SEA
1997 12 03.77		S	12.5	VN	20.0	L	4	190	1.0	1			PEA
1997 12 04.11		S	13.6	VB	30	R	18	170	0.6	s3			SHA02
1997 12 04.25		J	13.3	SC	25.4	T	5		1.53	s5	4.3m	50	ROQ
1997 12 05.75		S	12.8	VN	20.0	L	4	190	1.0	1			PEA
1997 12 06.74		S	12.8	VN	20.0	L	4	190	1.0	1			PEA
1997 12 07.04		C	13.9	HS	60	P	6	a 60	< 1	D5	& 2 m	37	PRA02
1997 12 07.74		S	12.7	VN	20.0	L	4	190	0.7	2			PEA
1997 12 08.76		S	12.8	VN	20.0	L	4	190	1.4	1			PEA
1997 12 18.50		S	12.6:	HS	20	L	7	158	1	2			MAT08
1997 12 24.48		M	13.1	HS	25.0	L	6	120	0.9				TSU02
1997 12 24.59		C	13.3	GA	60.0	Y	6	a120	1.5		5.0m	55	NAK01
1997 12 25.40		S	13.5	HS	25.6	L	5	84	1.5	3			BIV
1997 12 26.65		S	13.0	VN	41	L	4	90	1.5	4			PEA
1997 12 27.39		S	13.0	HS	25.6	L	5	84	1.5	2			BIV
1997 12 27.57		S	14.0	HS	46.0	L	5	148	0.7	3			YOS04
1997 12 27.58		S	13.9	HS	46.0	L	5	148	0.7	3			MIY01
1997 12 27.72		S	13.3	VN	41	L	4	90	1.4	3			PEA
1997 12 28.39		S	13.1	HS	25.6	L	5	84	1.0	2			BIV
1997 12 28.66		S	13.4	VN	41	L	4	90	1.3	2			PEA
1997 12 29.13		J	12.8	SC	25.4	T	5		1.02	s5	3.9m	70	ROQ
1997 12 30.75		S	12.5	HS	35	L	5	158	1.6	1/			HOR02
1997 12 30.75		S	12.6	HS	15	R	13	80	1.5	4			ZNO
1997 12 30.76		S	12.5	HS	35	L	5	158	1.2	1/			PLS
1997 12 30.82		S	12.0	HS	44.5	L	4	230	1.5	1			SAR02
1997 12 31.91		S	13.2	VB	30	R	18	170	0.7	2			SHA02
1998 01 16.49	a	C	14.4	GA	60.0	Y	6	a120	1.2		5.9m	61	NAK01
1998 01 17.75		S	13.2	HS	15	R	13	80	1.4	3/			ZNO
1998 01 17.83		S	13.3	HS	35	L	5	158	1.1	1/			HOR02
1998 01 18.12		J	14.9	SC	25.4	T	5		1.43	s3	2.4m	62	ROQ
1998 01 20.50			[13.0	HS	20	L	7	158					MAT08
1998 01 30.46	a	C	14.5:	GA	60.0	Y	6	a120	1.1		4.6m	64	NAK01

Comet C/1997 J1 (Mueller)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 13.05		S	13.0	AC	30.5	T	10	117	& 1	1			COM
1997 10 12.82		C	14.0	GA	60.0	Y	6	a120	1.7		2.7m	41	NAK01
1997 11 02.74		C	14.5	GA	60.0	Y	6	a120	1.4				NAK01
1997 11 09.81		C	14.3	GA	60.0	Y	6	a120	1.7				NAK01
1997 12 04.79		C	14.3	GA	60.0	Y	6	a120	1.8				NAK01
1997 12 21.65		C	14.4	GA	60.0	Y	6	a120	1.5				NAK01
1997 12 31.02		S	[14.5	HS	44.5	L	4	230	! 1				SAR02
1997 12 31.06		C	15.8	HS	60	P	6	a 60	& 0.4	d7			PRA02

Comet C/1997 J2 (Meunier-Dupouy)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 07.99		S	13.3	AC	30.5	T	10	117	& 0.5	2			COM

Comet C/1997 J2 (Meunier-Dupouy) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 13.04		S	13.2	AC	30.5	T	10	117	& 0.5	3/			COM
1997 06 02.96		S	12.4	AC	30.5	T	10	117	& 2	2/			COM
1997 07 06.11	a	S	12.4	AC	40.6	L	5	114	1.0	5/			BOR
1997 07 26.10	a	S	12.3	AC	40.6	L	5	114	1.2	5/			BOR
1997 07 29.93		S	12.2	AC	30.5	T	10	117	& 1	3			COM
1997 07 31.10	a	S	12.2	AC	40.6	L	5	114	1.3	5			BOR
1997 08 01.89		S[	10.8:	VF	11	L	7	50	! 1				BAR06
1997 08 01.89	s	S	12.6:	VF	20	L	6	63					FIL05
1997 08 04.97		S	12.1	AC	30.5	T	10	117	& 1.5	3			COM
1997 08 05.93		S	12.4	NP	30.5	L	5	96	> 1.5	3			GIL01
1997 08 05.97		S	12.2	AC	30.5	T	10	117	& 1.5	3			COM
1997 08 07.10	a	S	12.2	AC	40.6	L	5	114	1.5	5			BOR
1997 08 07.93		S	12.3	NP	30.5	L	5	96	1.3	3			GIL01
1997 08 08.88		C	12.7	HS	60	L	6	a120			3	m 220	GAL03
1997 08 10.92		S	12.3	AC	30.5	T	10	117	& 1.3	2/			COM
1997 08 12.08		S	12.5:	AC	30.5	T	10	117		2			COM
1997 08 13.84		C	12.6	HS	60	P	6	a300			4	m 223	GAL03
1997 08 16.13		S	11.9:	HS	20.3	L	6	159	1.5	5			BIV
1997 08 29.89		S	12.0:	HS	20.3	T	10	100	& 1.5	2			KAR02
1997 08 29.92		S	12.2	AC	30.0	L	5	92	2	1			SCH04
1997 08 31.89		S	12.6	AC	30.5	T	10	117	& 1.5	2			COM
1997 09 02.81	s	S	11.9	VF	20	L	6	56	2	1			FIL05
1997 09 03.86	s	S	11.8	VF	20	L	6	56	2	1			FIL05
1997 09 05.05		S	12.1	NP	40.6	L	5	70					BOR
1997 09 05.05	a	S	12.1	AC	40.6	L	5	70	1.2	5			BOR
1997 09 05.91		S	11.9	AC	30.5	T	10	117	& 1.5	2			COM
1997 09 06.07		S	12.1	NP	40.6	L	5	114	1.1	5/			BOR
1997 09 21.85		S	12.0	AC	30.5	T	10	117	& 1.5	2/			COM
1997 09 22.04		S	12.0	NP	40.6	L	5	70	1.4	5			BOR
1997 09 22.82		S	11.9	AC	25.3	L	4	106	2	7			LOO01
1997 09 22.85		S	11.8	AC	30.5	L	5	144	2	2			GIL01
1997 09 22.86		S	12.2	AC	30.5	T	10	117	1.5	2/			COM
1997 09 24.93		S	11.7	AC	20.3	T	10	80	1.6	3			GRA04
1997 09 27.05		S	12.0	NP	40.6	L	5	70	1.4	5			BOR
1997 09 28.08		S	11.9	NP	40.6	L	5	70	1.3	5			BOR
1997 09 30.02		S	11.9	NP	40.6	L	5	70	1.1	5/			BOR
1997 10 02.23		S	11.9	HS	25.6	L	5	84	1.5	5			BIV
1997 10 05.08		S	11.7	AC	20.3	T	10	100	1.6	3			GRA04
1997 10 05.23		B	11.8	HS	25.6	L	5	42	2	5			BIV
1997 10 05.86		S	11.9	HS	44.5	L	5	100	1.0	5			KAR02
1997 10 06.02		S	11.8	NP	40.6	L	5	70	1.1	5/			BOR
1997 10 07.92		S	11.8	AC	30.0	L	5	92	3	0			SCH04
1997 10 08.78		S	11.7	AA	25	L	6	96	1.7	3			AND01
1997 10 12.46		C	13.5	HS	20.3	T	9	a 30	+ 0.47				SUZ02
1997 10 18.71		C	12.3:	HS	60	P	6	a160	& 1	D5	3	m 289	PRA02
1997 10 20.75		S	11.4	AA	25	L	6	96	1.8	6			AND01
1997 10 20.83		S	11.2	AC	30.5	T	10	117	& 2.5	2			COM
1997 10 23.03	a	S	11.7	NP	40.6	L	5	70	1.3	6			BOR
1997 10 24.74		S	11.0:	TI	20	L	4	57	1.2	4			KYS
1997 10 24.75		M	10.8:	TJ	13	L	8	69	3.0	3			HOR02
1997 10 25.00		S	12.0:	HS	45	L	4	111	1.5	3			WAR01
1997 10 25.80		S	11.4	AC	20.3	T	10	100	1.6	4			GRA04
1997 10 26.40		C	12.3	GA	60.0	Y	6	a120	2.3		5.5m	291	NAK01
1997 10 26.46		C	13.4	HS	20.3	T	9	a 30	+ 0.47				SUZ02
1997 10 27.86		M	11.0:	TJ	20	L	5	48	2.9	3			HOR02
1997 10 28.76		M	11.0:	TI	20	L	5	48	3	3/			PLS
1997 10 28.77	x	S	11.5	TJ	25.4	J	6	72	1.8	4/			BOU
1997 10 28.83		S	11.4	AC	30.5	T	10	117	& 3	2			COM
1997 10 29.01		S	11.8	NP	40.6	L	5	70	1.3	5/			BOR
1997 10 29.77	!	V	12.3	YF	36.0	T	7	a180	+ 1.9	7	& 5	m 290	MIK
1997 10 29.92		S	11.2:	TI	10	B		25	2.5	4			MAN02
1997 10 30.74		M	11.0:	TI	20	L	5	48	3	3/			PLS
1997 10 30.75		S	11.3:	TI	20	L	4	57	1.5	3			KYS
1997 10 30.78	x	M	11.4	TJ	25.4	J	6	72	2.1	4/			BOU
1997 10 30.92		S	12.0:	HS	45	L	4	111	1.4	3			WAR01

Comet C/1997 J2 (Meunier-Dupouy) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 31.74		S	10.5	TI	20	L	4	57	2.9	3			KYS
1997 10 31.77	x	S	11.5	TJ	25.4	J	6	72	1.8	5			BOU
1997 10 31.78		M	11.1:	TI	35	L	5	92	2.6	3/			PLS
1997 10 31.79		M	10.7:	TI	35	L	5	92	2.4	3/			HOR02
1997 10 31.83		S	11.8	AC	30.0	L	5	92	1.5	0			SCH04
1997 11 01.30		B	11.2:	HS	25.6	L	5	42	2	4			BIV
1997 11 01.40		S	11.4	HS	25.4	T	6	60	1.5	3			YOS04
1997 11 01.48		C	12.1	HS	20.3	T	9	a 40	& 1.3				SUZ02
1997 11 01.74		M	11.2:	TI	35	L	5	66	2.7	3/			PLS
1997 11 01.77		M	10.6:	TJ	35	L	5	92	2.2	2/			HOR02
1997 11 02.23		B	11.7	HS	25.6	L	5	84	1.5	6			BIV
1997 11 02.78		S	10.8	HS	20.3	T	10	77	1.3	2			KAM01
1997 11 03.67	a	S	10.8	SE	25	L	4	64	3	3			SHU
1997 11 03.74		S	11.5	AC	15.2	L	5	42	2.0	2			MOE
1997 11 03.77		E	11.2	AS	30	L	5	100	2.5	s5			NEV
1997 11 03.78		S	11.5	GA	25.4	J	6	72	2.0	4/			BOU
1997 11 04.73		O	10.8:	TI	20	L	4	57	1.5	3			KYS
1997 11 04.88	x	S	11.4	TJ	25.4	J	6	72	2.2	3/			BOU
1997 11 04.88	x	S	11.6	TJ	25.4	J	6	72	2.1	2			DIJ
1997 11 05.69		E	11.0	AS	30	L	5	100	2.5	s5			NEV
1997 11 05.76		S	11.5	VF	20	L	5	71	3	3			BAR06
1997 11 17.75	x	M	11.3	TJ	25.4	J	6	72	1.8	4			BOU
1997 11 18.73		S	11.3	AC	15.2	L	5	42	2.0	3			MOE
1997 11 19.39		C	12.1	GA	60.0	Y	6	a120	2.1		> 7.4m	307	NAK01
1997 11 19.42		M	11.8	HS	25.0	L	6	120					TSU02
1997 11 19.71		S	11.3	AC	15.2	L	5	42	2.0	3			MOE
1997 11 19.73		S[	10.3	NP	8.0	B		20					OKS
1997 11 19.76		C	12.8	HS	60	P	6	a030	< 1	D7	2 m	323	PRA02
1997 11 19.77	x	M	11.3	TJ	25.4	J	6	72	2.2	4			BOU
1997 11 20.72		S[	10.3	NP	8.0	B		20					OKS
1997 11 20.73		S	10.9:	TI	10	B		25	2	4			ZNO
1997 11 20.73		S	11.5	AC	27	L	6	83	1.5	3			TOT03
1997 11 20.74		M	10.7:	TI	20	L	5	48	3.8	3			PLS
1997 11 20.74		M	10.8:	TJ	20	L	5	48	3.7	4			HOR02
1997 11 22.75		S	11.7	VB	33	L	5	75	1.2	2			SHA02
1997 11 23.23		S	11.7:	HS	25.6	L	5	84	2	5			BIV
1997 11 26.73		S	11.3	AC	15.2	L	5	42	2.0	3			MOE
1997 11 27.11		S	10.8	AC	20.0	T	10	113	1.5	3/			SPR
1997 11 27.99	a	S	11.8	NP	40.6	L	5	70	1.1	5			BOR
1997 11 30.21		S	11.6	HS	25.6	L	5	84	1.5	3			BIV
1997 11 30.41		S	11.0	HS	25.0	L	6	57	2	4			MIY01
1997 11 30.81		S	11.6	VB	33	L	5	100	1.1	3			SHA02
1997 12 01.11		S	11.1	AC	20.0	T	10	113	1.2	3/			SPR
1997 12 01.73		S	11.4	AC	30.5	T	10	117	& 2	2/			COM
1997 12 01.74	x	M	11.3	TJ	25.4	J	6	72	1.9	4			BOU
1997 12 02.11		S	11.1	AC	20.0	T	10	125	1.0	3/			SPR
1997 12 02.98	a	S	11.7	NP	40.6	L	5	90	1.0	5			BOR
1997 12 03.76		S	11.9	VB	33	L	5	100	1.3	2			SHA02
1997 12 06.79		S	12.0	HS	44.5	L	5	100	1.2	5			KAR02
1997 12 18.71		S	12.0:	VF	20	L	5	71	2	2			BAR06
1997 12 19.75		E	12.6	AS	30	L	5	100	0.7	2			NEV
1997 12 21.68		E	12.6	AS	30	L	5	100	1	2			NEV
1997 12 21.99	a	S	11.5	NP	40.6	L	5	90	1.0	5			BOR
1997 12 22.09	a	S	10.7	AC	20.0	T	10	185	2.5	2/			SPR
1997 12 24.39	a	C	12.4	GA	60.0	Y	6	a120	1.7		> 5.8m	327	NAK01
1997 12 24.40		M	11.1	HS	25.0	L	6	120	0.9	4			TSU02
1997 12 27.26		S	11.8	HS	25.6	L	5	84	2	2			BIV
1997 12 27.41		S	11.2	HS	46.0	L	5	148	1.4	4			YOS04
1997 12 27.41		S	11.9	HS	46.0	L	5	148	0.9	2			MIY01
1997 12 28.23		S	11.7	HS	25.6	L	5	84	1.5	4			BIV
1997 12 28.76	!	V	12.5	YF	36.0	T	7	a180	+ 1.6	7	& 4 m	325	MIK
1997 12 29.70		M	10.6:	TI	10	B		25	1.5	4			ZNO
1997 12 30.70		M	10.8:	TI	10	B		25	2.5	4			ZNO
1997 12 30.71		M	11.0:	TT	13	L	8	69	> 2.5	3/			HOR02
1997 12 30.72		S	10.9	TI	13	L	8	69	2.2	2/			PLS

Comet C/1997 J2 (Meunier-Dupouy) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 31.74		S	11.4:	S	33	L	5	100	0.9	3			SHA02
1997 12 31.98	a	S	11.7	NP	40.6	L	5	90	1.1	2			BOR
1998 01 01.73		S	10.8	S	10	B		25	1.9				MAN02
1998 01 01.73		S	11.1	TI	20	L	4	57	1.0	2			KYS
1998 01 04.21	x	S	11.5	TJ	25.4	J	6	100	1.5	3			BOU
1998 01 17.72		M	11.1	TI	10	B		25	2.3	4			ZN0
1998 01 22.74	x	S	11.2	TJ	25.4	J	6	100	1.7	1/			BOU
1998 01 23.69		S	11.3:	VF	11	L	7	50	1.5				BAR06
1998 01 26.22	x	S	11.4	TJ	25.4	J	6	100	1.8	2/			BOU
1998 01 26.76		S	11.0	AC	15.2	L	5	42	2.0	3			MOE
1998 01 31.76		S	11.1	AC	15.2	L	5	42	1.5	3			MOE
1998 01 31.83	x	S	10.5	TJ	46.0	L	5	150	1.8	3/			YOS04

Comet C/1997 N1 (Tabur)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 05.75	a	S	8.7:	AA	6	R	6	51	3	3			ERO
1997 09 09.83		S	[10.0	TJ	20.3	T	10	123	! 2.0				GRA04
1997 09 13.74	a	S	10.0	AA	6	R	6	51	1.8	3/			ERO
1997 09 21.72	a	S	10.1	AA	6	R	6	51	1	3			ERO
1997 09 24.71	a	S	10.4	AA	6	R	6	51	1	3			ERO

Comet C/1997 O1 (Tilbrook)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 04.87	a	C	15.3	GA	60.0	Y	6	a120	1.3	1			NAK01
1997 12 31.10		S	14.7	HS	44.5	L	4	230	1.2	3			SAR02

Comet C/1997 T1 (Utsunomiya)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 06.83		S	10.9	AC	30.5	T	10	117	& 2	4	&0.5		COM
1997 10 07.02		S	10.0	TI	40.6	L	5	70	2.3	6/	0.15	120	BOR
1997 10 07.30		S	10.8	HS	25.6	L	5	42	2.5	4	0.05	140	BIV
1997 10 07.80		S	10.7	AC	30.5	T	10	117	& 2	4	&1		COM
1997 10 07.91		S	10.9	AC	30.0	L	5	92	& 2	4	&0.1	132	SCH04
1997 10 07.98		S	10.6	GA	25.4	L	4	46	2	1		135	DID
1997 10 08.36		S	10.3	HS	25.6	L	5	42	2	4	0.05	130	BIV
1997 10 08.76		S	9.3	TJ	25.4	T	6	60	5	5			YOS04
1997 10 08.82		S	10.2	AA	25	L	6	96	3.5	5	0.05	125	AND01
1997 10 09.81		O	10.5	TI	11	L	7	32	3.5	4/	0.03		KYS
1997 10 09.97		S	10.7	AC	30.5	T	10	117	& 2	3/	&1		COM
1997 10 10.60		C	12.2	HS	20.3	T	9	a 10	+ 0.47		>0.01		SUZ02
1997 10 10.81		S	10.7	AC	25.3	L	4	53	1	7			LOO01
1997 10 11.12	x	M	10.1	TJ	25.4	J	6	58	2.5	5/			BOU
1997 10 11.23		B	10.1	AC	10.0	B	4	20	4	1			NOW
1997 10 11.39		S	10.6	GA	25.4	L	4	46	2	1			DID
1997 10 12.15		S	10.5	AC	30.5	T	10	117	& 2.5	3/	&1		COM
1997 10 12.61		C	12.4	HS	20.3	T	9	a 10	+ 0.47		>0.01		SUZ02
1997 10 13.58		C	12.3	HS	20.3	T	9	a 10	+ 0.47				SUZ02
1997 10 15.52		C	12.2	HS	20.3	T	9	a 10	+ 0.47		>0.01		SUZ02
1997 10 16.85		C	11.4	HS	60	P	6	a 42	& 1	D5	4 m	83	PRA02
1997 10 17.55		C	12.5	HS	20.3	T	9	a 10	+ 0.47				SUZ02
1997 10 18.76	x	M	9.9	TJ	25.4	J	6	58	2.8	5			BOU
1997 10 19.78		S	10.3	AC	20.0	L	4	42	3	4			SCH04
1997 10 19.89		M	9.8	AC	20.3	T	10	100	1.8	5	0.07	50	GRA04
1997 10 19.89		S	9.8	TI	10	B		25	3.5	3/			MAN02
1997 10 20.26		S	10.3	HS	25.6	L	5	42	3	3	0.05	80	BIV
1997 10 20.78		S	10.1	AA	25	L	6	96	3.5	5	0.08	20	AND01
1997 10 20.81		S	10.5	AC	30.5	T	10	117	& 3	3/			COM
1997 10 20.81	x	M	9.8	TJ	25.4	J	6	58	2.6	5/			BOU
1997 10 20.81	x	S	10.0	TJ	25.4	J	6	58	2.1	5			DIJ
1997 10 20.86		M	9.7	AC	20.3	T	10	100	2.2	4/			GRA04
1997 10 21.04		S	10.2	GA	25.4	L	4	46	3	1			DID
1997 10 21.29		S	10.2	HS	25.6	L	5	42	2.6	3	0.05	80	BIV

Comet C/1997 T1 (Utsunomiya) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 21.79		S	10.4	AC	30.5	T	10	117	& 3	3			COM
1997 10 21.82		S	9.5	AA	11	L	7	32	5	3			VEL03
1997 10 21.82	x	M	9.8	TJ	25.4	J	6	58	2.5	5			BOU
1997 10 21.85		B	10.3:	AA	12.0	R	5	27		3			BAL02
1997 10 21.88		S	10.6	AC	30.0	L	5	60	2	3			SCH04
1997 10 21.88		S	10.9	AC	30.5	L	5	96	2	4	0.5	105	GIL01
1997 10 21.91		S	10.4	AC	25.3	L	4	106	1.5	3			LOO01
1997 10 22.79		S	10.8	AC	30.5	L	5	72	2.5	4	0.5	120	GIL01
1997 10 22.83		B	10.0:	AA	20.0	L	5	55	2	3			GAS01
1997 10 22.87		B	9.8:	AA	12.0	R	5	35	2	3			CHE03
1997 10 22.88		S	9.7	AC	20.3	T	10	100	2.3	4			GRA04
1997 10 23.06		S	10.2	GA	25.4	L	4	54	2	2			DID
1997 10 24.30		S	10.2	HS	25.6	L	5	42	3	3	0.05	70	BIV
1997 10 24.75		M	9.6	TJ	13	L	8	69	3.6	4/	0.12	65	HOR02
1997 10 24.82		S	9.5	AA	11	L	7	32	5	3			VEL03
1997 10 24.83		S	10.4	AC	25.3	L	4	53	1.3	3			LOO01
1997 10 24.84		S	9.8	AC	20.3	T	10	100	2.2	4			GRA04
1997 10 24.94		S	10.5	HS	45	L	4	111	3	5	0.12	70	WAR01
1997 10 25.55		S	9.8	TJ	25.4	T	6	60	2	3			YOS04
1997 10 25.81		S	9.6	AC	20.3	T	10	100	2.9	4	0.08	50	GRA04
1997 10 26.29		B	10.0	HS	25.6	L	5	42	3	4	0.08	70	BIV
1997 10 26.49		C	12.3	HS	20.3	T	9	a 10	+ 0.47		>0.01		SUZ02
1997 10 26.83		S	9.3	TI	6	R	10	30	3	4	0.08	60	MAN02
1997 10 27.75		B	10.0:	AA	34.0	L	4	45	2	1			SIE
1997 10 27.79		S	10.4	AC	25.3	L	4	53	4.5	4			LOO01
1997 10 27.79	x	M	9.9	TJ	25.4	J	6	58	2.5	5			BOU
1997 10 27.80	x	S	10.0	TJ	25.4	J	6	58	2.6	5			DIJ
1997 10 27.85		S	10.4	AC	30.0	L	5	92	2	5/	0.1	55	SCH04
1997 10 27.90		M	9.5	TJ	20	L	5	48	3.2	5	0.10	70	HOR02
1997 10 27.93		S	10.6	AC	30.5	L	5	72	2.5	5	0.1	110	GIL01
1997 10 27.98		S	9.6	TI	6	R	10	30	4	4	0.12	60	MAN02
1997 10 28.53		M	9.9	HS	12.5	L	6	60	3.0	4			TSU02
1997 10 28.76		S	9.9	TT	10.0	B		25	1.4	3			HAS02
1997 10 28.76	x	M	9.9	TJ	25.4	J	6	58	2.7	4/			BOU
1997 10 28.77		M	9.6	TI	20	L	5	48	3.3	4	0.08	70	PLS
1997 10 28.78		S	10.5	AC	30.5	T	10	117	& 3	3	<0.1		COM
1997 10 28.79		S	10.5	AC	25	L	4	53	2.5	5			LOO01
1997 10 28.83		S	10.6	AC	30.5	L	5	72	2	4	0.1	90	GIL01
1997 10 28.89		M	9.7	TJ	20	L	5	48	3.2	5	0.12	70	HOR02
1997 10 28.90		S	10.8	AC	30.0	L	5	92	3	6	<0.1		SCH04
1997 10 29.03		S	9.5	TI	40.6	L	5	70	2.6	6	0.10	57	BOR
1997 10 29.79	!	V	10.4	YF	36.0	T	7	a120	+ 4.8	6	&12 m	55	MIK
1997 10 29.88		S	10.0	AC	25	L	4	53	2.5	4	?		LOO01
1997 10 29.91		S	9.5	TI	10	B		25	3.5	3/	0.08	70	MAN02
1997 10 30.76		M	9.6	TI	20	L	5	48	4.5	3/			PLS
1997 10 30.76		M	9.8	TI	20	L	4	57	2.5	4/			KYS
1997 10 30.77		B	10.2:	AA	34.0	L	4	45	2	2			SIE
1997 10 30.79		M	9.6:	TJ	20	L	5	48	3.2	4/	0.08	65	HOR02
1997 10 30.83	x	M	10.0	TJ	25.4	J	6	58	2.7	5			BOU
1997 10 30.88		S	10.5	HS	45	L	4	111	3	5/	0.17	70	WAR01
1997 10 30.94		S	10.6	AC	20.0	L	4	80	3	2			SCH04
1997 10 31.74		M	9.6	TI	20	L	5	48	3.2	4/	0.11	60	PLS
1997 10 31.76		M	9.7	TI	20	L	4	34	4.0	2/			KYS
1997 10 31.76	x	M	10.0	TJ	25.4	J	6	58	2.6	4			BOU
1997 10 31.80		M	9.6	TJ	20	L	5	48	3.0	5	0.08	60	HOR02
1997 10 31.86		S	9.8:	TI	6	R	12	37	2.5				SVE
1997 10 31.88		S	10.6	AC	30.0	L	5	60	3	4			SCH04
1997 11 01.36		S	9.7	HS	25.6	L	5	42	3	4	0.1	60	BIV
1997 11 01.39		S	9.4	TJ	25.4	T	6	60	4.5	5			YOS04
1997 11 01.40		B	11.0	TJ	25.0	L	6	57	2	3			MIY01
1997 11 01.55		C	10.4	HS	20.3	T	9	a 10	& 2.0		> 3.9m	69	SUZ02
1997 11 01.76		M	9.7	TI	20	L	5	48	3.3	4			PLS
1997 11 01.78		M	9.6	TJ	20	L	5	48	4.0	4	0.13	55	HOR02
1997 11 01.81	!	V	10.2	YF	36.0	T	7	a120	+ 4.8	6	&10 m	60	MIK
1997 11 01.83		S	9.8:	TI	6	R	12	37	2.5				SVE

Comet C/1997 T1 (Utsunomiya) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 01.87		S	9.0:	HV	7.0	R	7	24	5	4			GRA04
1997 11 02.26		S	9.9	HS	25.6	L	5	42	3	6	0.1	70	BIV
1997 11 02.40		S	10.0	AC	20	L	6	67	2.5	4			YAS
1997 11 02.43		S	9.7	NP	15.0	R	5	25	6	4			NAG02
1997 11 02.47	x	S	9.6	TJ	10.0	B		37	4	4			YOS02
1997 11 02.52		S	11.3:	TJ	40.0	L	6	120	1.6	5	& 2 m	50	NAG08
1997 11 02.71		S	9.5	VF	20	L	5	33	5.5	2/			BAR06
1997 11 02.83		S	9.7	TJ	20.3	T	10	50	2.1	3/			KAM01
1997 11 03.07		J	9.4	SC	25.4	T	5		4.07	s6	4.4m	65	ROQ
1997 11 03.40		S	10.1	AC	20	L	6	67	2.5	4			YAS
1997 11 03.46	x	S	9.7	TJ	10.0	B		37	4	4			YOS02
1997 11 03.69	a	M	9.7	SE	25	L	4	64	5	4			SHU
1997 11 03.74		S	10.4:	AC	15.2	L	5	42	3	3			MOE
1997 11 03.77		S	9.7	AC	20.3	T	10	123	2.2	4			GRA04
1997 11 03.79		E	10.8	AS	30	L	5	100	5	s6			NEV
1997 11 03.82	x	M	10.0	TJ	25.4	J	6	58	2.7	5			BOU
1997 11 03.82	x	S	9.9	TJ	25.4	J	6	58	2.7	5			DIJ
1997 11 03.83	!	V	10.3	YF	36.0	T	7	a180	+ 4.8	6	&13 m	60	MIK
1997 11 03.84		O	9.8	TI	8	R	4	17	2.8	3			KYS
1997 11 03.92		S	10.3	AC	20.0	L	4	80	2	5			SCH04
1997 11 03.96		S	9.4	GA	25.4	L	4	54	3	1			DID
1997 11 04.03		S	9.7	TI	40.6	L	5	70	2.5	6/			BOR
1997 11 04.16		S	9.9	AA	10.0	R	5	60	2.0	4			SPR
1997 11 04.72		E	10.2	HP	6	R		51	0.8	1/			ERO
1997 11 04.73		O	9.6:	TI	20	L	4	34	3.5				KYS
1997 11 04.89	x	S	10.1	TJ	25.4	J	6	72	2.4	5			DIJ
1997 11 04.89	x	S	10.1	TJ	25.4	J	6	72	2.5	5/			BOU
1997 11 05.65		E	10.1	HP	6	R		51	1	3			ERO
1997 11 05.71		E	10.7	AS	30	L	5	60	5	s6			NEV
1997 11 05.72		S	9.4	VF	20	L	5	33	5.7	2/			BAR06
1997 11 05.80		E	10.2	HP	6	R		51	1	3			ERO
1997 11 06.67		E	10.2	HP	6	R		51	0.8	3			ERO
1997 11 06.85		S	9.9	TI	25.3	L	6	58	& 3.5	3			PER01
1997 11 07.52		C	11.5	HS	20.3	T	9	a 20	& 1.2		> 2.7m	54	SUZ02
1997 11 07.66		E	10.0	HP	6	R		51	1.2	3			ERO
1997 11 07.72		S	9.7	VF	20	L	5	71	4	1/			BAR06
1997 11 07.72		S	9.9:	VF	11	B		20	4.5	1			BAR06
1997 11 07.82		S	9.9	TI	25.3	L	6	58	& 3	4			PER01
1997 11 07.82		S	10.0	TI	25.3	L	6	58	& 2.1	3			VIT01
1997 11 08.46		S	9.7	NP	15.0	R	5	25	5	4			NAG02
1997 11 08.68		E	10.4	HP	6	R		51	0.5	3			ERO
1997 11 10.73		O	9.3:	TI	8	R	4	17	4.5	2			KYS
1997 11 10.75		S	11.5	VB	30	R	18	100	1.3	3			SHA02
1997 11 15.72	!	V	10.2	YF	36.0	T	7	a120	+ 3.8	7	&12 m	57	MIK
1997 11 17.76		S	10.0	AC	30.5	T	10	117	& 2.5	3			COM
1997 11 17.76	x	M	10.3	TJ	25.4	J	6	72	2.2	4			BOU
1997 11 18.43	x	S	10.3	TJ	10.0	B		37	3	4			YOS02
1997 11 18.44		S	9.8	NP	15.0	R	5	25	5	4/			NAG02
1997 11 18.73		S	10.2	AC	15.2	L	5	42	3.5	2			MOE
1997 11 18.81	!	J	9.1	SC	25.4	T	5		3.97	d4/	5.1m	61	ROQ
1997 11 18.98		S	9.9	TI	40.6	L	5	70	1.9	6			BOR
1997 11 19.41		C	10.7	GA	60.0	Y	6	a120	3.3		> 7.8m	54	NAK01
1997 11 19.41		M	10.5	HS	25.0	L	6	47					TSU02
1997 11 19.72		S	10.0:	NP	8.0	B		20	2	3			OKS
1997 11 19.72		S	10.5:	AC	15.2	L	5	42	3	3			MOE
1997 11 19.73		C	12.2	HS	60	P	6	a030	< 1	D6/	4.5m	56	PRA02
1997 11 19.74	x	M	10.4	TJ	25.4	J	6	58	2.1	4/	0.08	65	BOU
1997 11 19.78		S	10.4	AC	30.0	L	5	60	2.5	3/			SCH04
1997 11 19.82		S	10.1	TI	25.3	L	6	58	& 2.2	4/			PER01
1997 11 19.82		S	10.2	TI	25.3	L	6	58	& 2.0	4			VIT01
1997 11 20.71		S	10.5	AC	15.2	L	5	42	3	3			MOE
1997 11 20.72		M	10.1	TI	10	B		25	3.5	3			ZNO
1997 11 20.72		S	10.1:	NP	8.0	B		20	2	3			OKS
1997 11 20.74	!	V	10.3	YF	36.0	T	7	a300	+ 3.8	7	&14 m	55	MIK
1997 11 20.76		M	9.7	TI	20	L	5	48	3.9	4/			PLS

Comet C/1997 T1 (Utsunomiya) [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 20.76		M	9.7	TJ	20	L	5	48	4.0	4			HOR02
1997 11 21.75		S	9.4	AC	10.0	B		25	1.5	4			HAS02
1997 11 22.15		S	9.9	AA	20.0	T	10	64	2.3	4			SPR
1997 11 22.23		S	10.1	S	25.6	L	5	42	3.5	3	0.1	40	BIV
1997 11 22.80		S	10.0	TI	10.0	B		14	& 4	3			PER01
1997 11 22.81		S	9.3	TI	10.0	B		14	& 7	2			VIT01
1997 11 23.25		B	10.2	HS	25.6	L	5	42	4	3	0.1	50	BIV
1997 11 23.39		S	9.9	NP	15.0	R	5	25	5	4			NAG02
1997 11 23.40		B	10.9:	HS	25.0	L	6	57	3	3			MIY01
1997 11 24.06		J	9.5	SC	25.4	T	5		3.36	s5/	4.3m	57	ROQ
1997 11 25.02		M	9.8	AA	20	L	6	47	2.4	4			CRE01
1997 11 25.07		S	9.6	AA	20.0	T	10	64	2.0	5/			SPR
1997 11 26.72		S	10.4	AC	15.2	L	5	42	2.5	3			MOE
1997 11 26.74		S	9.9	TJ	7.0	R	7	24	3	4			GRA04
1997 11 27.10		S	9.8	AA	20.0	T	10	64	2.0	5/			SPR
1997 11 28.00		S	9.8	TI	40.6	L	5	70	2.0	5/			BOR
1997 11 28.82	a	S	10.0	TI	25.3	L	6	58	& 2.4	3/			PER01
1997 11 28.82	a	S	10.2	TI	25.3	L	6	58	& 2.4	3			VIT01
1997 11 29.79		S	9.9	TI	25.3	L	6	58	& 3.0	3/			VIT01
1997 11 29.79		S	10.1	TI	25.3	L	6	58	& 2.5	2/			PER01
1997 11 30.24		S	10.1	HS	25.6	L	5	42	3	3	0.1	60	BIV
1997 11 30.78		J	9.8	SC	25.4	T	5		4.07	s4	4.1m	56	ROQ
1997 11 30.80	!	S	10.4	VB	33	L	5	75	2.4	3			SHA02
1997 12 01.10		S	9.9	AC	20.0	T	10	102	2.0	5			SPR
1997 12 01.73		S	10.3	AC	30.5	T	10	117	& 3	4	&0.1		COM
1997 12 01.73	x	M	10.4	TJ	25.4	J	6	72	2.0	4/			BOU
1997 12 02.11		S	10.0	AC	20.0	T	10	125	2.0	4/			SPR
1997 12 02.99		S	9.9	TI	40.6	L	5	70	3.0	4			BOR
1997 12 03.40		S	9.6	HS	25.0	L	6	57	3	3			MIY01
1997 12 03.74		S	10.5	VB	33	L	5	75	1.2	2			SHA02
1997 12 04.41	x	S	10.3	TJ	10.0	B		37	2	2			YOS02
1997 12 04.43		S	10.3	NP	15.0	R	5	39	4	4			NAG02
1997 12 05.79		S	10.3	TI	25.3	L	6	58	& 1.6	3			PER01
1997 12 05.80		S	10.2	TI	25.3	L	6	58	& 1.6	3			VIT01
1997 12 06.08	a	S	10.5	AC	20.0	T	10	125	2.0	4			SPR
1997 12 07.70		S	10.5:	VF	11	L	7	32	2.5	2			BAR06
1997 12 12.08	!	J	11.0	SC	25.4	T	5		1.53	s4	2.1m	66	ROQ
1997 12 17.52	!	J	10.1	SC	25.4	T	5		2.04	d1/	2.4m	64	ROQ
1998 01 01.75		S	9.9	S	10	B		25	2.7				MAN02

Comet 22P/Kopff

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 05 18.25		S	10.5:	HS	33.3	L	4	58	& 2	3			KRO02
1996 06 21.20		S	8.5	SC	33.3	L	4	58	3.5	5			KRO02
1996 06 22.21		S	8.6	SC	33.3	L	4	58	2.8	3			KRO02

Comet 29P/Schwassmann-Wachmann 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 29.79	a	C	12.8	GA	60.0	Y	6	a120	1.7	7			NAK01
1998 01 29.79	a	C	13.4	GA	60.0	Y	6	a120	+ 0.5				NAK01
1998 01 30.20	!	V	13.2	YF	20.0	T	2	a300	+ 1.2	9			MIK
1998 01 31.75	x	S	11.8	HS	46.0	L	5	150	2.3	3			YOS04
1998 02 01.06		S	13.1	HS	25.4	L	6	104	0.5	5/			SAR02

Comet 43P/Wolf-Harrington

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 05.07		C	14 :	HS	60	P	6	a 30			1 m	275	GAL03
1997 08 08.07		C	14.1	HS	60	P	6	a 30			1.5m	275	GAL03
1997 10 05.14		C	12.2	HS	60	P	6	a 90	& 0.5	D6/	2 m	288	PRA02
1997 10 05.60		B	12.4	HS	25.6	L	5	84	1	4			BIV
1997 10 12.80		C	13.0	GA	60.0	Y	6	a120	1.4		> 8.4m	291	NAK01
1997 10 26.63		S	11.9	HS	25.6	L	5	84	1.5	3			BIV

Comet 43P/Wolf-Harrington [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 01.45	!	J	10.6	SC	25.5	T	5		4.07	s5	4.9m	288	ROQ
1997 11 03.80		C	12.9	GA	60.0	Y	6	a120	1.8		> 8.0m	289	NAK01
1997 11 04.16		S	12.1:	TI	20	L	4	57	1.8	1/			KYS
1997 11 04.17		S	12.8	AC	25.4	J	6	100	1.3	1			BOU
1997 11 04.23		S	12.6	VB	30	R	18	170	0.8	3			SHA02
1997 11 09.15		S	12.9:	VB	20	T	10	135	0.6	1			SHA02
1997 11 12.19		S	12.7	AC	25.4	J	6	100	1.0	2/			BOU
1997 12 02.79		S	12.8	VN	20.0	L	4	190	0.6	3			PEA
1997 12 03.78		S	12.9	VN	20.0	L	4	190	0.8	1			PEA
1997 12 04.82		C	13.1	GA	60.0	Y	6	a120	1.5		> 7.1m	294	NAK01
1997 12 05.75		S	12.8	VN	20.0	L	4	190	0.8	1			PEA
1997 12 06.21		C	13.3	HS	60	P	6	a100	& 1	d5	4 m	295	PRA02
1997 12 07.11		S	12.3	HS	44.5	L	5	100	1.1	3			KAR02
1997 12 07.79		S	13.0	VN	20.0	L	4	190	1.1	1			PEA
1997 12 24.77		C	13.1	GA	60.0	Y	6	a120	1.4		> 8.9m	295	NAK01
1997 12 24.86		S	13.8	HS	46.0	L	5	148	0.8	3			MIY01
1997 12 26.73		S	13.2	VN	41	L	4	90	1.3	3/			PEA
1997 12 27.61		S	12.8	HS	25.6	L	5	84	1.0	4			BIV
1997 12 27.74		S	13.1	VN	41	L	4	90	1.3	3/			PEA
1997 12 27.76		S	12.5	HS	46.0	L	5	148	0.7	3			MIY01
1997 12 27.76		S	13.2	HS	46.0	L	5	148	1.3	3/			YOS04
1997 12 28.74		S	13.2	VN	41	L	4	90	1.3	3/			PEA
1997 12 28.83		S	12.9	HS	25.0	L	6	112	1	2			MIY01
1997 12 31.08		S	13.2:	HS	44.5	L	4	230	1.5	3			SAR02
1998 01 03.77		S	13.4	HS	46.0	L	5	150	0.9	2			YOS04
1998 01 05.60		S	13.0	GA	25.4	L		71					SEA
1998 01 19.56		S	13.3:	HS	20	L	7	158	1	2			MAT08
1998 01 20.55		S	13.3:	HS	20	L	7	158	1	2			MAT08
1998 01 22.29	!	J	12.4	SC	25.4	T	5		.71	s3	3.3m	288	ROQ
1998 01 29.73	a	C	13.2	GA	60.0	Y	6	a120	1.3		> 5.8m	311	NAK01
1998 01 31.70	x	S	13.1	HS	46.0	L	5	150	1.1	3/			YOS04

Comet 46P/Wirtanen

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 02 09.11	w	S	11.0	AC	44.5	L	4	80	1.9	2			MOR03
1997 02 25.03		S	10.7	AC	44.5	L	4	80	2.8	2			MOR03
1997 03 03.03	w	S	9.3	AC	15	R	5	42	3.5	2			MOR03
1997 03 12.06		S	9.9	AC	15	R	5	42	4	2			MOR03
1997 03 27.04		S	10.0	AC	15	R	5	42	2.5	2			MOR03
1997 04 02.07	w	S	10.7	AC	15	R	5	42	2.5	1			MOR03
1997 04 03.84		S	9.4	AC	30.0	L	5	60	4	3			SCH04
1997 04 06.85		S	10.1	AC	30.0	L	5	92	& 2	1			SCH04
1997 04 26.10		S	12.2	AC	44.5	L	4	167	1.1	2			MOR03
1997 05 05.10		S	11.6	AC	44.5	L	4	80	2.3	1			MOR03

Comet 48P/Johnson

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 23.73		S	[13.5	HS	44.5	L	4	230	! 1				SAR02

Comet 49P/Arend-Rigaux

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 27.63		C	19.5	GA	60.0	Y	6	a240	0.2	8			NAK01

Comet 55P/Tempel-Tuttle

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 09.84	a	C	19.5	GA	60.0	Y	6	a240	0.25				NAK01
1997 12 04.86		C	17.6	GA	60.0	Y	6	a240	0.5			295	NAK01
1997 12 24.78		C	13.7	GA	60.0	Y	6	a120	2.2				NAK01
1997 12 24.84		B	13.8	HS	46.0	L	5	148	0.5	2			MIY01
1997 12 25.07		S	13.2	VB	20	T	10	135	1.2	1			SHA02
1997 12 26.81		S	[12.0	VN	41	L	4	90					PEA

Comet 55P/Tempel-Tuttle [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 27.56		S	13.0	HS	25.6	L	5	84	2.5	2			BIV
1997 12 27.58		S	12.5	HS	25.6	L	5	42	3	2			BIV
1997 12 27.79		S	12.2	HS	46.0	L	5	69	3.0	1/			YOS04
1997 12 27.80		B	11.9	HS	46.0	L	5	69	3	2			MIY01
1997 12 27.80		C	12.8	GA	60.0	Y	6	a120	3.3				NAK01
1997 12 27.81		S	12.1	VN	41	L	4	90	3	0/			PEA
1997 12 28.06		S	12.8	VB	30	R	18	100	1.5	2			SHA02
1997 12 28.81		B	11.5	HS	25.0	L	6	57	2.5	2			MIY01
1997 12 28.82		S	11.9	VN	41	L	4	90	3.6	1			PEA
1997 12 31.05		S	11.2	HS	44.5	L	4	82	7	1			SAR02
1997 12 31.66		M	10.6	TI	25.0	L	6	47	4.0	1			TSU02
1997 12 31.79		S	12.5:	HS	20.0	Y	9	51	& 2	1/			SAI01
1998 01 01.07		S	11.3:	VB	20	T	10	75	2.0	1			SHA02
1998 01 01.17		S	11.5:	AC	20.0	L	4	80	& 4	0			SCH04
1998 01 01.19	!	V	11.3	YF	36.0	T	7	a180	+ 5.4	3			MIK
1998 01 02.49		S	10.8	AC	20.0	T	10	64	3.8	3/			SPR
1998 01 03.20	x	S	10.5	TJ	25.4	J	6	47	4.5	2			BOU
1998 01 03.48		S	10.7	TJ	25.6	L	5	42	3.5	2			BIV
1998 01 03.66		S	9.8	TJ	46.0	L	5	41	3.2	1			YOS04
1998 01 03.75		S	9.7	TJ	25.4	T	6	32	4	1			YOS04
1998 01 04.19		S	10.0	AC	30.5	T	10	54	& 5	1			COM
1998 01 04.20	x	S	10.3	TJ	25.4	J	6	47	4.5	1/			BOU
1998 01 05.14		S	10.3	TT	25.3	L	6	58	& 4.5	3			PER01
1998 01 05.15		S	10.1	TT	25.3	L	6	58	& 3.7	1			VIT01
1998 01 06.14		S	9.1	AC	20.0	L	4	42	9	1/			SCH04
1998 01 06.15		S	10.4	TT	25.3	L	6	58	& 5	2			PER01
1998 01 06.19		S	10.1	TT	15.0	L	4	26	& 6	2			PER01
1998 01 06.27		S	10.2	TT	25.3	L	6	58	& 4.5	2			VIT01
1998 01 06.79		B	11.0	HS	25.0	L	6	57	5	2			MIY01
1998 01 06.79	x	C	10.4	TT	8.0	R	6	a120	10.5				NAK01
1998 01 06.82		S	9.2	TJ	25.4	T	6	32	8	1/			YOS04
1998 01 06.85		M	8.6	TI	12.5	L	6	23	7.0	2			TSU02
1998 01 07.04		M	9.7	TT	13	L	8	69	5.5	1/			HOR02
1998 01 07.22		O[	9.5	TI	5.0	B		7	! 7				KYS
1998 01 08.12		M	9.7	TT	13	L	8	69	5.5	1			HOR02
1998 01 08.16		S	10.4	TT	25.3	L	6	58	& 5.5	0/			PER01
1998 01 08.17		S	10.2	TT	15.0	L	4	26	& 6	1			PER01
1998 01 08.26		S	9.7	TT	10.0	B		14	& 7.5	2			PER01
1998 01 09.83		S	8.4:	HS	16.0	L	6	33	6	1/			SAI01
1998 01 10.18	!	V	9.7	YF	36.0	T	7	a120	+ 9.6	6			MIK
1998 01 10.20		S	8.9	AC	20.0	L	4	42	11	1/			SCH04
1998 01 10.22		S	9.2	TJ	20.3	T	10	50	4.5	1/			KAM01
1998 01 10.23		S	10.3	TT	20.3	T	10	63	4.5	2			HAS02
1998 01 10.23	x	S	9.2	TJ	15.6	L	5	29	7.5	1/			BOU
1998 01 10.24		S	9.2	TT	15.0	L	4	26	&12	1			PER01
1998 01 10.24		S	9.4	TT	10.0	B		14	&10	2/			PER01
1998 01 10.26		S	8.8	AC	25	L	4	53	20	2			LOO01
1998 01 11.22		S	8.8	TT	8.0	B		10	14	1			HOR02
1998 01 11.25		S	8.9	AC	8.0	B		15	10	2/			SCH04
1998 01 11.25		S	9.0	AC	20.0	L	4	42	9	1/			SCH04
1998 01 11.30		S	9.0	NP	20	L	6	47	7.5	1			CRE01
1998 01 12.19	!	V	10.1	YF	36.0	T	7	a120	+ 6.4	6			MIK
1998 01 12.84		B	9.0	AC	10.0	B		25		2			HAS02
1998 01 13.78		S	9.4:	AA	11	L	7	50	5.5	2			BAR06
1998 01 14.80		S	8.0	TI	6	R	12	37	6	4			SVE
1998 01 15.71		M	7.4	TT	8.0	B		10	15	2			HOR02
1998 01 15.71		M	8.3	TI	10	B		25	10	2			ZNO
1998 01 15.75		M	8.0	TI	8.0	B		10	22	1			PLS
1998 01 15.79		S	8.5	NH	10.0	B		14	>12	3			PER01
1998 01 16.44	x	S	8.6	TJ	10.0	B		20	11	1/			YOS02
1998 01 16.48		M	8.6	TI	12.5	L	6	32	10.0	3			TSU02
1998 01 16.49		S	9.2	NP	15.0	R	5	25	8	2/			NAG02
1998 01 16.50		C	9.1	GA	8.0	R	6	a120	14.2				NAK01
1998 01 16.81		S	7.8	NH	10.0	B		14	& 8	2/			VIT01
1998 01 16.81		S	8.3	NH	10.0	B		14	& 9	3			PER01

Comet 55P/Tempel-Tuttle [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 17.72		M	8.7	TI	8.0	B		10	9	1			KUJ
1998 01 17.73		M	8.9	S	10	B		25	6	1			KUB
1998 01 17.74		M	7.8	TI	8.0	B		10	12	2			ZNO
1998 01 17.75		M	8.1	TI	20	L	4	34	7.2	2			KYS
1998 01 17.76		0	7.9	TI	5	R		7	9.5	1/			KYS
1998 01 17.77		M	7.8	TT	8.0	B		10	18	1			PLS
1998 01 17.77		S	9.6	TI	6	R	12	37	4.7	4			SVE
1998 01 17.78		M	7.8	TT	8.0	B		10	16	1/			HOR02
1998 01 17.83	!	V	9.1	YF	36.0	T	7	a120	+ 8.0	6			MIK
1998 01 17.88		M	7.9	TI	5.0	B		7	12	3			KYS
1998 01 17.88		S	8.2	HV	7.0	R	7	24	10	3			GRA04
1998 01 17.89		S	7.6	HV	6.3	B		9	10	2/			KAM01
1998 01 17.89		S	8.2	HV	5.0	B		10	10	2			GRA04
1998 01 17.90		S	8.6	TI	6	R	12	37	5.1	5			SVE
1998 01 17.97		S	8.5	TI	6	R	12	37	4.8	5/			SVE
1998 01 18.44		S	8.9	NP	15.0	R	5	25	8	2/			NAG02
1998 01 18.71		S	7.9:	TI	8.0	B		20	& 8	1/			KAR02
1998 01 18.72		S	8.4	AA	11	L	7	32	11	2			BAR06
1998 01 18.74		M	7.9	TT	8.0	B		10	12	2			HOR02
1998 01 18.76		S	8.0	TT	8.0	B		10	20	1/			PLS
1998 01 18.79		S	8.5	AC	33.4	L	5	56	20	4			SZE02
1998 01 18.84		S	7.5	HV	6.3	B		9	13.5	2/			KAM01
1998 01 18.87		S	7.9	AA	20	L	4	40	10	0/			GUL01
1998 01 19.01		S	8.4	AA	11	L	7	32	10	d2			BAR06
1998 01 19.27		S	9.1	NP	20	L	6	38	6.3	2			CRE01
1998 01 19.30		M	7.7	SC	3.5	B		7	10	3	0.25	35	OME
1998 01 19.73		S	8.5	AA	11	L	7	32	10	d2/			BAR06
1998 01 19.79		S	8.2	AC	8.0	B		15	&15	2			SCH04
1998 01 20.14		S	7.9	AA	20.0	T	10	64	8.5	2			SPR
1998 01 20.3		M	7.6	SC	5.0	B		10	15	3			OME
1998 01 20.43		S	8.9	TJ	10.0	B		20	14	3			NAG08
1998 01 20.79		S	7.9	HV	7.0	R	7	24	13	3			GRA04
1998 01 20.85		S	8.7	TT	10.0	B		14	& 9	3			PER01
1998 01 20.85		S	8.9	TT	10.0	B		14	& 9	2/			VIT01
1998 01 20.87		S	7.8	TT	3.4	B		9	&15	1/			PER01
1998 01 20.89		S	7.8	S	10.0	R	5	20	9	1			MAR02
1998 01 20.99		S	8.1	HS	14.0	S	4	28	8	2			WAR01
1998 01 21.12		S	7.7	AA	8.0	R	5	27	10.5	1/			SPR
1998 01 21.3		M	7.6	SC	5.0	B		10	12	2			OME
1998 01 21.46		S	8.6	S	15.0	R	5	25	7	3			NAG02
1998 01 21.80		S	7.9	TT	3.4	B		9	&13	3/			PER01
1998 01 21.80		S	8.8	TT	10.0	B		14	& 9	2			VIT01
1998 01 21.91		S	7.9	S	10.0	R	5	20	8	2			MAR02
1998 01 22.11		S	7.7	AA	8.0	B		11	11.5	1/			SPR
1998 01 22.3		M	7.4	SC	3.5	B		7	15	3			OME
1998 01 22.61		B	9.1:	AA	12.0	R	5	35	8	1			SIE
1998 01 22.67		S	7.9	AA	6.0	B		20	10	3			CHE03
1998 01 22.69		B	8.8	AA	12.0	L	5	27	11	3			GAS01
1998 01 22.74		S	8.3	AA	11	L	7	32	7.5	2			BAR06
1998 01 22.75		S	8.9	AC	25	L	4	53	10	2			LOO01
1998 01 22.76	x	S	7.8	TJ	8.0	B		15	9.5	1/			BOU
1998 01 22.77		S	7.7	AC	30.5	T	10	54	& 8	1/			COM
1998 01 22.79		S	8.5	AA	15.0	R	8	30	3.5	2			DIE02
1998 01 22.90		B	8.3:	AA	11.0	B		20					CHE03
1998 01 22.94		S	7.8	S	10.0	R	5	20	14	1			MAR02
1998 01 23.01		S	8.4	AA	5.0	B		20	9	1			BAR06
1998 01 23.01		S	8.5	AA	11	L	7	32	7	2			BAR06
1998 01 23.47	x	S	8.1	TT	10.0	B		20	10	2			YOS02
1998 01 23.73		S	8.4	AA	11	L	7	32	7.5	3			BAR06
1998 01 23.77		S	8.3	AA	5.0	B		20	10	1/			BAR06
1998 01 23.87		B	8.1	AA	12.0	R	5	27	10	3			CHE03
1998 01 24.01		S	8.2	AA	5.0	B		20	10	1/			BAR06
1998 01 24.01		S	8.4	AA	11	L	7	32	8	2			BAR06
1998 01 24.01		S	8.6	AA	11	L	7	50	6	2			BAR06
1998 01 24.47		S	8.5	S	15.0	R	5	25	8	3			NAG02

Comet 55P/Tempel-Tuttle [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 24.48		S	8.0	TJ	25.4	T	6	32	9	3			YOS04
1998 01 24.71		S	8.4	AA	11	L	7	32	7.8	3			BAR06
1998 01 24.82		S	8.5	TT	10.0	B		14	& 8	3			PER01
1998 01 24.82		S	8.7	TT	10.0	B		14	& 9	2/			VIT01
1998 01 24.83		S	8.6	TT	3.4	B		9	& 7	3			PER01
1998 01 25.3		M	7.4	SC	5.0	B		10	15	3			OME
1998 01 25.43		S	8.6	TJ	10	L	5	28	7	3			SHI
1998 01 25.75		S	8.1:	SC	10.6	L	7	52	<12	d2/			TOL
1998 01 25.77		S	8.1	TT	8.0	B		10	13	1/			HOR02
1998 01 25.78		M	8.4	TI	10	B		25	10	2			KUJ
1998 01 25.78		S	7.7	TT	8.0	B		10	18	1			PLS
1998 01 25.80		S	7.7	TT	5.0	B		10	6.0	2			HAS02
1998 01 25.81	x	S	7.7	TJ	8.0	B		15	10	2			BOU
1998 01 25.87		M	8.5	AA	11	L	7	32	7.5	3			BAR06
1998 01 25.88		S	8.2	AA	5.0	B		20	9	2			BAR06
1998 01 25.94		S	8.0	AC	30.5	T	10	54	& 7	2			COM
1998 01 26.01		S	8.6:	AA	11	L	7	50	7	2			BAR06
1998 01 26.07		J	10.1	SC	25.4	T	5		4.89	s3/			ROQ
1998 01 26.72		S	7.8	TI	8.0	B		10	12	1			PLS
1998 01 26.72		S	8.5:	AA	11	L	7	32	6	2			BAR06
1998 01 26.75		S	7.7:	TI	10	B		25	16	2			ZNO
1998 01 26.77		S	8.3	AA	15.2	L	5	42	7	2			MOE
1998 01 26.80		S	7.8	AC	30.5	T	10	54	& 7	2			COM
1998 01 26.82		S	8.6	TT	10.0	B		14	& 7	2/			VIT01
1998 01 26.82		S	9.0	TT	10.0	B		14	& 8	4			PER01
1998 01 26.86		S	8.2	AA	15.0	R	8	30	4	1			DIE02
1998 01 26.95		S	8.0	TT	8.0	B		10	12	1/			HOR02
1998 01 26.97	x	S	7.9	TJ	8.0	B		15	8	2			BOU
1998 01 27.4		M	7.3	SC	5.0	B		10	15	2			OME
1998 01 27.72		S	8.3	AA	11	L	7	32	6	2			BAR06
1998 01 27.76		S	7.9	HS	6.0	B		20	13	1			SAR02
1998 01 27.77		S	8.5	AC	25.0	L	4	53	15	2			LOO01
1998 01 27.80		S	7.7	TI	8.0	B		10	17	1			PLS
1998 01 27.81		S	8.3	TT	10.0	B		14	& 7	4/			PER01
1998 01 27.82		S	8.0	TT	3.4	B		9	&10	4			PER01
1998 01 27.88		S	8.3	TT	8.0	B		10	12	1/			HOR02
1998 01 28.76		B	8.0	TT	5.0	B		10	5.2	2			HAS02
1998 01 28.85		S	8.9	TT	3.4	B		9	& 4.5	6			PER01
1998 01 28.85		S	8.9	TT	10.0	B		14	& 6	3/			PER01
1998 01 28.91	x	S	8.0	TJ	8.0	B		15	8.5	2/			BOU
1998 01 29.48	x	S	8.1	TJ	10.0	B		20	9	3			NAG08
1998 01 29.49		S	8.9	HS	10.5	R	7	23	5	4			HAS08
1998 01 29.54		S	8.0	S	15.0	R	5	25	6	4			NAG02
1998 01 29.80	!	V	8.5	YF	20.0	T	2	a300	+14.0	6			MIK
1998 01 29.83		S	8.9	TT	3.4	B		9	& 8.5	4			PER01
1998 01 29.84		S	8.5	TT	10.0	B		14	& 7	2/			VIT01
1998 01 29.84		S	8.7	TT	10.0	B		14	& 9	4			PER01
1998 01 30.85		S	7.9	HV	6.3	B		9	9.5	3			KAM01
1998 01 30.93		S	8.4	S	8.0	B		11	8	2			GON05
1998 01 31.07		J	9.9	SC	25.4	T	5	a 50	5.40	s5/			ROQ
1998 01 31.11		S	7.7	AA	10.0	R	5	27	11.5	2/			SPR
1998 01 31.51	x	S	7.7	TJ	25.4	T	6	32	8	3			YOS04
1998 01 31.75		S	8.5	AA	15.2	L	5	42	7	3			MOE
1998 01 31.79		S	8.7	AC	25.0	L	4	53	6	5			LOO01
1998 01 31.93		S	8.2	S	8.0	B		11	7	2			GON05

Comet 62P/Tsuchinshan 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 31.20		c	22.4	FA	91.4	L	5						SCO01
1997 12 31.21		C	19.7	FA	91.4	L	5		0.20		9.0s	59	SCO01
1998 01 29.48		C	17.6	GA	60.0	Y	6	a240	0.5				NAK01

Comet 65P/Gunn

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 06 23.19		S	12.6	HS	33.3	L	4	200	1.1	3			KRO02
1996 07 12.16		S	12.7	HS	33.3	L	4	200	0.9	4			KRO02
1997 08 05.01		C	17 :	HS	60	P	6	a240			1 m	253	GAL03
1997 08 26.70		C	15.2	GA	60.0	Y	6	a120	0.85		1.1m	238	NAK01
1997 08 28.68		C	15.3	GA	60.0	Y	6	a120	0.85			235	NAK01
1997 09 29.61		C	15.0	GA	60.0	Y	6	a120	0.95		1.9m	238	NAK01
1997 10 05.92		S[	13.0	HS	44.5	L	5	100					KAR02
1997 10 22.53		C	15.1:	GA	60.0	Y	6	a120	1.1				NAK01
1997 11 20.45		C	15.4	GA	60.0	Y	6	a120	1.0				NAK01
1997 12 04.43		C	16.2	GA	60.0	Y	6	a120	0.6			145	NAK01
1997 12 24.43		C	16.5	GA	60.0	Y	6	a120	0.45				NAK01
1998 01 30.42		C	16.6:	GA	60.0	Y	6	a240	0.65				NAK01

Comet 69P/Taylor

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 03.76		C	18.4	GA	60.0	Y	6	a240	0.35			300	NAK01
1997 11 09.78		C	18.3	GA	60.0	Y	6	a240	0.35		1.2m	284	NAK01
1997 12 04.77		C	16.4	GA	60.0	Y	6	a240	0.7		2.4m	284	NAK01
1997 12 24.71		C	15.1	GA	60.0	Y	6	a240	0.95		1.4m	276	NAK01
1997 12 30.93		S	13.3:	HS	35	L	5	158	1.0	2			HOR02
1997 12 31.09		S[	14.3	HS	44.5	L	4	230	! 1				SAR02
1998 01 17.77		M	11.9	TI	35	L	5	92	2.1	2			HOR02
1998 01 17.79		M	11.9	TI	35	L	5	92	2.3	2			PLS
1998 01 18.73		M	11.8	TI	35	L	5	92	2.0	1/			HOR02
1998 01 18.74		S	11.9	TI	35	L	5	92	2.5	1			PLS
1998 01 22.05		S	12.4	CA	25.3	L	6	58	& 1.3	4/			PER01
1998 01 22.83		S	12.1	AC	25.4	J	6	100	2.0	1/			BOU
1998 01 24.53	x	S	12.5	HS	46.0	L	5	150	1.0	6			YOS04
1998 01 25.80		M	12.3	HS	35	L	5	104	1.8	2/			HOR02
1998 01 25.83		S	12.3	AC	25.4	J	6	88	1.7	2/			BOU
1998 01 27.84		M	12.3	HS	35	L	5	92	1.8	2/			HOR02
1998 01 29.58		C	12.7	GA	60.0	Y	6	a120	2.5				NAK01
1998 01 30.86		S	12.7	HS	44.5	L	5	100	1.2	6			KAR02
1998 01 31.63	x	S	12.0	HS	46.0	L	5	80	2.1	6/			YOS04
1998 01 31.98		S	12.9	HS	25.4	L	6	104	1.2	4			SAR02

Comet 74P/Smirnova-Chernykh

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 29.63		C	18.4	GA	60.0	Y	6	a240	0.3		2.3m	249	NAK01
1997 09 30.64		C	18.3	GA	60.0	Y	6	a240	0.3		1.7m	249	NAK01
1997 10 27.58		C	18.2	GA	60.0	Y	6	a240	0.35				NAK01
1997 12 04.46		C	18.1	GA	60.0	Y	6	a240	0.35				NAK01

Comet 78P/Gehrels 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 09.07		C	12.6	HS	60	P	6	a200			4 m	266	GAL03
1997 10 05.58		B	12.2	HS	25.6	L	5	84	1.5	5			BIV
1997 10 06.05		C	13 :	HS	60	P	6	a120	& 0.6	D6	3.5m	274	PRA02
1997 10 12.77		C	12.3	GA	60.0	Y	6	a120	1.9		> 7.2m	277	NAK01
1997 10 27.74		C	12.4	GA	60.0	Y	6	a120	1.8		> 6.8m	280	NAK01
1997 10 29.98		S	13.0:	HS	45	L	4	256	0.6	3	0.03	275	WAR01
1997 10 31.92		M	12.0:	TI	35	L	5	104	1.0	2			HOR02
1997 11 01.73		S	11.5	HS	25.4	T	6	60	1.1	3			YOS04
1997 11 02.19		O[	11.9:	TI	20	L	4	57	! 0.7				KYS
1997 11 04.12		S	12.0:	TI	20	L	4	57	0.8	2			KYS
1997 11 04.16		S	12.8	AC	25.4	J	6	100	1.2	3/			BOU
1997 11 04.20		S	13.0	VB	30	R	18	170	0.8	2			SHA02
1997 11 06.05		E	12.3	PA	30	L	5	100	3	1			NEV
1997 11 09.05		S	12.7	VB	20	T	10	135	0.7	2			SHA02
1997 11 09.76		C	12.3	GA	60.0	Y	6	a120	2.2		> 6.9m	281	NAK01
1997 11 12.16		S	13.0:	AC	25.4	J	6	150	0.9	3			BOU
1997 11 21.95		S	13.6	VB	30	R	18	170	0.6	3			SHA02

Comet 78P/Gehrels 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 22.37		J	10.2	SC	25.4	T	5		2.75	d5/	4.1m	278	ROQ
1997 11 22.37		J	11.4	SC	25.4	T	5		1.83	d5/	4.1m	278	ROQ
1997 11 23.44		B	12.0	HS	25.6	L	5	84	1.2	6			BIV
1997 11 24.68		C	12.5	GA	60.0	Y	6	a120	1.8		> 7.8m	284	NAK01
1997 11 27.61		S	12.1	HS	25.6	L	5	84	1.3	6			BIV
1997 11 30.44		S	12.0	HS	25.6	L	5	84	1.2	7			BIV
1997 12 01.04		S	13.2	VB	30	R	18	170	0.5	3			SHA02
1997 12 02.83		S	11.9	HS	25.0	L	6	100	1	2			MIY01
1997 12 04.12		S	13.5	VB	30	R	18	170	0.8	3			SHA02
1997 12 04.29		J	11.7	SC	25.4	T	5		1.22	s5/	3.9m	270	ROQ
1997 12 04.92		S	12.8	HS	27	L	6	214	0.9	4/			TOT03
1997 12 06.57		B	11.9	HS	25.6	L	5	84	1.5	5			BIV
1997 12 06.94	!	V	12.4	YF	20.0	T	2	a300	+ 2.2	7	& 6 m	280	MIK
1997 12 06.95		S	12.1	HS	44.5	L	5	100	1.0	4			KAR02
1997 12 07.09		C	12.6	HS	60	P	6	a120	& 1	d5	< 4 m	287	PRA02
1997 12 08.58		B	12.3	HS	25.6	L	5	84	1	5			BIV
1997 12 09.19		S	11.6	CA	25.3	L	6	58	& 1.4	4/			PER01
1997 12 10.79		S	12.3	HS	25.0	L	6	100	0.3	3			MIY01
1997 12 11.81		S	12.2	VN	20.0	L	4	190	1.2	2			PEA
1997 12 18.53		S	12.3:	HS	20	L	7	158	1	2			MAT08
1997 12 21.64		C	12.8	GA	60.0	Y	6	a120	1.5		5.5m	289	NAK01
1997 12 21.68		S	12.2	VN	20.0	L	4	190	1.0	3			PEA
1997 12 22.33		S	12.5	HS	25.6	L	5	84	1.3	4			BIV
1997 12 23.70		S	12.3	VN	20.0	L	4	190	0.9	3			PEA
1997 12 24.48		S	12.3	HS	25.6	L	5	84	1.0	4			BIV
1997 12 24.57		S	12.5	HS	46.0	L	5	148	0.7	4			MIY01
1997 12 24.61		M	12.8	HS	25.0	L	6	120	1.1	3			TSU02
1997 12 25.06		S	13.0	VB	20	T	10	75	1.2	1			SHA02
1997 12 25.35		S	12.4	HS	25.6	L	5	84	1.0	5			BIV
1997 12 26.66		S	12.8	VN	41	L	4	90	1.3	4/			PEA
1997 12 27.41		S	12.9	HS	25.6	L	5	84	1.5	4			BIV
1997 12 27.55		S	11.4	HS	46.0	L	5	69	1	2			MIY01
1997 12 27.55		S	11.8	HS	46.0	L	5	69	2.2	3			YOS04
1997 12 27.72		S	12.7	VN	41	L	4	90	0.8	6			PEA
1997 12 27.99		S	12.9	VB	30	R	18	100	1.0	4			SHA02
1997 12 28.41		S	12.2	HS	25.6	L	5	84	1.3	5			BIV
1997 12 28.73		S	12.7	VN	41	L	4	90	0.8	4/			PEA
1997 12 28.96	!	V	11.8	YF	36.0	T	7	a300	+ 1.9	7	& 6 m	280	MIK
1997 12 29.15	!	J	11.3	SC	25.4	T	5		.81	s5/	4.4m	290	ROQ
1997 12 30.12		S	12.8	HS	27	L	6	167	1.2	3			TOT03
1997 12 30.73		p	13.1	HS	13.0	H	3	A200	0.7	8	2.4m	285	OHM
1997 12 30.78		M	11.9:	TI	35	L	5	92	2.2	2/			HOR02
1997 12 30.79		M	11.6	HS	35	L	5	92	2	2/			PLS
1997 12 31.02		C	13.0	HS	60	P	6	a 80	> 1	d5	> 3 m	287	PRA02
1997 12 31.02		S	12.7	HS	27	L	6	167	1	2			TOT03
1997 12 31.04		S	12.5	HS	44.5	L	4	230	1.2	3/			SAR02
1997 12 31.71		S	12.8:	HS	20.0	Y	9	51	& 1	5/			SAI01
1997 12 31.90		S	13.5	VB	30	R	18	170	0.6	3			SHA02
1998 01 03.23		S	12.7	AC	20.0	T	10	226	1.0	2			SPR
1998 01 03.52		S	11.5	HS	46.0	L	5	150	1.4	5			YOS04
1998 01 05.54		S	12.3	GA	25.4	L		71					SEA
1998 01 17.77		S	12.3	TI	20	L	4	57	1.3	2			KYS
1998 01 17.81		S	12.2	HS	35	L	5	158	1.2	2			HOR02
1998 01 17.82		S	11.6	HS	35	L	5	158	1.2	3			PLS
1998 01 17.86	!	V	12.9	YF	36.0	T	7	a300	+ 1.1	7			MIK
1998 01 17.92		C	12.7	HS	60	P	6	a 90	& 1.5	D5	& 3 m	295	PRA02
1998 01 18.16		J	10.7	SC	25.4	T	5		1.43	s5	?		ROQ
1998 01 18.72		S	12.2	HS	35	L	5	158	1.1	2			HOR02
1998 01 19.50		S	12.8:	HS	20	L	7	158	1	2			MAT08
1998 01 20.51		S	12.7:	HS	20	L	7	158	1	2			MAT08
1998 01 21.98		S	11.4	CA	25.3	L	6	58	& 3.3	3			PER01
1998 01 22.80		S	12.5	AC	25.4	J	6	100	1.6	1			BOU
1998 01 24.55	x	S	11.9	HS	46.0	L	5	150	1.0	4/			YOS04
1998 01 25.76		S	12.1	HS	35	L	5	104	1.7	2			HOR02
1998 01 25.77		S	11.9	TI	35	L	5	104	2.5	2/			PLS

Comet 78P/Gehrels 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 25.80		S	12.5	AC	25.4	J	6	88	1.7	1/			BOU
1998 01 26.74		M	12.3	HS	15	R	13	80	2.1	5			ZNO
1998 01 27.78		S	12.3	TI	35	L	5	81	2	1/			PLS
1998 01 27.83		M	11.9	TI	35	L	5	92	1.9	2			HOR02
1998 01 29.54		C	12.7	GA	60.0	Y	6	a120	1.8		3.6m	292	NAK01
1998 01 29.87	!	V	12.9	YF	20.0	T	2	a300	+ 1.6	8			MIK
1998 01 31.60	x	S	11.0	HS	46.0	L	5	80	2.6	2			YOS04

Comet 81P/Wild 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 12 19.43		S	12.7	AC	44.5	L	4	167	0.9	3			MOR03
1997 01 01.10		S	12.5	AC	44.5	L	4	167	0.6	3			MOR03
1997 01 02.93		S	12.5:	AC	30.5	T	10	120	& 2	2			COM
1997 01 14.92		S	11.0	AC	30.0	L	5	60	1.5	7			SCH04
1997 02 02.01		S	11.8	AC	44.5	L	4	167	0.9	4			MOR03
1997 02 09.07		S	10.4	AC	15	R	5	42	1.5	2			MOR03
1997 02 10.96		S	9.7	AC	20.0	L	4	42	4.5	2			SCH04
1997 02 25.02		S	10.5	AC	15	R	5	42	2	4			MOR03
1997 03 01.07		S	10.5	AC	15	R	5	42	3	3			MOR03
1997 03 03.03		S	10.4	AC	15	R	5	42	2.5	3			MOR03
1997 03 06.91		S	10.0	AC	30.0	L	5	60	2.5	4/			SCH04
1997 03 09.05		S	10.6	AC	15	R	5	42	2.5	3			MOR03
1997 03 24.19		S	10.7	AC	15	R	5	42	2	2			MOR03
1997 03 30.92		S	10.5	AC	30.0	L	5	60	4	1			SCH04
1997 03 31.91		S	10.5	AC	30.0	L	5	60	4	1			SCH04
1997 04 01.12		S	10.7	AC	15	R	5	42	3	3			MOR03
1997 04 01.89		S	10.4	AC	30.0	L	5	60	4	2/			SCH04
1997 04 02.07		S	10.8	AC	15	R	5	42	4.5	4			MOR03
1997 04 03.87		S	10.4	AC	30.0	L	5	60	3	4			SCH04
1997 04 06.92		S	10.4	AC	30.0	L	5	60	& 2	3			SCH04
1997 04 09.88		S	10.2	AC	30.0	L	5	60	2	3/			SCH04
1997 04 11.07		S	11.0	AC	15	R	5	42	3	2			MOR03
1997 04 26.07		S	11.0	AC	15	R	5	42	3.5	3			MOR03
1997 05 05.12		S	11.0	AC	15	R	5	42	3.5	3			MOR03
1997 05 26.13		S	11.5	AC	15	R	5	42	3.5	1			MOR03
1997 06 27.13	s	S	12.0	AC	44.5	L	4	80	1.2	1			MOR03
1997 07 06.12		S	12.1	AC	44.5	L	4	167	1.3	1			MOR03

Comet 88P/Howell

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 31.53		c	21.6	FA	91.4	L	5						SCO01
1997 12 31.54		C	20.0	FA	91.4	L	5		0.15		10.8s	291	SCO01
1998 01 29.83		C	19.0	GA	60.0	Y	6	a240	0.3				NAK01
1998 01 31.53		c	22.7	FA	91.4	L	5						SCO01
1998 01 31.54		C	20.1	FA	91.4	L	5		0.17		18.6s	290	SCO01

Comet 103P/Hartley 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1991 09 07.02		E	9.2	AA	10	M	7	30	3.5	2/			SCO04
1991 09 08.03		E	9.5	AA	10	M	7	30	3	2/			SCO04
1991 10 10.08		E	8.7	AA	10	M	7	30	3.5				SCO04
1991 10 11.08		E	9.1	AA	10	M	7	30	3.5				SCO04
1991 10 12.08		E	8.9	AA	10	M	7	30	3.5	3/			SCO04
1997 09 22.87		S	12.6:	AC	30.5	T	10	117	> 2	1			COM
1997 09 29.24		S	13.3:	HS	25.6	L	5	169	0.8	5			BIV
1997 09 30.27		S	13.2:	HS	25.6	L	5	169	0.7	3			BIV
1997 10 05.28		S	13.6	HS	25.6	L	5	169	0.8	3			BIV
1997 10 05.75		S	13.0	HS	44.5	L	5	100	0.8	2			KAR02
1997 10 23.04	a	S	12.4	AC	40.6	L	5	114	0.8	5			BOR
1997 10 23.77		S	11.5:	AC	30.5	T	10	117	> 3	1			COM
1997 10 24.73		S	10.1	TI	20	L	4	34	2	3			KYS
1997 10 26.34	*	S	12.0	HS	25.6	L	5	84	2	2			BIV

Comet 103P/Hartley 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 26.34		S	12.5	HS	25.6	L	5	84	2	2			BIV
1997 10 26.39		S	10.4	CH	25.4	L	6	61	2.5	2			SEA01
1997 10 26.70		S	12.1:	VF	20	L	5	71	1.5				BAR06
1997 10 27.67		E	10.6:	S	6	R	6	51	0.7	1			ERO
1997 10 27.75	x	S	10.8	TJ	25.4	J	6	88	2.3	1/			BOU
1997 10 27.82		S	11.5:	AC	30.0	L	5	92	& 2	0			SCH04
1997 10 28.67		E	10.4:	S	6	R	6	51	0.5	2/			ERO
1997 10 28.74		M	10.9:	TI	35	L	5	92	2.3	2			PLS
1997 10 28.75		S	11.5:	AC	30.5	T	10	117	> 3	1			COM
1997 10 28.76	x	S	10.9	TJ	25.4	J	6	88	2.2	1/			BOU
1997 10 28.78		S	11.4	AC	30.0	L	5	92	& 2	2/			SCH04
1997 10 29.02		S	11.3	AC	40.6	L	5	114	1.5	1			BOR
1997 10 29.75	!	V	11.2	YF	36.0	T	7	a300	+ 3.2	5			MIK
1997 10 29.93		S	10.5	TI	10	B		25	1	3/			MAN02
1997 10 30.39		S	10.6	CH	25.4	L	6	61	2	2			SEA01
1997 10 30.73		M	9.9	TJ	35	L	5	66	3.8	2			HOR02
1997 10 30.74		M	10.1	TI	35	L	5	66	4.4	1/			PLS
1997 10 30.74		S	10.6:	TI	20	L	4	57	2.6	2			KYS
1997 10 30.75	x	S	10.7	TJ	25.4	J	6	72	2.4	1			BOU
1997 10 31.72		S	9.4	TI	20	L	5	48	4	1/			PLS
1997 10 31.73		0	10.5:	TI	20	L	4	57	2.5	2			KYS
1997 10 31.77		S	9.9	TJ	35	L	5	92	3.5	2			HOR02
1997 11 01.34		S	10.9	HS	25.6	L	5	42	4	3			BIV
1997 11 01.41		S	12.8	HS	25.0	L	6	57	3	2			MIY01
1997 11 01.47		C	12.8	HS	20.3	T	9	a 60	& 1.8				SUZ02
1997 11 01.73		S	9.4	TI	20	L	5	48	4.4	2			PLS
1997 11 01.75		S	9.6	TJ	20	L	5	48	3.6	1/			HOR02
1997 11 01.79	!	V	11.4	YF	36.0	T	7	a300	+ 3.2	5			MIK
1997 11 02.24		S	11.3	HS	25.6	L	5	42	4	3			BIV
1997 11 02.44	x	S	10.4	TJ	10.0	B		37	2	3			YOS02
1997 11 02.45		S	11.6	TI	20	L	7	45	2.5	1			MAT08
1997 11 03.46		S	11.2	TI	20	L	7	45	2.5	2			MAT08
1997 11 03.73	a	E	12.2	PA	30	L	5	60	5	2			NEV
1997 11 03.74		0	9.4	TI	8	R	4	17	4	2			KYS
1997 11 03.74		S	10.9	AC	15.2	L	5	42	2.5	2			MOE
1997 11 03.75	x	S	10.7	TJ	25.4	J	6	72	2.4	1/			BOU
1997 11 04.46		S	11.0	TI	20	L	7	45	2.5	3			MAT08
1997 11 04.72		E	10.0:	S	6	R	6	51	0.8	2			ERO
1997 11 05.41		C	12.1	GA	60.0	Y	6	a120	2.6			62	NAK01
1997 11 05.67		E	10.0:	S	6	R	6	51	0.8	2			ERO
1997 11 06.08		J	11.2	SC	25.4	T	5		2.34	d3	?		ROQ
1997 11 06.67		E	10.0:	S	6	R	6	51	0.8	2			ERO
1997 11 09.41		C	13.2	HS	20.3	T	9	a 60	& 1.3				SUZ02
1997 11 10.77		S	10.6:	VB	30	R	18	100	0.9	2			SHA02
1997 11 11.69		C	14.1	HS	60	P	6	a120	& 0.7	d3			PRA02
1997 11 15.71	!	V	10.4	YF	36.0	T	7	a180	+ 3.8	6			MIK
1997 11 16.51		S	10.0	TI	20.0	L	4	45	2.5	2			PEA
1997 11 17.46		S	10.0	TI	20	L	7	45	3	4			MAT08
1997 11 17.51		S	9.9	TI	20.0	L	4	45	2.8	3			PEA
1997 11 17.74	x	S	10.1	TJ	25.4	J	6	58	3.5	1/			BOU
1997 11 18.00		M	9.6	AA	20	L	6	58	3.0	3			CRE01
1997 11 18.24		J	10.1	SC	25.4	T	5		4.02	s5/	?		ROQ
1997 11 18.41	x	S	9.7	TJ	10.0	B		37	6	3			YOS02
1997 11 18.44		S	9.9	TJ	10.0	B		20	4	4			NAG08
1997 11 18.46		S	9.8	TI	20	L	7	45	3	4			MAT08
1997 11 18.74		S	10.7	AC	15.2	L	5	42	3	2			MOE
1997 11 18.79		S	9.5	TI	10.0	B		14	> 3	2			PER01
1997 11 18.80		S	9.4	TI	25.3	L	6	58	& 2.7	4			PER01
1997 11 18.98		S	9.3	TI	40.6	L	5	70	3.3	3			BOR
1997 11 19.42		C	10.8	GA	60.0	Y	6	a120	4.1			65	NAK01
1997 11 19.43		M	10.0	HS	25.0	L	6	47	3.0	4			TSU02
1997 11 19.46		S	9.8	TI	20	L	7	45	3	4			MAT08
1997 11 19.54		S	9.8	TI	20.0	L	4	45	3.2	3			PEA
1997 11 19.70		C	13.2	HS	60	P	6	a030	& 2	D5/			PRA02
1997 11 19.70		S	9.7	NP	8.0	B		20	3.5	2			OKS

Comet 103P/Hartley 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 19.73	x	S	9.9	TJ	25.4	J	6	58	3.5	2			BOU
1997 11 19.75		S	10.8	AC	15.2	L	5	42	3.5	1			MOE
1997 11 19.77		S	9.0:	TI	6	R	12	37	5.8				SVE
1997 11 19.78		S	10.1	AC	30.0	L	5	60	5	0/			SCH04
1997 11 19.80		S	9.2	TI	10.0	B		14	& 3.7	1/			PER01
1997 11 19.80		S	9.2	TI	25.3	L	6	58	& 3.7	3			PER01
1997 11 19.80		S	9.3	TI	25.3	L	6	58	& 3.0	2			VIT01
1997 11 20.39		S	9.8	AA	25.4	L	6	61	4	4			SEA01
1997 11 20.70		M	9.1	TI	10	B		25	4	2/			ZN0
1997 11 20.71		M	9.0	TI	20	L	5	48	4.2	1/			PLS
1997 11 20.71		S	9.6	NP	8.0	B		20	4.5	1			OKS
1997 11 20.72		M	9.3	TJ	20	L	5	48	5.5	2			HOR02
1997 11 20.72	!	V	10.1	YF	36.0	T	7	a300	+ 4.5	6			MIK
1997 11 20.75		S	10.1	AC	27	L	6	83	3.5	1			TOT03
1997 11 21.75		S	10.5	TT	10.0	B		25	2.1	1			HAS02
1997 11 22.15		S	9.5	AA	20.0	T	10	64	4	4/			SPR
1997 11 22.26		S	9.7	S	25.6	L	5	42	4	5			BIV
1997 11 22.74		S	9.8	VB	33	L	5	45	2.9	1			SHA02
1997 11 23.28		S	9.4	S	5.0	B		7	5	3			BIV
1997 11 23.30		S	9.2	S	25.6	L	5	42	5	4			BIV
1997 11 23.40		S	9.8	TJ	10.0	B		20	4	4			NAG08
1997 11 23.43		S	11.6:	HS	25.0	L	6	57	2	4			MIY01
1997 11 24.10		J	9.9	SC	25.4	T	5		4.58	s3	?		ROQ
1997 11 24.41		M	9.8	AA	25.4	L	6	61	5	4			SEA01
1997 11 24.50		S	9.4	TI	20	L	7	45	3	4			MAT08
1997 11 25.02		M	9.3	AA	20	L	6	47	2.9	3			CRE01
1997 11 25.07		S	9.4	AA	20.0	T	10	64	4.2	3/			SPR
1997 11 25.45		M	9.9	AA	25.4	L	6	61	5	4			SEA01
1997 11 26.52		S	9.5	TI	20.0	L	4	45	3.2	3/			PEA
1997 11 27.10		S	9.4	AA	20.0	T	10	64	4.4	3/			SPR
1997 11 27.40		S	9.8	TJ	40.0	L	6	44	3.2	3			NAG08
1997 11 27.52		S	9.4	TI	20.0	L	4	45		3			PEA
1997 11 27.98		S	9.2	TI	40.6	L	5	70	2.2	4			BOR
1997 11 28.80		S	9.3	TI	10.0	B		14	& 5.5	4			PER01
1997 11 28.80		S	9.4	TI	10.0	B		14	& 4	3/			VIT01
1997 11 29.81		S	9.1	TI	10.0	B		14	& 5.5	4/			PER01
1997 11 29.81		S	9.3	TI	10.0	B		14	& 5.5	2/			VIT01
1997 11 30.25		B	8.9	S	5.0	B		7	7	4			BIV
1997 11 30.27		B	9.2	S	25.6	L	5	42	5	4			BIV
1997 11 30.43		S	10.9	HS	25.0	L	6	57	2	4			MIY01
1997 11 30.80	!	S	9.5	VB	33	L	5	45	3.5	3			SHA02
1997 11 30.81		J	9.7	SC	25.4	T	5		4.98	s3			ROQ
1997 11 30.83		S	8.9	TI	10.0	B		14	& 5	4			PER01
1997 11 30.83		S	9.2	TI	10.0	B		14	& 5.5	3			VIT01
1997 12 01.10	a	S	9.2	AA	20.0	T	10	64	4.1	3/			SPR
1997 12 01.39		M	9.3	AA	25.4	L	6	61	6.5	4			SEA01
1997 12 01.44		S	9.1	AA	10.0	B		25					SEA
1997 12 01.48		S	9.2	TI	20	L	7	45	4	4			MAT08
1997 12 01.73	x	S	9.3	TJ	25.4	J	6	58	3.2	3			BOU
1997 12 01.85		S	8.7	TI	10.0	B		14	& 5.5	4			PER01
1997 12 01.85		S	9.2	TI	10.0	B		14	& 5.5	2/			VIT01
1997 12 02.11	a	S	9.1	AA	20.0	T	10	64	4	3/			SPR
1997 12 02.45		S	8.8	AA	8.0	B		15	5	2			SEA01
1997 12 02.48		S	9.0	TI	20	L	7	45	4	4			MAT08
1997 12 02.97		S	8.8	TI	8.0	B		20	6	4			BOR
1997 12 02.97		S	9.0	TI	40.6	L	5	70	3.2	4			BOR
1997 12 03.38		S	11.1	HS	25.0	L	6	57	1	3			MIY01
1997 12 03.39		S	9.0	TJ	10.0	B		20	5	4/			NAG08
1997 12 03.53		S	9.2	TI	20.0	L	4	45	3.5	3			PEA
1997 12 03.75		S	9.4	VB	33	L	5	45	3.3	2			SHA02
1997 12 03.78		S	8.8	S	10	B		14	3.3	2			SHA02
1997 12 04.43	x	S	9.3	TJ	10.0	B		20	5	4			YOS02
1997 12 04.48		S	9.2	AA	10.5	R	7	23	8	4			HAS08
1997 12 06.08	a	S	9.1	AA	20.0	T	10	64	4	3/			SPR
1997 12 06.67		E	8.7	S	6	R	6	51	2	3/			ERO

Comet 103P/Hartley 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 06.70		S	9.6	HS	44.5	L	5	100	1.6	2			KAR02
1997 12 07.11	a	S	9.3	AA	20.0	T	10	78	4	3/			SPR
1997 12 07.53		S	9.0	TI	20.0	L	4	45	2.8	3/			PEA
1997 12 08.97		S	8.7	TI	40.6	L	5	70	3.2	4			BOR
1997 12 12.67		C	12.2	HS	60	P	6	a 20	& 1.5	D5	& 2.5m	64	PRA02
1997 12 13.06		J	10.3	SC	25.4	T	5		4.07	s5	2.3m	74	ROQ
1997 12 14.54		S	8.9	TI	20.0	L	4	45	4	4			PEA
1997 12 14.73	!	V	9.1	YF	20.0	T	2	a120	+ 6.5	7			MIK
1997 12 14.79		S	9.7:	S	20	R	14	40	2.0	2			SHA02
1997 12 15.44		S	8.6	AA	10.0	B		25					SEA
1997 12 15.97		S	8.2	TI	8.0	B		20	5.2	5/			BOR
1997 12 15.98		M	8.5	NP	20	L	6	47	3.4	4			CRE01
1997 12 16.42		M	8.2	AA	8.0	B		15	2.4	2			SEA01
1997 12 16.47		S	8.7	TI	20	L	7	45	4	4			MAT08
1997 12 16.53		S	8.6	TI	20.0	L	4	45	3.8	4			PEA
1997 12 16.64		E	8.6	S	6	R	6	51	2	4			ERO
1997 12 16.68		S	8.9:	AA	20	L	5	33	4	4			BAR06
1997 12 16.95		B	8.6	AA	12.0	R	5	27	4.0	3			BAL02
1997 12 17.43		M	8.0	AA	8.0	B		15	4	6			SEA01
1997 12 17.53		S	8.6	TI	20.0	L	4	45	4.5	4			PEA
1997 12 17.68		M	8.9	AA	20	L	5	33	5	4			BAR06
1997 12 17.68		S	8.7	AA	8.0	B		12	6	4			BAR06
1997 12 17.68		S	8.8	AA	13.3	R	5	30	4	4			BAR06
1997 12 17.76		B	8.5	AA	20.0	L	5	55	5	4			GAS01
1997 12 17.98	s	M	8.4	NP	20	L	6	47	3.1	4/			CRE01
1997 12 18.23		S	9.0	TJ	25.6	L	5	42	3.5	4			BIV
1997 12 18.39		S	8.2	TJ	10.0	B		20	7	5			NAG08
1997 12 18.41		M	8.7	TI	25.0	L	6	47	5.0	3			TSU02
1997 12 18.47		S	8.5	TI	20	L	7	45	4	4			MAT08
1997 12 18.54		S	8.6	TI	20.0	L	4	45	4.5	5			PEA
1997 12 18.68		M	8.7	AA	20	L	5	33	5	4			BAR06
1997 12 18.68		S	8.5	AA	8.0	B		12	8	4			BAR06
1997 12 18.73		E	8.9	AA	13.3	R	5	33	5.1	3/			SCO04
1997 12 18.76		S	8.5:	AA	7.5	B		40					CHE03
1997 12 18.76		S	8.7	AC	6.0	B		20	3	0			KIS02
1997 12 18.97		S	8.1	TI	5.0	B		10	6				BOR
1997 12 18.97		S	8.2	TI	8.0	B		20	5.5	5/			BOR
1997 12 19.73	w	S	8.8	PA	30	L	5	60	4	s5			NEV
1997 12 19.78		S	8.5:	AA	12.0	R	5	35					CHE03
1997 12 19.80		S	8.5	TT	10.0	B		14	& 4	5			PER01
1997 12 19.97		S	8.1	TI	8.0	B		20	5.3	5/			BOR
1997 12 20.25		S	8.8	TJ	25.6	L	5	42	4	3			BIV
1997 12 21.40		B	10.0	HS	25.0	L	6	57	3	5			MIY01
1997 12 21.41		S	8.2	TJ	10.0	B		20	6	4/			NAG08
1997 12 21.43		S	9.5	TJ	25.4	T	6	60	2.5	3			YOS04
1997 12 21.54		S	8.6	TT	20.0	L	4	45		5			PEA
1997 12 21.64		E	8.3	S	6	R	6	51	3	5			ERO
1997 12 21.67	w	S	8.9	PA	30	L	5	60	4	4			NEV
1997 12 21.97		B	8.3	AC	10.0	B	4	20	5	2			NOW
1997 12 21.97		S	8.2	TI	5.0	B		10	6				BOR
1997 12 21.97		S	8.2	TI	8.0	B		20	5.8	5/			BOR
1997 12 22.08	a	S	8.1	AA	10.0	R	5	27	5.5	5/			SPR
1997 12 22.24		B	8.5	TJ	5.0	B		7	6	3			BIV
1997 12 22.25		B	8.6	TJ	25.6	L	5	42	4	4			BIV
1997 12 22.42		S	9.0	TJ	25.4	T	6	60	3	2			YOS04
1997 12 22.54		S	8.7	TT	20.0	L	4	45	4.6	5			PEA
1997 12 22.69		E	8.3	S	6	R	6	51	3	4			ERO
1997 12 22.98		B	8.5	S	7.0	B		10	7.5	4			DEA
1997 12 23.44		S	8.4	S	15.0	R	5	25	5	4/			NAG02
1997 12 23.54		S	8.7	TT	20.0	L	4	45	3.8	4/			PEA
1997 12 23.74		M	8.3	HV	7.0	R	7	24	3.5	4/			GRA04
1997 12 23.95		B	8.7	S	7.0	B		10	7.5	5			DEA
1997 12 24.39		S	8.3	TJ	10.0	B		20	5	4			NAG08
1997 12 24.41		M	9.2	TI	25.0	L	6	47	5.1	4	8 m	60	TSU02
1997 12 24.44		B	10.1	HS	25.0	L	6	57	4	5			MIY01

Comet 103P/Hartley 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 24.44	x	S	8.6	TJ	10.0	B		20	6	4			YOS02
1997 12 25.24		B	8.3	TJ	5.0	B		7	6	5			BIV
1997 12 25.24		B	8.6	TJ	25.6	L	5	42	5	5			BIV
1997 12 25.39		S	8.2	TJ	10.0	B		20	6	4/			NAG08
1997 12 25.43	x	S	8.5	TJ	10.0	B		20	6	3/			YOS02
1997 12 25.47		S	9.4	HS	10.5	R	7	23	5	4			HAS08
1997 12 25.55		S	8.6	TT	20.0	L	4	45	4.2	5			PEA
1997 12 25.77		S	8.9	HV	7.0	R	7	24	3.5	4			GRA04
1997 12 25.97		S	8.2	TI	8.0	B		20	5	5			BOR
1997 12 26.70		M	8.1	S	10	B		25	5	3			KUB
1997 12 26.72		S	8.3	TI	6	R	12	37	4.2	5			SVE
1997 12 26.73		S	8.3	HV	20.3	T	10	50	3.6	4			KAM01
1997 12 26.75		S	7.9	HV	7.0	R	7	24	4	4			GRA04
1997 12 26.79	s	S	8.4	TT	10.0	B		14	& 5	5			PER01
1997 12 26.80	s	S	8.5	TT	10.0	B		14	& 4	4			VIT01
1997 12 27.06		J	9.8	SC	25.4	T	5		4.89	s3/	4.3m	74	ROQ
1997 12 27.10	a	S	8.3	AA	10.0	R	5	27	5	5/			SPR
1997 12 27.29		B	8.4	TJ	5.0	B		7	7	5			BIV
1997 12 27.30		B	8.6	TJ	25.6	L	5	42	5	5	0.1	70	BIV
1997 12 27.40		S	7.7	TJ	25.4	T	6	32	6.5	6			YOS04
1997 12 27.42		B	10.2	HS	25.0	L	6	57	4	4			MIY01
1997 12 27.43		S	8.1	S	15.0	R	5	25	5	5			NAG02
1997 12 27.43		S	8.9	HS	10.5	R	7	23	5	4			HAS08
1997 12 27.57		S	8.4	TT	8.0	B		20	7.4	4			PEA
1997 12 27.76		S	7.9	S	8.0	B		20	7	3			SHA02
1997 12 28.24		B	8.4	TJ	5.0	B		7	6	5			BIV
1997 12 28.25		B	8.6	TJ	25.6	L	5	42	5	5	0.1	55	BIV
1997 12 28.42		S	8.0	S	15.0	R	5	25	5	4/			NAG02
1997 12 28.54		S	8.4	TT	8.0	B		20	6.7	4/			PEA
1997 12 28.72	!	V	8.8	YF	36.0	T	7	a120	+ 9.0	6	&12 m	70	MIK
1997 12 28.76		S	8.4	HV	7.0	R	7	24	4.5	4			GRA04
1997 12 28.97		S	8.2	TI	8.0	B		20	6.0	5			BOR
1997 12 29.42		S	8.5	AA	8.0	B		15	2.5	4			SEA01
1997 12 29.53		S	8.6	TT	8.0	B		20					PEA
1997 12 29.69		M	8.2	TI	10	B		25	7.5	2			ZNO
1997 12 29.75		S	8.2	HV	7.0	R	7	24	5	4			GRA04
1997 12 30.42		S	7.9	AA	5.0	B		10	3.5	2			SEA01
1997 12 30.68		S	8.3	HS	6.0	B		20	5	4			SAR02
1997 12 30.69		M	8.0	TI	10	B		25	8	2			ZNO
1997 12 30.70		M	8.0	TI	8.0	B		10	9	2			PLS
1997 12 30.72		M	7.7	TT	8.0	B		10	10	2			HOR02
1997 12 30.72		S	8.1	AC	5.0	B		10	4	2/			SAN07
1997 12 30.74		S	8.2	HV	7.0	R	7	24	5	4			GRA04
1997 12 30.83		S	8.6	TI	6	R	12	37	3.8	4/			SVE
1997 12 31.39		S	8.5	TJ	8.0	B		11	5	3/			NAG08
1997 12 31.41		S	8.3	S	15.0	R	5	25	6	4/			NAG02
1997 12 31.54		S	8.6	TT	8.0	B		20	8	4			PEA
1997 12 31.71		S	8.2	TI	11	L	7	32	4.1	2/			KYS
1997 12 31.72		O	7.7	TI	5.0	B		7	6	3			KYS
1997 12 31.75		S	9.0	S	33	L	5	60	2.7	4			SHA02
1997 12 31.76		S	7.6:	VB	8.0	B		10	3.4	3			SHA02
1997 12 31.79		S	8.6	TT	10.0	B		14	& 5	4/			PER01
1997 12 31.79		S	8.7	TT	10.0	B		14	& 5.5	5			VIT01
1997 12 31.98		S	8.3	TI	8.0	B		20	5.5	5			BOR
1998 01 01.26		B	8.4	TJ	5.0	B		7	5	5			BIV
1998 01 01.42		S	8.1	AA	8.0	B		15	4.5	3			SEA01
1998 01 01.54		S	8.4	TT	8.0	B		20	9	4			PEA
1998 01 01.72		M	7.9	TI	20	L	4	34	4.7	2			KYS
1998 01 01.72		O	7.7	TI	5	R		7	7	2			KYS
1998 01 01.75		S	8.2	AC	20.0	L	4	42	8	5/	&0.1	70	SCH04
1998 01 01.76		S	8.5	TI	6	R	12	37	4.1	6			SVE
1998 01 01.79		B	8.4	TI	5.6	R	14	40	5				DEM
1998 01 01.81		S	8.6	S	10	B		25	6.4				MAN02
1998 01 01.99		M	8.6	NP	20	L	6	47	5.9	5/	?0.1	280	CRE01
1998 01 02.39		S	8.3	S	15.0	R	5	25	5	5			NAG02

Comet 103P/Hartley 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 02.39		S	8.6	TJ	10.0	B		20	5	5/			NAG08
1998 01 02.46		S	8.1	AA	8.0	B		15	3.5	3			SEA01
1998 01 02.55		S	8.4	TT	8.0	B		20	7	4			PEA
1998 01 02.78		B	8.2	TI	5.6	R	14	40	5				DEM
1998 01 03.46		S	8.7:	TJ	46.0	L	5	69	3.5	4			YOS04
1998 01 03.56		S	8.4	TT	8.0	B		20	8	4/			PEA
1998 01 07.38		S	9.4	HS	25.0	L	6	57	2	3			MIY01
1998 01 10.74	!	V	8.7	YF	36.0	T	7	a120	+ 7.6	6			MIK
1998 01 11.73		S	9.0:	AA	11	L	7	50	4.5	2			BAR06
1998 01 12.70		S	8.9	AA	11	L	7	50	5.5	2/			BAR06
1998 01 13.70		S	8.9	AA	11	L	7	50	5	2/			BAR06
1998 01 14.77		S	9.1	TI	6	R	12	37	7.4	6			SVE
1998 01 15.71		M	8.4	TI	10	B		25	8	2/			ZNO
1998 01 15.72		S	7.8	TT	8.0	B		10	11	1/			HOR02
1998 01 15.72		S	8.9	AA	11	L	7	50	5	2			BAR06
1998 01 15.80		S	9.0	TT	10.0	B		14	& 5	5/	&0.15	65	PER01
1998 01 16.42	x	S	8.9	TJ	10.0	B		20	5	3			YOS02
1998 01 16.47		S	8.6	S	15.0	R	5	25	5	4			NAG02
1998 01 16.80		S	8.8	TT	10.0	B		14	& 7	4			PER01
1998 01 16.80		S	9.0	TT	10.0	B		14	& 7	2			VIT01
1998 01 17.71		M	8.1	TI	8.0	B		10	8	2/			ZNO
1998 01 17.71		M	8.7	S	10	B		25	6	3			KUB
1998 01 17.73		M	8.5	TI	20	N	4	34	5.8	3			KYS
1998 01 17.74		O	8.5	TI	5	R		7	7	2			KYS
1998 01 17.74		S	8.4	HV	20.3	T	10	50	4.9	4			KAM01
1998 01 17.74		S	8.9	TI	6	R	12	37	7.2	4			SVE
1998 01 17.75		M	7.9	TT	8.0	B		10	12	2			HOR02
1998 01 17.75		M	8.2	TI	8.0	B		10	9	2/			PLS
1998 01 17.76		M	8.6	TI	10	B		25	1.5	3			KUJ
1998 01 18.42		S	8.4	S	15.0	R	5	25	5	5			NAG02
1998 01 18.70		S	8.5	AA	5	R	7	20	10	2			BAR06
1998 01 18.70		S	8.6	AA	11	L	7	32	9	3			BAR06
1998 01 18.70		S	8.7	AA	11	L	7	50	8	3			BAR06
1998 01 18.71		M	8.0	TT	8.0	B		10	10	2			HOR02
1998 01 18.73		M	7.7	TI	8.0	B		10	12	2/			PLS
1998 01 18.75		S	8.5	TI	8.0	B		10	5	3			POD
1998 01 19.48		S	8.6	TI	20	L	7	45	4	4			MAT08
1998 01 19.73		S	8.8	AA	11	L	7	50	7	3			BAR06
1998 01 19.77		S	8.0	AC	20.0	L	4	42	6	4/			SCH04
1998 01 20.14		S	8.0	AA	20.0	T	10	64	4.5	4/			SPR
1998 01 20.42		S	9.0	TJ	10.0	B		20	5	4			NAG08
1998 01 20.48		S	8.6	TI	20	L	7	45	4	4			MAT08
1998 01 20.78		S	8.4	HV	7.0	R	7	24	5	3			GRA04
1998 01 20.88		M	8.8	NP	10.0	R	5	20	6	3			MAR02
1998 01 21.12		S	8.0	AA	8.0	R	5	27	4	4			SPR
1998 01 21.45		S	8.9	S	15.0	R	5	25	4	4/			NAG02
1998 01 21.81		S	8.6	TT	10.0	B		14	& 7	5			PER01
1998 01 21.81		S	8.6	TT	10.0	B		14	&10	3			VIT01
1998 01 21.90		M	8.6	NP	10.0	R	5	20	7	3/			MAR02
1998 01 22.11		S	8.0	AA	10.0	R	5	27	4	4			SPR
1998 01 22.66		B	8.9	AA	12.0	R	5	35	5	2/			SIE
1998 01 22.68		B	8.9	AA	12.0	L	5	27	5	3			GAS01
1998 01 22.71		S	9.0	AA	11	L	7	32	4.5	2			BAR06
1998 01 22.75	x	S	8.6	TJ	25.4	J	6	47	4.5	3			BOU
1998 01 22.85		S	8.5	NP	10.0	R	5	20	6	3			SAN04
1998 01 22.86		M	8.3	NP	10.0	R	5	20	10	4/			MAR02
1998 01 23.44	x	S	9.2	TT	10.0	B		20	6	3			YOS02
1998 01 23.70		B	8.6	AA	12.0	R	5	27	5	3			CHE03
1998 01 23.71		S	8.9	AA	5.0	B		20	6	2			BAR06
1998 01 23.71		S	9.1	AA	11	L	7	50	5.5	3			BAR06
1998 01 24.45		S	8.3	TJ	25.4	T	6	32	6	5			YOS04
1998 01 24.45		S	8.9	S	15.0	R	5	25	4	4			NAG02
1998 01 24.71		S	9.1	AA	11	L	7	32	4.5	3			BAR06
1998 01 24.81		S	8.7	TT	10.0	B		14	& 4.5	4			PER01
1998 01 24.81		S	9.0	TT	10.0	B		14	& 6	3/			VIT01

Comet 103P/Hartley 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 25.75		S	8.3	TT	8.0	B		10	9	2			HOR02
1998 01 25.76		M	9.7	TI	10	B		25	5	2			KUJ
1998 01 25.77	x	S	8.6	TJ	25.4	J	6	47	4.5	3			BOU
1998 01 26.71		S	8.9	AA	11	L	7	32	4.5	3			BAR06
1998 01 26.73		S	8.3	TI	8.0	B		10	11	1/			PLS
1998 01 26.74		M	8.4	TI	10	B		25	8	3			ZNO
1998 01 26.77		S	8.8	AA	15.2	L	5	42	4.5	4			MOE
1998 01 26.80		S	8.7	AC	30.5	T	10	54	& 4	3			COM
1998 01 27.72		S	8.7	AA	11	L	7	32	4.5	3			BAR06
1998 01 27.75		S	8.8	HS	6.0	B		20	6	2			SAR02
1998 01 27.81		S	8.6	TT	10.0	B		14	& 7	4/			PER01
1998 01 28.76		B	8.9	TT	5.0	B		10	2.0	3			HAS02
1998 01 29.46	x	S	9.1	TJ	10.0	B		20	5	3			NAG08
1998 01 29.50		S	9.6	HS	10.5	R	7	23	3	3			HAS08
1998 01 29.52		S	9.0	S	15.0	R	5	25	5	4			NAG02
1998 01 29.82		S	8.6	TT	10.0	B		14	& 6	4/			PER01
1998 01 29.82		S	8.8	TT	10.0	B		14	& 5	3			VIT01
1998 01 29.83	!	V	9.4	YF	20.0	T	2	a300	+ 7.9	6	&15	m 60	MIK
1998 01 30.83		S	8.3	HV	20.3	T	10	50	4.1	4/			KAM01
1998 01 31.11		S	8.8	AA	10.0	R	5	27	4	4			SPR
1998 01 31.52	x	S	8.5	TJ	46.0	L	5	41	7	4/			YOS04
1998 01 31.76	x	M	8.8	TJ	25.4	J	6	47	4	3			BOU
1998 01 31.78		S	8.9	AA	15.2	L	5	42	5	4			MOE
1998 01 31.91		S	8.6	S	8.0	B		11	7	2			GON05

Comet 104P/Kowal 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 08 05.95		C	16.6	HS	60	P	6	a 60			20 s	223	GAL03
1997 08 24.93		C	15.4	HS	60	P	6	a360			1 m	222	GAL03
1997 10 29.88	!	V	13.9	YF	36.0	T	7	a300	+ 1.6	7			MIK
1997 10 30.78		S	14.1	HS	35	L	5	207	0.8	2			PLS
1997 11 05.42		C	14.3	GA	60.0	Y	6	a120	1.3				NAK01
1997 11 20.41		C	13.6	GA	60.0	Y	6	a120	2.0				NAK01
1997 11 20.88		C	14.1	HS	60	P	6	a090	< 0.5	d5			PRA02
1997 12 01.78		M	13.5	GA	25.4	J	6	150	1.1	2			BOU
1997 12 04.41		C	13.4	GA	60.0	Y	6	a120	2.5		3.6m	66	NAK01
1997 12 06.75		S	13.1	HS	44.5	L	5	100	1.2	3			KAR02
1997 12 24.42		C	13.2	GA	60.0	Y	6	a120	2.3				NAK01
1997 12 27.56	a	S	13.5	VN	41	L	4	90	1.0	2			PEA
1997 12 28.56	a	S	13.4	VN	41	L	4	90	0.9	2			PEA
1997 12 28.79	!	V	12.9	YF	36.0	T	7	a300	+ 3.2	4			MIK
1997 12 29.72		S	13.3	HS	15	R	13	80	1.1	2			ZNO
1997 12 30.72		S	13.2	HS	15	R	13	80	1.5	2			ZNO
1997 12 31.78		S	13.7:	VB	30	R	18	170	0.6	2			SHA02
1998 01 17.79		S	12.9	HS	35	L	5	158	1.3	1/			HOR02
1998 01 22.78		S	12.9	GA	25.4	J	6	100	1.4	2			BOU
1998 01 24.41	x	S	13.4	HS	46.0	L	5	150	0.8	3			YOS04
1998 01 25.79		S	13.0	AC	25.4	J	6	150	1.2	2			BOU
1998 01 29.43		C	13.8:	GA	60.0	Y	6	a120	2.1				NAK01
1998 01 31.76		S	13.0	GA	25.4	J	6	100	1.1	2			BOU

Comet 116P/Wild 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 05 31.73	a	C	14.2	GA	60.0	Y	6	a120	1.35		5.5m	261	NAK01
1997 06 29.71	a	C	13.8	GA	60.0	Y	6	a120	1.5		6.3m	262	NAK01
1997 07 05.65	a	C	13.7	GA	60.0	Y	6	a120	1.6		6.8m	264	NAK01
1997 08 01.62	a	C	14.2	GA	60.0	Y	6	a120	1.25		4.2m	272	NAK01
1997 08 27.50		C	14.6	GA	60.0	Y	6	a120	1.1				NAK01
1997 10 23.74		S[	12.5	HS	44.5	L	4	230	! 1				SAR02

Comet 117P/Helin-Roman-Alu 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 07 05.65	a	C	16.9	GA	60.0	Y	6	a240	0.5		2.0m	261	NAK01
1997 08 01.67	a	C	16.7	GA	60.0	Y	6	a240	0.45		1.0m	277	NAK01
1997 10 23.75		S[	13.2	HS	44.5	L	4	230	! 1				SAR02
1997 10 29.43	a	C	16.8	GA	60.0	Y	6	a240	0.5				NAK01

Comet 118P/Shoemaker-Levy 4

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 01 02.92		S	12.8:	AC	30.5	T	10	120	& 2	3			COM

Comet 119P/Parker-Hartley

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 31.49		c	22.4	FA	91.4	L	5						SC001
1997 12 31.50		C	19.9	FA	91.4	L	5		0.10		46.2s	296	SC001
1998 01 31.52		c	22.6	FA	91.4	L	5		0.18		54.6s	302	SC001

Comet 121P/Shoemaker-Holt 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1996 03 09.83		S	13.5	HS	44.0	L	5	156	0.2	4			HAS02

Comet 128P/Shoemaker-Holt 1

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 09 02.01		C	17.5	HS	60	P	6	a360			25 s	265	GAL03
1997 10 23.93		S[	14.5	HS	44.5	L	4	230	! 1				SAR02
1997 11 02.70		C	16.1	GA	60.0	Y	6	a120	0.65		2.8m	264	NAK01
1997 11 09.69		C	15.7	GA	60.0	Y	6	a120	0.7			263	NAK01
1997 11 23.62		C	15.2	GA	60.0	Y	6	a120	0.95		1.8m	264	NAK01
1997 12 21.59		C	15.5	GA	60.0	Y	6	a120	0.8				NAK01
1997 12 24.60		C	15.5	GA	60.0	Y	6	a120	0.8				NAK01
1997 12 27.20		C	16.0	FA	91.4	L	5		0.53		168.6s	272	SC001
1997 12 27.20		c	19.8	FA	91.4	L	5						SC001
1998 01 29.51		C	15.8	GA	60.0	Y	6	a240	0.9				NAK01

Comet 129P/Shoemaker-Levy 3

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 12.79		C	18.5	GA	60.0	Y	6	a240	0.25				NAK01
1997 11 03.77		C	18.6:	GA	60.0	Y	6	a240	0.3				NAK01
1997 11 09.80		C	18.4	GA	60.0	Y	6	a240	0.35			287	NAK01
1997 12 04.74		C	17.1	GA	60.0	Y	6	a240	0.55		1.3m	282	NAK01
1997 12 24.73		C	16.7	GA	60.0	Y	6	a240	0.55		1.1m	284	NAK01
1998 01 07.08		C	16.0	HS	60	P	6	a 90	& 0.25	d8	< 1 m	258	PRA02
1998 01 17.97		C	15.6	HS	60	P	6	a 60	& 0.25	d6/			PRA02
1998 01 27.86		S	14.2	HS	35	L	5	237	0.6	2			HOR02
1998 01 29.57		C	16.2	GA	60.0	Y	6	a120	0.6				NAK01

Comet 131P/Mueller 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 05.51		C	17.7	GA	60.0	Y	6	a240	0.4			150	NAK01
1997 12 04.48		C	17.8	GA	60.0	Y	6	a240	0.65	1			NAK01
1997 12 31.18		c	23.0	FA	91.4	L	5						SC001
1997 12 31.20		C	20.5	FA	91.4	L	5		0.22		12.6s	118	SC001

Comet 132P/Helin-Roman-Alu 2

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 05.55		C	15.6	GA	60.0	Y	6	a120	1.0				NAK01
1997 11 23.57		C	16.2	GA	60.0	Y	6	a120	0.5				NAK01
1997 12 24.55		C	16.8	GA	60.0	Y	6	a240	0.55			60	NAK01
1997 12 31.22		c	20.3	FA	91.4	L	5						SC001
1997 12 31.24		C	17.6	FA	91.4	L	5		0.22		63.0s	64	SC001

Comet 132P/Helin-Roman-Alu 2 [cont.]

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 01 29.49		C	17.6	GA	60.0	Y	6	a240	0.45				NAK01

Comet 134P/Kowal-Vavrova

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 29.54		C	21.0	FA	91.4	L	5						SC001
1997 12 31.48		C	21.0	FA	91.4	L	5						SC001
1998 01 31.48		c	22.3	FA	91.4	L	5						SC001
1998 01 31.49		C	20.0	FA	91.4	L	5		0.15		16.2s	295	SC001

Comet P/1997 C1 (Gehrels)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 31.52		c	23.7	FA	91.4	L	5						SC001
1997 12 31.53		C	22.1	FA	91.4	L	5		0.08		34.8s	299	SC001

Comet P/1997 G1 (Montani)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 12 27.81		C	19.1	GA	60.0	Y	6	a480	0.3		1.0m	295	NAK01
1998 01 31.52		c	22.9	FA	91.4	L	5		0.18		94.8s	297	SC001

Comet P/1997 T3 (Lagerkvist-Carsenty)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 10 12.72	a	C	18.9:	GA	60.0	Y	6	a240		8/			NAK01
1997 10 27.63		C	19.5	GA	60.0	Y	6	a240		9			NAK01
1997 12 04.53		C	19.4	GA	60.0	Y	6	a240	0.23	8			NAK01
1997 12 28.12		c	22.2	FA	91.4	L	5						SC001
1997 12 28.14		C	20.4	FA	91.4	L	5		0.17		13.8s	242	SC001

Comet P/1997 V1 (Larsen)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1997 11 05.48		C	16.6	GA	60.0	Y	6	a240	0.4			247	NAK01
1997 11 07.63		C	16.6	GA	60.0	Y	6	a240	0.75		1.1m	241	NAK01
1997 11 23.50		C	16.7	GA	60.0	Y	6	a240	0.55			240	NAK01
1997 12 04.45		C	16.7	GA	60.0	Y	6	a240	0.55		1.2m	254	NAK01
1997 12 24.44		C	17.1	GA	60.0	Y	6	a240	0.45				NAK01
1997 12 28.11		c	20.8	FA	91.4	L	5						SC001
1998 01 30.43		C	17.4:	GA	60.0	Y	6	a240	0.5				NAK01

Φ Φ Φ

DESIGNATIONS OF RECENT COMETS

Listed below, for handy reference, are the last 5 comets to have been given designations in the new system. The name, preceded by a star (⋆) if the comet was a new discovery (compared to a recovery from predictions of a previously-known short-period comet). 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* (4-digit number) containing the discovery/recovery or permanent-number announcement. Not included below are numerous recently-discovered comets observed only with the ESA/NASA Solar and Heliospheric Observatory (SOHO) spacecraft — and seen only close to the sun with the SOHO instruments — that are presumed to be Kreutz sungrazers that are no longer in existence. Note that 132P and 133P were assigned to P/1997 N2 and P/1996 N2, respectively. [This list updates that in the Oct. 1997 issue, p. 286.]

	New-Style Designation	*P*	*T*	*q*	*IAUC*
⋆	C/1997 T1 (Utsunomiya)		12/10/97	1.36	6751
⋆	P/1997 T3 (Lagerkvist-Carsenty)	17.3	3/10/98	4.2	6754
⋆	P/1997 V1 (Larsen)	11.0	9/15/97	3.3	6767
	134P/1997 X2 (Kowal-Vávrová)	15.6	11/18/98	2.6	6784
	135P/1998 B1 (Shoemaker-Levy 8)	7.5	12/10/99	2.7	6821