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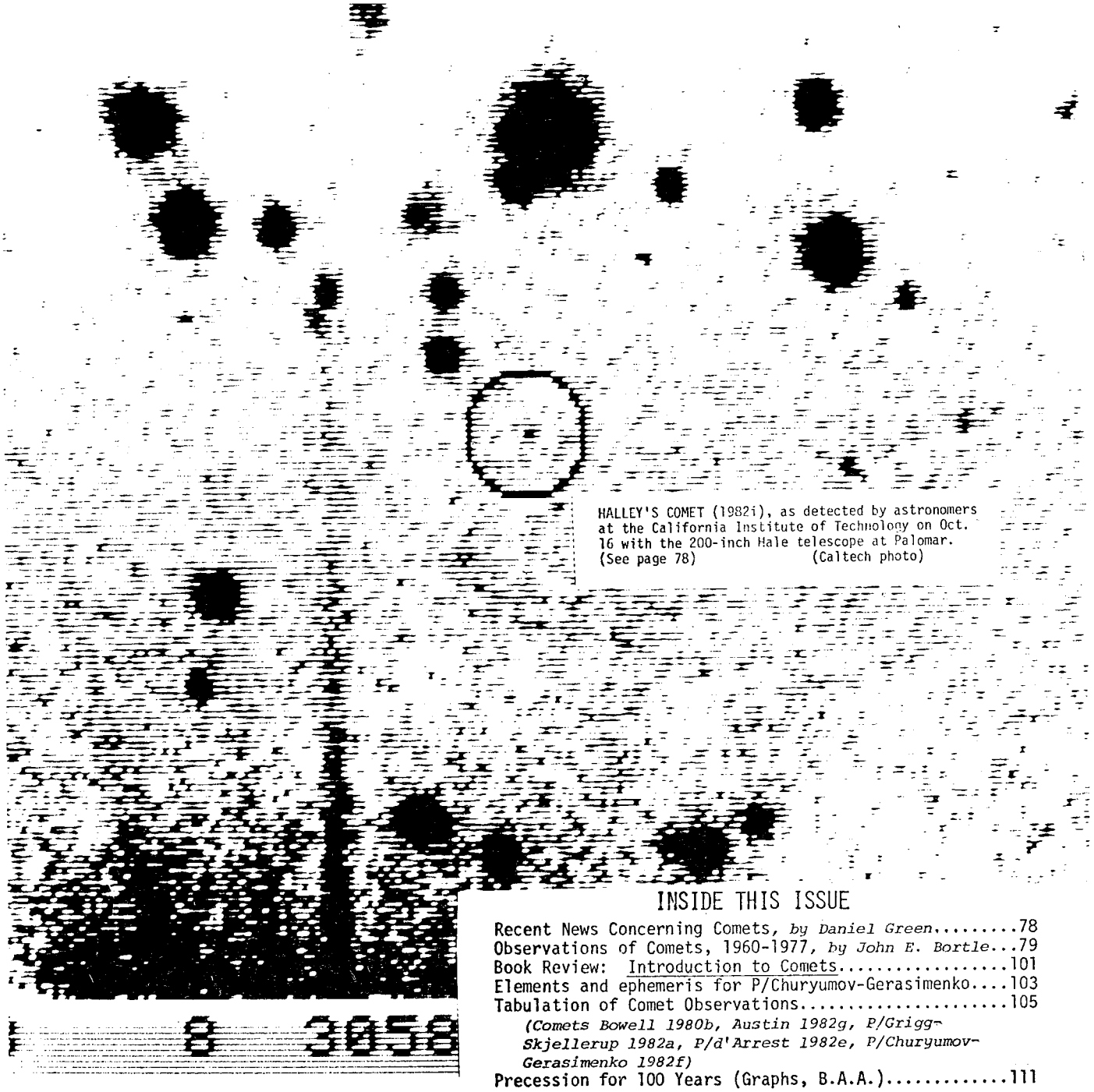

HALLEY'S COMET (1982i), as detected by astronomers at the California Institute of Technology on Oct. 16 with the 200-inch Hale telescope at Palomar. (See page 78) (Caltech photo)

INSIDE THIS ISSUE

THE INTERNATIONAL COMET QUARTERLY (ICQ) is a non-profit journal devoted to news and observation of comets. Issues are published 4 times per year (January, April, July, and October). The ICQ is published by the Department of Physics and Astronomy at Appalachian State University and is mailed from Boone, North Carolina, U.S.A.

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All cometary observations should be sent to C. S. Morris; Prospect Hill Rd.; Harvard, MA 01451, U.S.A. Back issues are available from Dr. T. L. Rokoske, Dept. of Physics and Astronomy; A.S.U.; Boone, NC 28608, U.S.A.

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RECENT NEWS CONCERNING COMETS

The world was recently informed of the apparent recovery of periodic comet Halley in October. A group using the 200-inch Palomar telescope of the California Institute of Technology have claimed recovery of this most famous comet based upon observations on only one night (Oct. 16) with a detector known as the Prime Focus Universal Extragalactic Instrument. This detector was developed by James E. Gunn and James A. Westphal at Caltech, and consists basically of an 800-by-800-unit array of supersensitive electronic light detectors called a CCD (charge-coupled device). The comet cannot be detected yet by the best photographic methods due to its faintness (magnitude 24 or fainter).

The photograph on the cover of this issue is one of the six frames that were taken at Palomar; the six exposures, each of 480-s duration, were taken some 10 to 15 min apart. The comet moved with the expected daily motion in the expected direction, as ascertained from elements and an ephemeris by Donald Yeomans.

The comet, designated comet 1982i, is at the incredible distance of 11 AU; only comet Stearns 1927 IV was observed further from the sun. P/Halley is thus some 1.5 AU beyond Saturn's orbit, and is now located in Canis Minor as seen from earth. The comet will be at perihelion in February 1986, but will not be seen by ama-

(Continued on page 102)

OBSERVATIONS OF COMETS, 1960 - 1977

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FOREWARD.

As a contributor to these pages for some time and as author of "Comet Digest" since 1977, readers of the ICQ may have at least some familiarity with my comet observations. My personal observational records long predate either of these reviews, extending back more than a quarter of a century. In all, I have made observations of roughly 90 comets in the period 1957-82. These data are given in this issue, following a descriptive introduction.

OBSERVATIONAL METHODOLOGY.

Brightness determinations were always made by comparison with extra-focal images of nearby stars of known magnitude. Of inestimable value in my visual photometric measures of comets has been my twenty-year affiliation with the American Association of Variable Star Observers. To date, I have made upwards of 70,000 magnitude determinations of variable stars. This organization has also proved of immense value in supplying me with hundreds of charts containing comparison star sequences. It is thus rarely a problem for me to obtain suitable comparison stars in the immediate vicinity of any comet.

In the determination of the total integrated magnitude of a comet, I have consistently employed the method outlined by J. B. Sidgwick, except for those occasions when an extremely steep gradient in the coma's brightness was encountered; on those occasions, the methods proposed by N. T. Bobrovnikoff or M. Beyer, which are very similar and more suited to determining a comet's brightness in such situations, were resorted to. All are extra-focal methods of long standing (cf., e.g., Morris 1980). However, it has been my experience that the latter two methods consistently give magnitude values 0.1 mag fainter than the values of the Sidgwick method. When reducing my photometric data, this fact should always be noted and appropriate corrections applied.

With regard to instrumentation, whenever possible, I employed the instrument allowing the greatest observational time-span for a given comet. For the brighter comets, this most often meant binoculars with apertures in the 5- to 8-cm range. Throughout my observing career, I have found these to be the most suitable type of instrumentation for cometary photometry. In the cases of much fainter comets, a 32-cm f/5.6 Newtonian reflector has been used since 1971.

Instrument magnification has also been carefully regulated. Eyepieces producing an exit-pupil of approximately 5 mm were generally utilized, unless the comet was very small and faint. This corresponds to a magnification of 2x per cm of aperture. It was determined empirically that this magnification-to-aperture ratio would, in almost all cases, produce the largest and most easily visible image of the comet.

Coma diameters were determined by the methods of drift-transit-timing or comparison with pairs of stars of known angular separation in the field of the comet. Degree of condensation, while rather subjective, serves at least to indicate how intensely the coma's light seemed to be concentrated and how the coma's appearance changed with time and heliocentric distance.

THE OBSERVATIONS.

All of the following data is unadjusted from actual observation, except in cases where correction of differential atmospheric extinction between the comet and comparison stars was deemed necessary. This situation generally occurred only for bright comets near their perihelia, when ob-

OBSERVATIONS OF COMETS, 1960 - 1977

servations could be made only at low altitude. In such cases, the following formula was applied:

Correction = 0.282 mag/airmass. However, only in a relatively few instances was any correction necessary.

The observations are presented below of comets observed through 1977. Observations made after 1977 have been published in the ICQ during the past 4 years. The tabulation format is the same as the normal ICQ format for cometary observations. The description of each tabulated column is given on page 105 of this issue. Note that there are three new references for comparison stars in the following data: AE = planetary magnitudes taken from the American Ephemeris and Nautical Almanac; AN = those sequences described by M. Beyer in his articles on cometary brightness in Astronomisches Nachrichten; and NS = from "Magnitudes and Colors of Stars North of +80°", by Seares, Ross and Joyner (1941, Carnegie Institution Publication 532).

PHOTOMETRIC FORMULAE.

At the conclusion of the listings of observational data are presented analyses of the brightness data. Only one photometric value per night was utilized.

A TRS-80 microcomputer was programmed to perform a least-squares regression analysis of the data to find the best fit to the standard formula:

$$m_t = H_o + 5 \log \Delta + 2.5n \log r,$$

where m_t is the total magnitude, H_o is the absolute magnitude, and Delta and r are the comet's geocentric and heliocentric distances, respectively. All values were automatically corrected to a standard aperture of 6.78-cm, following the formula proposed by Morris (1973). Additionally, a correction of -0.1 mag was applied to all values obtained by the Bobrovnikoff or Beyer methods, to bring them into accordance with the majority made following the Sidgwick method.

In cases where too few data existed or the range in heliocentric distance was small, the value of "n" was assumed to be 4. Results from this assumption appear under the heading "H_{10}".

[Editors' note: The ICQ encourages the publication of all comet observations, particularly those by observers with long runs of data. The parametric results derived from such data can be quite useful. However, care must be taken in the use of such photometric parameters, particularly those that are based on few observations or a small arc of orbit. Results such as those obtained from Mr. Bortle's observations may differ from those derived from other sets of data.]

REFERENCES

Morris, C. S. (1973). PASP 85, 470.
Morris, C. S. (1980). ICQ 2, 69.

Comet Burnham (1960 II = 1959k)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1960 04 19.37	S	3.5:		0.0	E		1	1.5	4			BOR
1960 04 20.37	S	3.5:		0.0	E		1	1.5	5			BOR
1960 04 21.37	S	3.8:		0.0	E		1	1.5	4			BOR
1960 05 03.12	S	4.2		0.0	E		1	5	4			BOR
1960 05 04.11	S	5.1		0.0	E		1		3/			BOR
1960 05 05.08	S	5.9		6.0	R	15	22	5	3/			BOR
1960 05 07.08	S	6.5		6.0	R	15	22	3				BOR

Comet Humason (1962 VIII = 1961e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1962 08 23.11	S	5.8		5.6	B		7	20	6	&1	25	BOR

Comet Ikeya (1963 I = 1963a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1963 03 15.01	B	4.6		5.0	B		10	& 5				BOR
1963 03 16.01	B	4.7		5.0	B		10					BOR
1963 03 23.02	B	5.2		5.0	B		10					BOR
1963 03 24.01	B	5.3		5.0	B		10					BOR

Comet Tomita-Gerber-Honda (1964 VI = 1964c)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1964 07 06.08	S	5.3		5.0	B		10	2	7			BOR
1964 07 07.07	S	5.4		5.0	B		10	3	7/	1	85	BOR

Comet Ikeya (1964 VIII = 1964f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1964 08 04.34	S	4.7		5.0	B		10	8	5	0.75	259	BOR
1964 08 05.35	S	4.6		12.5	R	5	20	7.5	6			BOR
1964 08 06.35	S	4.4		5.0	B		10	9	4			BOR

Comet Everhart (1964 IX = 1964h)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1964 08 28.04	S	7.7:		5.0	B		10	12	2/			BOR
1964 09 02.03	S	8.3	AC	15.0	L	8	50	7	4			BOR
1964 09 03.07	S	8.3	A	15.0	L	8	50	5	2/			BOR

Comet Ikeya-Seki (1965 VIII = 1965f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1965 09 26.45	S	6.5	Y	5.0	B		10	3	5			BOR
1965 09 27.39	S	6.5	Y	12.5	R	5	18	3	6			BOR
1965 09 28.40	S	6.2	Y	5.0	B		10	3	7/	0.1	275	BOR
1965 10 02.40	S	5.5	Y	5.0	B		10	2.5	6	0.1	261	BOR
1965 10 03.40	S	5.1	Y	5.0	B		10	5	7	?		BOR
1965 10 04.40	S	4.9	Y	5.0	B		10	4	8	0.1	250	BOR
1965 10 05.40	S	4.8	Y	5.0	B		10	3.5	8	0.3	261	BOR
1965 10 13.43		3 :		12.5	R	5	18	2	8/			BOR
1965 10 29.43	S	3.4	Y	12.5	R	5	18	1.5	9	19	267	BOR
1965 10 30.43	S	3.9	Y	12.5	R	5	18	1.5	8	19	268	BOR
1965 10 31.43	S	3.9	Y	5.0	B		10	1.5	8	20	266	BOR
1965 11 01.42	S	4.2	Y	5.0	B		10	1.5	8	18	270	BOR
1965 11 02.42	S	4.7	Y	5.0	B		10	1.5	7/	21	280	BOR
1965 11 05.42	S	4.8	Y	5.0	B		10	1.5	7	20	275	BOR
1965 11 06.42	S	4.8	Y	5.0	B		10	1.5	7	25	276	BOR
1965 11 15.43	S	6.3	Y	5.0	B		10	2.5	4	2.5	271	BOR
1965 11 28.43	S	7.3	Y	12.5	R	5	18	6	2			BOR
1965 11 29.43	S	7.5	Y	5.0	B		10	6	2	0.7	290	BOR

Comet Ikeya-Everhart (1966 IV = 1966d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1966 09 17.02	S	8.4	S	15.0	L	4	18	3.5	3			BOR

Comet Kilston (1966 V = 1966b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1966 08 14.11	S	10.1	AC	15.0	L	4	18	2	8			BOR
1966 08 18.06	S	10.2	AC	15.0	L	8	50	1	7/			BOR
1966 08 19.05	S	10.3	AC	15.0	L	8	50	0.8	7			BOR
1966 08 21.05	S	10.3	AC	15.0	L	8	50		7			BOR
1966 08 24.06	S	10.2	AC	15.0	L	8	50	0.8	7			BOR
1966 08 26.05	S	10.1	AC	15.0	L	4	18	1	7			BOR
1966 08 27.06	S	10.2	AC	15.0	L	8	50	1	7			BOR
1966 08 28.06	S	10.2	AC	15.0	L	8	50	0.7	7			BOR
1966 09 06.03	S	9.5	AC	15.0	L	8	50	1.4	8			BOR
1966 09 07.03	S	9.6	AC	15.0	L	8	50	1.5	8/			BOR
1966 09 11.03	S	10.1	AC	15.0	L	8	50	1	8			BOR
1966 09 17.03	S	10.1	AC	15.0	L	4	33	1.8	9			BOR
1966 09 24.06	S	10.3	AC	15.0	L	8	50	1	6/			BOR
1966 09 25.01	S	10.2	AC	15.0	L	8	50	1.3	8			BOR
1966 09 27.01	S	10.0	AC	15.0	L	8	50	1	8			BOR

Comet Rudnicki (1967 II = 1966e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1966 11 14.08	S	8.7:	S	15.0	L	4	20	& 4	1			BOR
1966 12 04.02	S	8.0	AC	5.0	B		10	10	0			BOR
1966 12 05.01	S	7.9	AC	5.0	B		10	10	1/			BOR
1966 12 12.00	S	7.2	AC	5.0	B		10	9	3			BOR
1966 12 17.00	S	7.3	S	5.0	B		10	5	4/			BOR

Comet Ikeya-Seki (1968 I = 1967n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 01 06.45	S	8.8	AC	15.0	L	4	22	2	2			BOR
1968 01 09.45	S	8.5	AC	15.0	L	4	22	2	3			BOR
1968 01 12.45	S	8.6	AC	15.0	L	4	22		5			BOR
1968 01 19.45	S	8.5	AC	15.0	L	4	33	2	4			BOR
1968 01 22.45	S	7.7	AC	5.0	B		7	2.5	6/			BOR
1968 01 27.44	S	7.7	AC	5.0	B		7	3.5	6/			BOR
1968 02 05.45	S	7.7	AC	5.0	B		7	3	5		225	BOR
1968 02 07.44	S	7.7	AC	5.0	B		7	3	5/			BOR
1968 02 16.44	S	7.6	AC	5.0	B		7	3	6/			BOR
1968 02 26.43	S	7.5	AC	5.0	B		7	5	7	?	245	BOR
1968 03 04.42	S	7.3	AC	5.0	B		7	5	6	?	265	BOR
1968 03 08.42	S	7.1	AC	5.0	B		7	5	5	?	243	BOR
1968 03 14.41	S	7.0	AC	5.0	B		7	3	4/			BOR
1968 03 20.05	S	7.0	AC	5.0	B		7					BOR
1968 03 24.17	S	7.2	AC	5.0	B		7	4	5	?	210	BOR
1968 03 25.18	S	7.3	AC	5.0	B		7	5	5			BOR
1968 03 26.15	S	7.4	AC	5.0	B		7	5.5	6	?	230	BOR
1968 03 28.16	S	7.5	AC	5.0	B		7					BOR
1968 03 31.18	S	7.7	NS	5.0	B		7	5.5	6			BOR
1968 04 02.16	S	7.7	NS	5.0	B		7	4	5			BOR
1968 04 04.05	S	7.7	NS	5.0	B		7	4.5				BOR
1968 04 08.05	S	8.6	NS	15.0	L	8	50	2.5	5			BOR
1968 04 10.04	S	8.2	NS	15.0	L	8	50					BOR
1968 04 10.04	S	7.7	NS	5.0	B		7	3.5	4			BOR
1968 04 13.20	S	8.0	NS	5.0	B		7	3	5			BOR
1968 04 15.07	S	8.1	NS	5.0	B		7	4	6/			BOR

Comet Ikeya-Seki (1968 I = 1967n) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 04 17.15	S	8.2	NS	5.0	B		7	5				BOR
1968 04 28.10	S	8.4	AC	5.0	B		16	5	3/			BOR
1968 05 07.08	S	8.8	AC	5.0	B		20	4	3/			BOR
1968 05 21.07	S	9.5	AC	15.0	L	8	50	2.5	1			BOR
1968 09 29.30	S	12.5	AC	55.9	M	10	85	0.7	2			BOR
1968 10 22.30	S	12.6	AC	55.9	M	10	85	1	1/			BOR
1968 10 28.21	S	12.8	AC	55.9	M	10	85	0.9	1/			BOR

Comet Tago-Honda-Yamamoto (1968 IV = 1968a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 05 08.35	S	7.6	AC	5.0	B		7	3	2/			BOR

Comet Whitaker-Thomas (1968 V = 1968b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 07 01.16	S	10.0	AC	12.0	R	5	20	6	0			BOR

Comet Honda (1968 VI = 1968c)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 07 07.34	S	8.0	AC	12.5	R	5	20	3	3			BOR
1968 07 08.34	S	8.1	AC	15.0	L	4	33	3	2			BOR
1968 07 22.34	S	7.5	AC	5.0	B		16	3	5			BOR
1968 07 24.34	S	7.5	AC	5.0	B		16	4.5	5/			BOR
1968 07 26.34	S	7.3	AC	5.0	B		16	5	4			BOR
1968 07 29.34	S	7.2	AC	5.0	B		16	4.5	5	0.2	315	BOR
1968 08 03.33	S	7.0	AC	5.0	B		16	6	4	0.3	300	BOR
1968 08 04.33	S	7.0	AC	5.0	B		16	6.5	3	1.2	282	BOR
1968 08 04.33				5.0	B		16			0.4	305	BOR
1968 08 08.34	S	6.9	AC	5.0	B		16	3	3/			BOR
1968 08 12.35	S	6.5	AC	5.0	B		16	5.5	5	?	270	BOR
1968 08 16.35	S	6.5	Y	5.0	B		16	5.5	7	0.2	280	BOR
1968 08 19.21	S	6.4	Y	5.0	B		7	7	6			BOR
1968 08 19.21				15.0	L	8	50			0.2	280	BOR
1968 08 27.11	S	6.1	Y	5.0	B		7	10	5	?	255	BOR
1968 08 28.11				15.0	L	8	50			?	190	BOR
1968 08 28.11	S	6.1	Y	5.0	B		7	8	5			BOR
1968 08 30.08				15.0	L	4	22			1.2	140	BOR
1968 08 30.08	S	6.3	Y	5.0	B		7	8	6			BOR
1968 08 31.11	S	6.2	Y	5.0	B		7	11	5			BOR
1968 09 04.08	S	6.2	Y	5.0	B		7	7	6/			BOR
1968 09 08.08	E	6.2	Y	5.0	B		16	8	5/			BOR
1968 09 13.10	E	6.6	Y	5.0	B		16	9	5			BOR
1968 09 14.10	E	6.7	Y	5.0	B		16	7	6			BOR
1968 09 15.05	S	6.6	Y	5.0	B		16	11.5	4	0.3	40	BOR
1968 09 16.09	E	6.8	AC	5.0	B		16	10	4/			BOR
1968 09 16.09	S	7.6	AC	15.0	L	8	50					BOR
1968 09 19.06	E	7.0	AC	5.0	B		16	7	4	0.35	25	BOR
1968 09 28.04	S	7.6	AC	5.0	B		16	5.5	3			BOR
1968 09 29.07	S	7.5	AC	5.0	B		16	5.5	3			BOR
1968 10 04.99	S	8.8	AC	15.0	L	8	50	3	4			BOR

Comet Bally-Clayton (1968 VII = 1968d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1968 08 2/.12	S	10.4	AC	15.0	L	8	50	2	1/			BOR
1968 08 28.13	S	10.2	AC	15.0	L	8	50	2	1/			BOR
1968 08 30.06				55.9	M	10	85	3		0.1	130	BOR
1968 08 30.06	S	10.2	AC	15.0	L	4	33	3	0/			BOR
1968 09 14.07	S	10.8	AC	15.0	L	8	50	2	0/			BOR
1968 09 15.16	S	11.0	AC	25.4	L	8	47	2	1			BOR
1968 09 19.05	S	10.4	AC	15.0	L	8	50	1.5	1			BOR
1968 09 29.11	S	12.0:	AC	55.9	M	10	85	2	3			BOR

Comet Thomas (1969 I = 1968j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 01 14.16	S	12.3:	NS	55.9	M	10	85	0.7	2			BOR

Comet Fujikawa (1969 VII = 1969d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 08 24.35	S	9.0	AC	5.0	B		16	3.5	1			BOR
1969 08 24.35	S	9.2	AC	15.0	L	8	50					BOR
1969 09 10.38	S	8.5	AC	5.0	B		16	3.5	3			BOR
1969 09 12.38	S	8.3	AC	5.0	B		16	3.5	4			BOR
1969 09 14.38	S	8.3	AC	5.0	B		16	3.5	4/			BOR
1969 09 21.39	S	7.9	AC	5.0	B		16	4	5			BOR
1969 09 21.39				15.0	L	4	21			0.35	290	BOR

Comet Tago-Sato-Kosaka (1969 IX = 1969g)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 01 20.02	S	3.9	Y	5.0	B		7	8	7	1		BOR
1970 01 22.01	S	4.0	Y	5.0	B		7	8	7			BOR
1970 01 22.98	S	4.0	Y	5.0	B		7	9.5	5/			BOR
1970 01 31.03	S	5.1	Y	5.0	B		7	12	6/	1.35	84	BOR
1970 02 02.00	S	5.2	Y	5.0	B		7	12	4/	0.35	83	BOR
1970 02 02.00	E	5.3	Y	5.0	B		10					BOR
1970 02 04.99	E	6.1	Y	5.0	B		10	11	3/			BOR
1970 02 08.01	E	5.4	Y	5.0	B		10	13	3			BOR
1970 02 13.02	S	5.8	Y	5.0	B		10					BOR
1970 02 13.02	E	5.9	Y	5.0	B		10	7	4	0.35	78	BOR
1970 02 14.07	E	6.0	Y	5.0	B		10	7	3			BOR
1970 02 18.01	E	7.0	AC	5.0	B		10	8	3			BOR
1970 02 21.04	S	7.4	AC	5.0	B		10	7	2/			BOR
1970 02 21.04	E	7.5	AC	5.0	B		10					BOR
1970 02 24.02	E	7.6	AC	5.0	B		10					BOR
1970 02 24.02	S	7.5	AC	5.0	B		10	8	4			BOR
1970 03 09.03	S	9.2	AC	15.0	L	8	50	2.5	1			BOR
1970 03 10.03	S	9.2	AC	15.0	L	8	50	3	0			BOR
1970 03 11.06	S	9.2	AC	15.0	L	8	50					BOR
1970 03 11.06	S	8.8	AC	5.0	B		10	3.5	0			BOR
1970 03 12.04	S	9.3	AC	15.0	L	8	50	3	0			BOR
1970 04 04.06	S	11.5	AC	25.4	L	8	65	1	0			BOR

Comet Bennett (1970 II = 1969i)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 03 28.39	E	0.4	AT	0.0	E		1	9	9	5	275	BOR
1970 04 01.39	E	0.9	AT	0.0	E		1			4.5	293	BOR
1970 04 04.40				0.0	E		1			15	286	BOR
1970 04 04.40	E	1.2	AT	0.0	E		1			5.5	290	BOR
1970 04 05.40				0.0	E		1			15	283	BOR
1970 04 05.40	E	1.4	AT	0.0	E		1	5		11	283	BOR
1970 04 06.40	E	1.4	AT	0.0	E		1			17	281	BOR
1970 04 06.40				0.0	E		1			12	285	BOR
1970 04 08.40	E	1.6	AT	0.0	E		1			19	297	BOR
1970 04 11.34	E	1.9	AT	0.0	E		1	4		10	280	BOR
1970 04 13.39	E	2.4	AT	0.0	E		1	6		19	305	BOR
1970 04 16.37	E	2.4	AT	0.0	E		1	3	4/	12	305	BOR
1970 04 19.36	E	2.7	AT	0.0	E		1	3	5	11	307	BOR
1970 05 02.35	E	4.4	AT	5.0	B		7	5	7	5	321	BOR
1970 05 07.34	E	4.6	AT	0.0	E		1	4	6	11	328	BOR
1970 05 08.32	E	4.7	AT	5.0	B		7		6			BOR
1970 05 08.32	E	4.6	AT	0.0	E		1			12.5	325	BOR
1970 05 21.32	E	6.1	Y	5.0	B		10	3	6	1	335	BOR
1970 05 28.28	E	6.9	AC	5.0	B		10	3.5	4	&2	335	BOR
1970 05 29.32	E	7.0	AC	5.0	B		10	4	5	1.35	328	BOR
1970 06 08.30	E	7.2	AC	5.0	B		10	6	4	0.5	325	BOR
1970 06 15.24	S	7.6	AC	5.0	B		10	4.5		?		BOR
1970 06 21.31	S	7.9	AC	5.0	B		10	5.5	2			BOR
1970 06 29.21	E	8.1	AC	5.0	B		10	5	2			BOR
1970 07 06.32	S	8.4	AC	5.0	B		10	5	2	?		BOR
1970 07 08.18	S	8.2	AC	5.0	B		10	5	2	0.5	350	BOR
1970 07 13.30	S	8.3	AC	5.0	B		10	8	2			BOR
1970 07 22.11	S	9.2	AC	15.0	L	4	38	3.5	1			BOR
1970 07 24.13	S	8.5	AC	5.0	B		10					BOR
1970 07 24.13	S	8.9	AC	15.0	L	4	38	4	1			BOR
1970 08 05.29	E	9.0	AC	8.0	B		15	4.5	1			BOR
1970 08 13.30	S	9.0	AC	8.0	B		15	4	1			BOR
1970 08 14.30	S	9.0	AC	8.0	B		15	5	1			BOR
1970 08 25.16	S	9.8	AC	15.0	L	4	21	4	0			BOR
1970 09 02.15	S	10.2	AC	12.0	B	5	20	3	0			BOR
1970 09 13.35	S	10.6	AC	12.0	B	5	20	2.5	0			BOR
1970 10 29.07				32.0	L	6	62	2	0			BOR

Comet Kohoutek (1970 III = 1969b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 09 21.07	S	13.3	AC	55.9	M	10	85	0.5	0	0.02	110	BOR
1969 09 21.15	S	12.8	AC	25.4	L	8	65	0.5				BOR
1969 10 05.05	S	13.3	AC	55.9	M	10	85	0.3	3	0.03	110	BOR
1969 10 05.05	S	12.7	AC	25.4	L	8	65	0.3				BOR
1969 10 18.10	S	13.0	AC	25.4	L	8	65					BOR
1969 10 18.10				55.9	M	10	85	& 1	3	?	120	BOR
1970 04 04.05	S	10.8	AC	25.4	L	6	65	0.7	2/			BOR
1970 04 13.11	S	11.0	AC	25.4	L	6	65	0.5	3	0.02	0	BOR
1970 05 08.09	S	11.9	AC	25.4	L	6	65	0.4	2	?		BOR

Comet Suzuki-Sato-Seki (1970 X = 1970m)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 10 27.99	E	7.6	AC	15.0	L	4	21	3		?	135	BOR
1970 10 27.99	E	7.5	AC	5.0	B		10	5	6/			BOR
1970 10 29.00	E	7.3	AC	5.0	B		10	3	7			BOR
1970 11 06.98	E	8.1	S	5.0	B		10		4			BOR
1970 11 16.96	S	9.1	AC	15.0	L	4	21					BOR
1970 11 16.96	S	9.1	AC	5.0	B		10	4	2			BOR

Comet Abe (1970 XV = 1970g)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1970 07 13.31	S	8.6	AC	15.0	L	4	38	3.5	2/			BOR
1970 08 03.29	E	7.8	AC	5.0	B		10	7	3			BOR
1970 08 05.30	E	7.6	AC	5.0	B		10	6	4	?		BOR
1970 08 08.20	E	7.9	AC	15.0	L	4	38	7				BOR
1970 08 08.20	E	7.7	AC	5.0	B		10	8	5	?		BOR
1970 08 08.20	E	7.6	AC	5.0	B		7					BOR
1970 08 08.20	E	7.4	AC	4.0	R	7	10					BOR
1970 08 13.29	E	7.2	AC	5.0	B		7	8	5	?	135	BOR
1970 08 14.31	E	7.2	AC	5.0	B		7	9				BOR
1970 08 14.31	E	7.3	AC	5.0	B		10	9	5	?	150	BOR
1970 08 24.13	E	6.9	AC	5.0	B		10	10	4			BOR
1970 08 24.13	E	6.9	AC	5.0	B		7	10				BOR
1970 08 25.14	E	6.7	AC	5.0	B		7	15	6	0.2	163	BOR
1970 08 26.15	E	6.8	AC	5.0	R	4	6	14	5	0.3	155	BOR
1970 08 27.16	E	6.8	AC	5.0	R	4	6	12	5	0.3	155	BOR
1970 08 28.14	E	6.5	AC	5.0	R	4	6	15	5	0.5	160	BOR
1970 09 02.14	E	6.2	Y	5.0	R	4	6	12	6/	0.7	105	BOR
1970 09 02.14	S	6.2	Y	0.0	E		1					BOR
1970 09 02.14				5.0	R	4	6			1.0	152	BOR
1970 09 05.16	E	6.3	Y	5.0	R	4	6	10	5/	1.2	90	BOR
1970 09 06.16				5.0	R	4	6			0.8	110	BOR
1970 09 06.16	E	6.0	Y	5.0	R	4	6	10	6	0.7	85	BOR
1970 09 12.06	E	6.3	Y	5.0	R	4	6	9	5	0.8	80	BOR
1970 09 13.07	E	6.3	Y	5.0	R	4	6	6	4			BOR
1970 09 17.10	E	6.2	Y	5.0	B		7	9		0.7	70	BOR
1970 09 20.04	E	5.9	Y	5.0	R	4	6	6	6	0.8	55	BOR
1970 09 20.04				5.0	R	4	6			1.8	87	BOR
1970 09 26.05	E	6.5	Y	5.0	B		10	6		?	70	BOR
1970 09 27.07	E	6.2	Y	5.0	B		10	5	6	0.7	70	BOR
1970 09 30.03	E	6.3	Y	5.0	B		7	7	6	1.5	63	BOR
1970 10 02.07	E	6.6	S	5.0	B		10	8		1.0	65	BOR
1970 10 06.03	E	6.7	S	5.0	B		10	7	7	2.0	62	BOR
1970 10 07.03	E	6.7	S	5.0	B		10		5	0.8	67	BOR
1970 10 19.01	E	7.0	S	5.0	B		7	4	5	0.5	80	BOR
1970 10 20.01	E	7.1	S	5.0	B		7	4		1.0	65	BOR
1970 10 27.98	E	7.6	AC	15.0	L	4	38					BOR
1970 10 27.98	E	7.4	AC	5.0	B		10	4	6	0.3	55	BOR
1970 10 28.99	E	7.5	AC	5.0	B		10	5	6	0.5	62	BOR
1970 11 06.97	S	6.4	S	5.0	B		10	3.5	5/			BOR
1971 01 07.44	E	7.9	AC	5.0	B		10					BOR
1971 01 07.44	S	7.8	AC	5.0	B		10	6	4			BOR
1971 01 08.43	S	7.8	AC	5.0	B		10	5	3			BOR
1971 01 08.43	E	7.9	AC	5.0	B		10					BOR
1971 01 29.39	S	8.4	AC	5.0	B		10	3	2/			BOR

Comet Abe (1970 XV = 1970g) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1971 02 10.34	S	8.5	AC	5.0	B		10	5	2			BOR
1971 02 10.34	S	8.7	AC	15.0	L	4	21	4				BOR
1971 02 26.38	S	8.9	AC	8.0	B		15	3.5	2			BOR
1971 02 28.38	S	8.6	AC	5.0	B		10	6	4			BOR
1971 02 28.38	B	8.6	AC	5.0	B		10					BOR
1971 03 02.37	S	8.6	AC	5.0	B		10	6	2/			BOR
1971 03 22.17	S	9.0	AC	12.0	B		20	3				BOR
1971 03 22.17	S	8.9	AC	8.0	B		15		0			BOR
1971 03 24.16	S	9.2	AC	12.0	B		20	& 2.5				BOR
1971 03 24.16	S	9.0	AC	8.0	B		15	3	2			BOR
1971 03 26.17	S	9.3	AC	8.0	B		15	2	1/			BOR
1971 03 26.17	S	9.5	AC	12.0	B		20	2				BOR
1971 04 01.12	S	9.6	AC	31.7	L	6	62	2	4			BOR
1971 04 01.12	S	9.7	AC	15.0	L	4	38	2				BOR
1971 04 01.12	S	9.7	AC	12.0	B		20	2				BOR
1971 04 16.09	S	10.3	AC	31.7	L	6	62	1	2			BOR
1971 04 16.09	S	10.3	AC	12.0	B		20	1				BOR
1971 04 17.12	S	10.2	AC	12.0	B		20	1.5	3/			BOR
1971 04 18.10	S	10.5	AC	31.7	L	6	62	1.3	2/			BOR
1971 04 18.10	S	10.1	AC	12.0	B		20					BOR
1971 04 18.10	S	10.7	AC	15.0	L	4	38					BOR
1971 04 24.07	S	10.5	AC	31.7	L	6	62	0.8	2			BOR

Comet Toba (1971 V = 1971a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1971 03 22.39	S	9.1	AN	5.0	B		10	3	2			BOR
1971 03 24.40	S	9.1	AN	5.0	B		10	2				BOR
1971 03 24.40	E	9.2	AN	5.0	B		10					BOR
1971 03 26.39	S	9.0	AN	5.0	B		10	3	3			BOR
1971 03 31.39	S	8.9	AN	5.0	B		10	4	3			BOR
1971 04 23.33	E	7.9	AC	5.0	B		10	2.5	3/			BOR
1971 04 24.35	E	8.1	AC	5.0	B		10	2	5			BOR
1971 05 05.33	E	7.8	S	5.0	B		10	5	5	?	300	BOR
1971 05 05.33				15.0	L	4	21	3.1		?	300	BOR
1971 05 07.34				15.0	L	4	33	3.8		?	315	BOR
1971 05 07.34	E	7.7	S	5.0	B		10	5	4	?	315	BOR

Comet Heck-Sause (1972 VIII = 1973a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 01 26.22	E	10.7	AC	31.7	L	6	55					BOR
1973 01 26.22	S	10.7	AC	31.7	L	6	55	1.5	5	?	200	BOR
1973 02 10.25	E	10.7	AC	31.7	L	6	55					BOR
1973 02 10.25	S	10.6	AC	31.7	L	6	55	0.6	5	0.2	170	BOR
1973 02 25.11	S	10.9	AC	31.7	L	6	55	0.6	3	0.2	160	BOR
1973 02 28.16	E	11.0	AC	31.7	L	6	55	0.8	3	0.2	170	BOR
1973 03 02.08	S	11.4	AC	31.7	L	6	55	0.7	4/	0.1	170	BOR
1973 03 05.05	S	11.4	NP	31.7	L	6	55	0.8	3/	0.1	180	BOR
1973 03 10.01	S	11.4	NP	31.7	L	6	55	1.0	3	0.1	180	BOR
1973 03 24.07	S	11.9	NP	31.7	L	6	55	1.5	3/	&0.3	120	BOR
1973 03 25.07	S	12.1	NP	31.7	L	6	55	1.2	3/	0.3	120	BOR
1973 03 28.03	S	12.4	NP	31.7	L	6	55	1.3	2/	0.2	135	BOR
1973 04 07.05	S	12.8	NP	31.7	L	6	55	0.5	2	0.03	120	BOR
1973 04 22.07	S[	12.8	NP	31.7	L	6	55					BOR

Comet Sandage (1972 IX = 1972h)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 11 03.98	S	12.9	AC	31.7	L	6	65	0.4	1			BOR
1973 03 10.35	S	12.9	NP	31.7	L	6	65	0.3	2			BOR
1973 03 10.35	S	13.0	AC	31.7	L	6	65					BOR
1973 05 07.16	S	13.1	NP	31.7	L	6	88	0.4	1			BOR
1973 05 23.18	S	13.2	NP	31.7	L	6	88	0.4	1			BOR
1973 06 03.13	S	13.1	NP	31.7	L	6	88	0.5	1			BOR
1973 06 28.16	S	13.1	NP	31.7	L	6	88	0.7	0/			BOR
1973 07 24.10	S	12.7	NP	31.7	L	6	88	0.6	3			BOR
1973 07 25.10	S	12.9	NP	31.7	L	6	88	0.5	1			BOR
1973 07 30.11	S	13.2	NP	31.7	L	6	88	0.5	2			BOR
1973 07 31.10	S	13.1	NP	31.7	L	6	88	0.4	1			BOR
1973 08 06.17	S	13.0	NP	31.7	L	6	88	0.4	2			BOR
1973 08 21.08	S	13.1	NP	31.7	L	6	88	0.4	1			BOR
1973 09 20.04	S	13.2	NP	31.7	L	6	88	1.0	0			BOR
1973 10 01.04	S[	13.4	NP	31.7	L	6	146					BOR

Comet Kojima (1973 II = 1972j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 11 16.41	B	11.9	AC	31.7	L	6	65					BOR
1972 11 16.41	S	11.7	AC	31.7	L	6	65	0.4	1			BOR
1972 12 12.20	S	10.6	AC	31.7	L	6	65	1.5	4	?	90	BOR
1972 12 29.17	B	10.6	AC	31.7	L	6	55					BOR
1972 12 29.17	S	10.5	AC	31.7	L	6	55	1.3	5	?	90	BOR
1972 12 29.17	S	10.5	AC	15.0	L	4	38					BOR
1973 01 02.13	B	10.5	AC	31.7	L	6	55					BOR
1973 01 02.13	S	10.4	AC	31.7	L	6	55	1.8	5/			BOR
1973 01 03.14	S	10.5	AC	31.7	L	6	55	2	5	0.1	90	BOR
1973 01 03.14	B	10.6	AC	31.7	L	6	55					BOR
1973 01 07.08	S	10.5	AC	31.7	L	6	55	2.5	5			BOR
1973 01 10.08	S	10.7	AC	31.7	L	6	55	2	5	0.05	90	BOR
1973 01 22.04	S	10.9	AC	31.7	L	6	55	1.8	3	?	90	BOR
1973 01 26.08	S	10.9	AC	31.7	L	6	55	1.5	3	?	90	BOR
1973 01 27.01	S	10.8	AC	31.7	L	6	55	1.7	4	0.05	90	BOR
1973 01 30.00	S	10.9	AC	31.7	L	6	55	1.6	3			BOR
1973 02 10.00	S	11.0	AC	31.7	L	6	55	1.1	1/			BOR
1973 02 25.01	S	11.6	AC	31.7	L	6	55	0.9	2			BOR
1973 02 27.01	S	11.6	AC	31.7	L	6	55	0.8	2			BOR

Comet Kohoutek (1973 VII = 1973e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 03 24.06	S	12.1	NP	31.7	L	6	55	1.7	0			BOR
1973 03 25.08	S	12.0	NP	31.7	L	6	65	2.3	0			BOR
1973 03 28.11	S	12.1	NP	31.7	L	6	65	2.1	1			BOR
1973 04 07.10	S	11.9	NP	31.7	L	6	65	1.8	0			BOR
1973 04 22.06	S	11.9	NP	31.7	L	6	55	1.6	0			BOR
1973 05 07.08	S	12.0	NP	31.7	L	6	88	0.8	0			BOR
1973 05 23.08	S	12.1	NP	31.7	L	6	88	1.3	0			BOR
1973 06 03.10	S	12.4	NP	31.7	L	6	88	1.2	0			BOR

Comet Kohoutek (1973 XII = 1973f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 04 07.08		[13.0	NP	31.7	L	6	110					BOR
1973 05 23.08		[12.0	NP	31.7	L	6	146					BOR
1973 10 01.39	S	10.0	AC	20.3	L	5	56	& 1.75	0			BOR
1973 10 06.40	S	9.9	AC	20.3	L	5	56	1	1			BOR
1973 10 24.41	S	8.6	NO	8.0	B		15					BOR
1973 10 24.41	S	9.0:	NO	31.7	L	6	55	2.5	3	?	280	BOR
1973 10 25.41	S	8.5	NO	8.0	B		15	4				BOR
1973 10 25.41				31.7	L	6	55	2.2	4	0.1	280	BOR
1973 10 27.41	S	8.4	NO	5.0	B		10					BOR
1973 10 27.41	S	8.3	NO	8.0	B		15	2.8				BOR
1973 10 27.41				31.7	L	6	55	1.8	4	0.1	280	BOR
1973 11 06.42	S	7.6	NO	5.0	B		10	4.4				BOR
1973 11 06.42				31.7	L	6	55	1.8	4	0.2	295	BOR
1973 11 08.42				31.7	L	6	55	2.1	4	0.3	280	BOR
1973 11 08.42	S	7.6	NO	5.0	B		10	3.6		0.2	280	BOR
1973 11 08.42	B	7.8	NO	5.0	B		10					BOR
1973 11 18.43	E	6.8	NO	5.0	B		10					BOR
1973 11 18.43	B	7.1	NO	5.0	B		10					BOR
1973 11 18.43				31.7	L	6	55	1.7	4	0.2	287	BOR
1973 11 18.43	S	6.8	NO	5.0	B		10					BOR
1973 11 20.43	S	6.7	NO	5.0	B		10	2.1				BOR
1973 11 20.43				31.7	L	6	55	1.8	5	0.3	290	BOR
1973 11 30.43				31.7	L	6	55	3.2	6/	1.0	280	BOR
1973 11 30.43	B	6.1	Y	5.0	B		10					BOR
1973 11 30.43	E	6.0	Y	5.0	B		10	3.6		0.5	280	BOR
1973 12 02.44	E	5.3	Y	5.0	B		10	3.6				BOR
1973 12 02.44				31.7	L	6	55	2.1	6	0.6	285	BOR
1973 12 03.44				31.7	L	6	55	1.9	6	0.9	280	BOR
1973 12 03.44	E	5.5	Y	5.0	B		10	3.2				BOR
1973 12 03.44	B	5.5	Y	5.0	B		10					BOR
1973 12 13.46	S	4.4	Y	5.0	B		10					BOR
1973 12 13.46				31.7	L	6	55	1.2	6/	?	270	BOR
1974 01 04.95	E	2.9	AT	5.0	B		10	2		5.0	65	BOR
1974 01 08.96	E	3.5	AT	5.0	B		10	1.5		5.0	60	BOR
1974 01 12.97				31.7	L	6	55	3.0	7/			BOR
1974 01 12.97	E	4.0	AT	5.0	B		10	2.0		6.0	60	BOR
1974 01 13.97	E	4.1	AT	5.0	B		10	5.2		9.0	62	BOR
1974 01 13.97				31.7	L	6	55	2.6	7/			BOR
1974 01 13.97	E	4.0	AT	0.0	E		1			9.5	62	BOR
1974 01 17.98	E	4.3	Y	0.0	E		1			7.0	60	BOR
1974 01 17.98	E	4.8	Y	5.0	B		10	7.1		7.5	60	BOR
1974 01 17.98				31.7	L	6	55	3.5	6			BOR
1974 01 19.99	E	4.8	Y	0.0	E		1			4.5	60	BOR
1974 01 19.99	E	5.3	Y	5.0	B		10	4.9		7.0	60	BOR
1974 01 19.99				31.7	L	6	55	3.4	5			BOR
1974 01 22.98	E	5.7	Y	5.0	B		10	7.5		4.3	60	BOR
1974 01 22.98				31.7	L	6	55	3.5	4/			BOR
1974 01 25.98	E	5.9	Y	5.0	B		10	4.3		6.0	58	BOR
1974 01 25.98				31.7	L	6	55	4.5	5			BOR
1974 01 30.00	E	6.3	NO	5.0	B		10	7.2				BOR
1974 01 30.00				31.7	L	6	55		5			BOR
1974 01 30.99	E	6.5	NO	5.0	B		10	6.4		1.5	55	BOR
1974 01 30.99				31.7	L	6	55	2.9	4			BOR

Comet Kohoutek (1973 XII = 1973f) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1974 02 06.00	S	7.2	NO	5.0	B		10	4.5		0.5	55	BOR
1974 02 06.00				31.7	L	6	55	1.9	4			BOR
1974 02 07.99	S	7.3	NO	5.0	B		10	6.4				BOR
1974 02 07.99				31.7	L	6	55	3.6	3/	0.5		BOR
1974 02 12.00	S	7.4	MP	5.0	B		10	&11		0.5	90	BOR
1974 02 12.00				31.7	L	6	55	6.5	4/	1.5	55	BOR
1974 02 16.01	S	7.6	NO	5.0	B		10	10.8		?		BOR
1974 02 16.01				31.7	L	6	55	3.2	4	1.3	55	BOR
1974 02 18.02	S	7.8	NO	5.0	B		10	7.2				BOR
1974 02 18.02				31.7	L	6	55	3.4	3	1.0	65	BOR
1974 02 19.01	S	7.9	NO	5.0	B		10	9.0		0.7	70	BOR
1974 02 19.01				31.7	L	6	55	4.0	3/	0.7	70	BOR
1974 02 19.01				31.7	L	6	55			0.3	270	BOR
1974 02 24.02	S	8.4	NO	5.0	B		10	8				BOR
1974 02 24.02				12.0	B		20			0.8	283	BOR
1974 02 24.02				12.0	B		20	8	3	0.3	40	BOR
1974 02 25.01				12.0	B		20	11	2	0.4	40	BOR
1974 02 25.01	S	8.4	NO	5.0	B		10	8				BOR
1974 02 25.01				12.0	B		20			0.5	280	BOR
1974 03 11.04	S	9.0	MP	12.0	B		20	8	0/	?	280	BOR
1974 03 13.04	S	9.0	NO	8.0	B		15	7.3				BOR
1974 03 13.04	S	9.0	NO	12.0	B		20	7.3	0			BOR
1974 03 14.03	S	9.2	MP	12.0	B		20	6	0/			BOR
1974 03 15.03	S	9.1	NO	8.0	B		15	10				BOR
1974 03 15.03	S	9.1	NO	12.0	B		20	7.5	0/			BOR
1974 03 21.03	S	9.8	MP	12.0	B		20	7	0			BOR
1974 03 21.03	S	10.1	MP	31.7	L	6	55	& 3.5	0			BOR
1974 03 22.04	S	10.0	MP	12.0	B		20	6	0			BOR

Comet Bradfield (1974 III = 1974b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1974 03 15.00	S	5.0	AT	8.0	B		15	2	9			BOR
1974 03 19.00	E	4.2	AT	5.0	B		10	3		0.5	100	BOR
1974 03 21.01	E	4.5	AT	5.0	B		10			1.5	95	BOR
1974 03 21.01				15.0	L	4	30	1.9	8			BOR
1974 03 22.01	E	4.0	AT	5.0	B		10			2.0	86	BOR
1974 03 23.01				31.7	L	6	55	1.4	8			BOR
1974 03 23.01	E	4.2	AT	5.0	B		10	1		1.5	87	BOR
1974 03 24.02				31.7	L	6	55	1.9	7			BOR
1974 03 24.02	E	4.3	AT	5.0	B		10	1.4		2.8	83	BOR
1974 03 25.02	E	4.4	AT	5.0	B		10	1.8		3.2	83	BOR
1974 03 25.02				31.7	L	6	55	2.0	8			BOR
1974 03 26.02	E	4.6	Y	5.0	B		10	1.4		4.3	82	BOR
1974 03 26.02				31.7	L	6	55	1.7	6			BOR
1974 03 28.02				31.7	L	6	55	1.9	6			BOR
1974 03 28.02	E	4.6	Y	5.0	B		10	1.9		4.0	74	BOR
1974 03 29.03	E	4.3	AT	5.0	B		10			2.7	74	BOR
1974 03 29.03				31.7	L	6	55	1.8	6			BOR
1974 04 03.03				31.7	L	6	55	1.9	6/			BOR
1974 04 03.03	E	4.8	AT	5.0	B		10	3.1		2.3	56	BOR
1974 04 08.04	E	5.1	Y	5.0	B		10	3.2		2.5	40	BOR
1974 04 08.04				31.7	L	6	55	2.7	6/			BOR
1974 04 11.05	E	5.8	Y	5.0	B		10	4.5	6	2.3	35	BOR

Comet Bradfield (1974 III = 1974b) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1974 04 17.30	B	6.9	NO	5.0	B		10	2.6	4/	2.3	35	BOR
1974 04 18.06	B	7.0	NO	5.0	B		10	4.2	5	1.5	75	BOR
1974 04 20.15	B	7.0	NO	5.0	B		10	3.6	4	1.2	50	BOR
1974 04 21.07	B	7.4	NO	5.0	B		10	4.4	4	0.8	30	BOR
1974 04 26.07	E	7.0	NO	5.0	B		10	5.5	5	1.5	45	BOR
1974 04 27.30	E	7.5	NO	5.0	B		10	4.8	4	1.3	40	BOR
1974 04 28.34	E	7.6	NO	5.0	B		10	4.4	4/	0.7	50	BOR
1974 04 30.31	S	8.0	NO	5.0	B		10	3.2	5	0.6	40	BOR
1974 05 02.33	E	7.9	NO	5.0	B		10	3.4	5	0.6	38	BOR
1974 05 08.08	E	7.8	NO	5.0	B		10	2.7	4	0.5	46	BOR
1974 05 09.09	B	7.9	NO	5.0	B		10	4.7	3	0.6	44	BOR
1974 05 12.08	S	8.2	NO	8.0	B		15	5.2		0.7	55	BOR
1974 05 12.08	B	8.1	NO	5.0	B		10	5.2	4	?		BOR
1974 05 14.08	E	8.0	NO	5.0	B		10	& 9	5	0.7	85	BOR
1974 05 15.08	E	8.2	NO	5.0	B		10	4.5				BOR
1974 05 15.08	E	9.2	NO	31.7	L	6	55	2.3	4/	0.3	123	BOR
1974 05 19.09	S	8.6	NO	5.0	B		10	5.0				BOR
1974 05 19.09	E	9.4	NO	31.7	L	6	55	2.3	4	0.4	190	BOR
1974 05 20.15	E	9.8	NO	31.7	L	6	55	2.3	4	0.7	217	BOR
1974 05 20.15	S	8.8	NO	5.0	B		10	& 9				BOR
1974 05 21.11	E	9.8	NO	31.7	L	6	55	1.2	3/	0.5	197	BOR
1974 05 21.11	S	9.2	NO	5.0	B		10	4.0				BOR
1974 05 24.09	E	9.4	NS	31.7	L	6	55	2.8	3	0.3	195	BOR
1974 05 24.09	S	9.0	NP	5.0	B		10	6.3				BOR
1974 05 27.11	S	9.8	NS	31.7	L	6	55	2.0	2			BOR
1974 06 12.15	S	10.7	AC	31.7	L	6	55	2.8	2	0.1	205	BOR
1974 06 13.10	S	10.7	AC	31.7	L	6	55	2.8	2	0.1	200	BOR
1974 06 14.11	S	10.7	AC	31.7	L	6	55	3.0	1/	0.1	210	BOR
1974 06 19.11	S	10.8	AC	31.7	L	6	55	2.4	1	?	220	BOR
1974 07 09.10	S	12.4	AC	31.7	L	6	88	1.2	0			BOR
1974 07 11.11	S	12.0	AC	31.7	L	6	88	1.1	1			BOR
1974 07 12.10	S	12.1	AC	31.7	L	6	88	1.1	0/			BOR
1974 07 13.11	S	12.4	AC	31.7	L	6	88	1.1	0			BOR
1974 07 17.12	S	12.4	AC	31.7	L	6	88	1.7	0			BOR
1974 07 20.16	S	12.4	AC	31.7	L	6	88	1.6	0			BOR
1974 07 21.17	S	12.5	AC	31.7	L	6	88	1.6	0			BOR
1974 07 22.11	S	12.5	AC	31.7	L	6	88	1.0	0			BOR
1974 08 16.11	S	12.8	AC	31.7	L	6	88	1.3	0			BOR

Comet Kobayashi-Berger-Milon (1975 IX = 1975h)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 07 08.17	S	6.6	NO	5.0	B		10	12	5			BOR
1975 07 14.09	B	5.6	NO	5.0	B		10	18	5/			BOR
1975 07 16.31	B	5.5	Y	5.0	B		10	17	4/	1.0	210	BOR
1975 07 18.10	S	5.3	NO	5.0	B		10	16	4			BOR
1975 07 22.55	B	4.9	NO	5.0	B		10	18	4/			BOR
1975 07 26.50	B	4.7	NO	5.0	B		10	16	7	0.8	130	BOR
1975 07 27.54	B	4.8	NO	5.0	B		10	17	6	0.7	120	BOR
1975 07 29.54	B	4.8	NO	5.0	B		10	16	6/	1.7	105	BOR
1975 08 01.51	B	4.7	NO	5.0	B		10	14	5	2.3	90	BOR
1975 08 02.52	B	4.8	NO	5.0	B		10	15	6	1.8	90	BOR
1975 08 03.55	B	4.9	NO	5.0	B		10	10	6	2.3	80	BOR
1975 08 09.07	B	4.7	NO	5.0	B		10	9	5/	4.3	70	BOR

Comet Kobayashi-Berger-Milon (1975 IX = 1975h) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 08 10.08	B	4.8	NO	5.0	B		10	9	6	4.8	67	BOR
1975 08 19.07	B	4.7	NO	5.0	B		10		6/	2.0	46	BOR
1975 08 20.09	B	4.7	NO	5.0	B		10	5	7	1.0	48	BOR
1975 08 23.06	B	4.7	NO	5.0	B		10	2.2	6/	1.3	38	BOR
1975 08 28.04	B	4.7	NO	5.0	B		10	2.7	6/	7.5	28	BOR
1975 09 04.02	S	4.8	NO	5.0	B		10	1	7			BOR
1975 09 11.40	S	4.9	NO	8.0	B		15	2				BOR
1975 09 13.40	S	4.9	NO	5.0	B		10	2	7	0.2	340	BOR
1975 09 14.40	S	5.1	Y	5.0	B		10	1.5	7	1.0	320	BOR
1975 09 15.39	S	5.0	Y	5.0	B		10	1.3	7	1.0	320	BOR
1975 09 29.40	S	5.0	NO	5.0	B		10	2.0				BOR
1975 10 03.41	B	7.1	NO	8.0	B		15	1.5	5			BOR
1975 10 04.40	S	6.9	NO	5.0	B		10	2.0	5/			BOR
1975 10 07.40	S	7.1	NO	5.0	B		10					BOR
1975 10 08.41	S	6.9	NO	5.0	B		10	1.8	5			BOR
1975 10 21.42	[	8.5	S	31.7	L	6	55					BOR

Comet Suzuki-Saigusa-Mori (1975 X = 1975k)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 10 08.34	S	8.2	MP	5.0	B		10	3.0	4	0.3	270	BOR
1975 10 12.40	S	7.8	NO	5.0	B		10	5.3				BOR
1975 10 21.40	S	7.0	NO	5.0	B		10	9	3/			BOR
1975 10 22.39	S	6.8	NO	5.0	B		10	8	3			BOR
1975 10 23.39	S	6.8	NO	5.0	B		10	8	3			BOR
1975 10 28.41	S	5.5	NO	5.0	B		10	12	4	1.0	0	BOR

Comet Bradfield (1975 XI = 1975p)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 01 01.95	B	6.5	NO	8.0	B		15	0.9	7			BOR
1976 01 04.96	B	7.0	NO	8.0	B		15	2.5	7			BOR
1976 01 05.96	B	7.0	NO	8.0	B		15	2.5				BOR
1976 01 05.96	B	7.6	NO	31.7	L	6	55	1.1	7/			BOR
1976 01 06.96	B	7.0	NO	8.0	B		15	1.7				BOR
1976 01 06.96	B	7.1	NO	31.7	L	6	55	1.1	7			BOR
1976 01 10.97	B	7.9	NO	8.0	B		15	1.9	6			BOR
1976 01 14.97	S	8.6:	NO	8.0	B		15	& 1.8				BOR
1976 01 14.97	S	8.5	NO	31.7	L	6	55	2.0	4/			BOR
1976 01 18.98	S	8.3	AC	8.0	B		15	3.4				BOR
1976 01 18.98	S	8.5	AC	31.7	L	6	55	2.2	5			BOR
1976 01 19.97	S	8.7	NO	8.0	B		15	3.4	4/			BOR
1976 01 22.99	S	9.1	NO	8.0	B		15	3.2	4/			BOR
1976 01 29.00	S	9.6	AC	8.0	B		15	3.8				BOR
1976 01 29.00	S	9.7	AC	31.7	L	6	55	2.9	3			BOR
1976 01 30.00	S	9.9	AC	31.7	L	6	55	2.3	2			BOR
1976 01 30.00	S	9.8	AC	8.0	B		15	2.9				BOR
1976 02 03.01	S	10.5	AC	31.7	L	6	55	2.0	0			BOR
1976 02 05.01	S	10.9	AC	31.7	L	6	55	1.3	0			BOR
1976 02 21.02	[	12.0	AC	31.7	L	6	55					BOR

Comet Mori-Sato-Fujikawa (1975 XII = 1975j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 10 08.35	S	10.0	AC	31.7	L	6	55	1.5	3			BOR
1975 10 21.41	S	9.5	AC	31.7	L	6	55	1.7	1/			BOR
1975 10 23.40	S	9.6	AC	31.7	L	6	55	1.8	1			BOR
1975 10 31.35	S	8.9	S	31.7	L	6	55	1.9	5			BOR
1975 10 31.35	S	8.6	S	5.0	B		10	4.8				BOR
1975 11 01.37	S	8.9	S	31.7	L	6	55	2.4	5	0.2	330	BOR
1975 11 01.37	S	8.7	S	5.0	B		10	5.1				BOR
1975 11 05.34	S	8.7	NO	31.7	L	6	55	2.8	5			BOR
1975 11 05.34	S	8.5	NO	5.0	B		10	4.3				BOR
1975 11 11.39	S	8.5	S	31.7	L	6	55	3.5	4			BOR
1975 11 11.39	S	8.3	S	5.0	B		10	6				BOR
1975 11 12.41	S	8.0	NO	5.0	B		10	7				BOR
1975 11 12.41	S	8.3	NO	31.7	L	6	55	4.5	4/			BOR
1975 11 16.41	S	8.4	NO	31.7	L	6	55	3	4			BOR
1975 11 16.41	S	7.8	NO	5.0	B		10					BOR

Comet Bradfield (1976 IV = 1976a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 03 08.03	S	8.6:	S	31.7	L	6	55	& 4	0			BOR
1976 03 18.04	S	10.1	AC	31.7	L	6	55	2.6	1			BOR
1976 03 22.05	S	10.0	AC	31.7	L	6	55	2.3	2			BOR
1976 03 22.05	S	9.6	AC	8.0	B		15	3.5				BOR
1976 03 23.04	S	9.9	AC	31.7	L	6	55	2.9	2			BOR
1976 03 23.04	S	9.6	AC	8.0	B		15	4.0				BOR
1976 03 24.03	S	9.9	AC	31.7	L	6	55	3.7	2			BOR
1976 03 26.06	S	10.0	AC	31.7	L	6	55	3.0	1			BOR
1976 03 27.05	S	10.1	AC	31.7	L	6	55	3.0	2			BOR
1976 03 29.04	S	10.0	AC	31.7	L	6	55	3.3	2			BOR
1976 03 31.05	S	9.8	AC	31.7	L	6	55	2.8	2			BOR
1976 04 05.08	S	10.2	AC	31.7	L	6	55	3.0	0			BOR
1976 04 24.06		[12.0	AC	31.7	L	6	55					BOR

Comet West (1976 VI = 1975n)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 02 23.95	S-	1.6	AE	5.0	B		10	0.5	8	0.5	100	BOR
1976 02 24.95	S-	1.6	AE	5.0	B		10	0.5	8	?	90	BOR
1976 02 25.94	S-	3.0	AE	5.0	B		10	0.5	7/	0.7	60	BOR
1976 02 27.76	S-	2.4	AE	8.0	B		15	0.8		0.05	0	BOR
1976 02 29.47	S-	1.3	AE	5.0	B		10	0.5	8	1.0	340	BOR
1976 03 07.41	B	0.9	AT	5.0	B		10	3.5	8	19	310	BOR
1976 03 08.41	B	1.5	AT	5.0	B		10	2		25	315	BOR
1976 03 12.41	B	1.8	AT	5.0	B		10	3		26.5	307	BOR
1976 03 14.40	B	1.9	AT	5.0	B		10	3		10.5	315	BOR
1976 03 18.40	B	3.0	AT	5.0	B		10	2		5.5	297	BOR
1976 03 20.40	B	3.7	AT	5.0	B		10	3	7	4.0	286	BOR
1976 03 22.39	B	3.8	AT	5.0	B		10	3	7/	6.5	290	BOR
1976 03 23.39	B	3.8	AT	5.0	B		10	3.5	6	&6.5	303	BOR
1976 03 24.40	B	4.1	AT	5.0	B		10	4		7.0	298	BOR
1976 03 25.39	B	4.2	AT	5.0	B		10	3.5		6.0	289	BOR
1976 03 26.38	B	4.1	AT	0.0	E		1					BOR
1976 03 26.38	B	4.2	AT	5.0	B		10	3.5	5/	4.5	286	BOR
1976 03 28.37	B	4.3	AT	5.0	B		10	4		5.5	287	BOR

Comet West (1976 VI = 1975n) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 03 29.39	B	4.5	AT	5.0	B		10	4	6/	6.0	287	BCR
1976 03 29.39	B	4.2	AT	0.0	E		1					BOR
1976 03 31.38	B	4.4	AT	0.0	E		1					BOR
1976 03 31.38	B	4.7	AT	5.0	B		10	5	6	4.0	284	BOR
1976 04 05.37	B	5.4	AT	5.0	B		10	5	6	5.5	290	BOR
1976 04 05.37	B	5.0	AT	0.0	E		1					BOR
1976 04 06.37	B	5.4	NO	5.0	B		10	6.9	6/	5.5	294	BOR
1976 04 08.37	B	5.8	NO	5.0	B		10	4.6	6	4.5	299	BOR
1976 04 10.37	B	5.9	NO	5.0	B		10	5.3	6	4.0	291	BOR
1976 04 12.37	B	6.0	NO	5.0	B		10	3.8	5/	3.0	289	BOR
1976 04 13.37	B	5.9	NO	5.0	B		10	4.8	5/	1.5	279	BOR
1976 04 17.35	B	6.4	NO	5.0	B		10	5.5	5	0.4	275	BOR
1976 04 23.31	B	6.3	NO	5.0	B		10	4.0	5	2.3	277	BOR
1976 04 24.29	B	6.5	NO	5.0	B		10	4.0	6	2.0	272	BOR
1976 04 30.29	B	6.6	NO	5.0	B		10	7.5	5	1.8	275	BOR
1976 05 04.29	B	7.1	NO	5.0	B		10	5.4	4	2.0	270	BOR
1976 05 05.28	B	7.0	NO	5.0	B		10	5.6	4	1.7	270	BOR
1976 05 11.33	B	6.9	NO	5.0	B		10	6.0		0.8	275	BOR
1976 05 13.32	S	7.1	NO	5.0	B		10	6.0	4/	0.7	271	BOR
1976 05 21.26	B	7.3	NO	5.0	B		10	5.3	4	0.4	275	BOR
1976 05 23.26	B	7.2	NO	5.0	B		10	7.0	3	0.8	267	BOR
1976 05 24.26	B	7.2	NO	5.0	B		10	6.8	4/	0.6	268	BOR
1976 05 28.27	B	7.4	NO	5.0	B		10	7.2	4/	0.5	260	BOR
1976 06 05.27				31.7	L	6	55	4.0	4	0.4	254	BOR
1976 06 05.27	B	8.0	NO	5.0	B		10	8.5		0.5	254	BOR
1976 06 21.12	S	8.0	NO	5.0	B		10	12				BOR
1976 06 21.12				31.7	L	6	55	7.0	3	?	270	BOR
1976 06 23.14				31.7	L	6	55	6.3	3	0.4	263	BOR
1976 06 23.14	S	8.1	NO	5.0	B		10	12				BOR
1976 06 27.13				31.7	L	6	55	6.4	3	0.3	280	BOR
1976 06 27.13	S	8.1	NO	5.0	B		10	17				BOR
1976 06 28.13	S	8.2	NO	5.0	B		10	12		0.2	280	BOR
1976 06 28.13				31.7	L	6	55	6.0	3	0.1	280	BOR
1976 07 03.15				31.7	L	6	65	4.8	3	0.2	270	BOR
1976 07 03.15	S	8.3	NO	5.0	B		10	9.6				BOR
1976 07 05.25	S	8.3	NO	5.0	B		10	11.5				BOR
1976 07 05.25				31.7	L	6	55	5.8	2	0.3	290	BOR
1976 07 06.26				31.7	L	6	55	4.8	2	0.2	270	BOR
1976 07 06.26	S	8.3	NO	5.0	B		10	9.6				BOR
1976 07 16.11	S	9.2	AC	31.7	L	6	55	4.0	1/			BOR
1976 07 18.10	S	9.0	AC	31.7	L	6	55	5.5	2/	0.1	295	BOR
1976 07 18.10	S	8.5	AC	5.0	B		10	11				BOR
1976 07 19.10	S	8.6	AC	5.0	B		10	8.6				BOR
1976 07 19.10	S	9.2	AC	31.7	L	6	55	6.1	2	0.2	300	BOR
1976 07 23.10	S	8.8	NO	5.0	B		10	11				BOR
1976 07 23.10	S	9.3	AC	31.7	L	6	55	4.0	2	0.2	315	BOR
1976 07 26.10	S	8.8	NO	5.0	B		10	10				BOR
1976 07 26.10	S	9.5	AC	31.7	L	6	55	6.7	1/	0.2	320	BOR
1976 07 27.10	S	8.7	NO	5.0	B		10	13				BOR
1976 07 27.10	S	9.5	AC	31.7	L	6	55	10	1/	0.2	330	BOR
1976 08 03.17	S	9.9	AC	31.7	L	6	55	4.3	0			BOR
1976 08 17.12	S	10.4	AC	31.7	L	6	55	4	0			BOR
1976 08 18.07	S	10.4	AC	31.7	L	6	55	5.5	0			BOR
1976 08 19.08	S	10.6	AC	31.7	L	6	55		0			BOR
1976 08 25.09	S	11.0:	AC	31.7	L	6	55	& 2.5	0			BOR

Periodic Comet Encke (1967 XIII = 1971 II = 1974 V)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1967 09 02.38	S	8.7	AC	15.0	L	4	20	1	1/			BOR
1967 09 03.39	S	8.7	AC	15.0	L	4	20	1	4			BOR
1970 10 29.07		[12.0		31.7	L	6	62					BOR
1970 11 07.23		[11.5		31.7	L	6	62					BOR
1970 11 16.99	S	9.1	AC	5.0	B		10	8				BOR
1970 11 16.99	S	9.3	S	15.0	L	4	21	6	2			BOR
1970 11 21.14				5.0	B		10	12	1			BOR
1970 11 22.02	S	8.6	A	5.0	B		10	10	3			BOR
1970 11 22.02	S	8.4	S	15.0	L	4	21	7				BOR
1970 11 24.02				5.0	B		10	12				BOR
1970 11 24.02	S	8.4	S	15.0	L	4	21	8	2			BOR
1970 11 25.07	S	7.9	AC	5.0	B		10	12				BOR
1970 11 25.07	S	8.1	S	15.0	L	4	21	9	2			BOR
1970 11 25.99	S	7.9	AC	5.0	B		10	9	2			BOR
1970 11 30.99	S	7.7	AC	5.0	B		10	8	3			BOR
1970 12 03.02	S	7.6	AC	5.0	B		7					BOR
1970 12 03.02	S	7.4	AC	5.0	B		10	12	3			BOR
1970 12 05.02	S	7.3	AC	5.0	B		10	10	2/			BOR
1970 12 07.95	S	6.9	AC	5.0	B		10	9	2			BOR
1970 12 18.94				15.0	L	4	21	2	6			BOR
1970 12 18.94	S	6.3	Y	5.0	B		10	2.5	6			BOR
1974 04 11.03	S	9.0	S	31.7	L	6	55	0.7	2			BOR
1974 04 17.03	B	8.5	S	31.7	L	6	55	0.5	4			BOR
1974 04 18.03	S	8.7	S	31.7	L	6	88	0.3	2			BOR
1974 04 20.04	S	8.2	S	31.7	L	6	55	0.7	4/	?	40	BOR
1974 04 21.04	S	8.3	S	31.7	L	6	55	0.8	3/			BOR
1974 04 27.04	S	7.7	S	31.7	L	6	55	0.4	4			BOR

Periodic Comet Tuttle-Giacobini-Kresák (1973 VI = 1973b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1973 03 24.05		[13.0	AC	31.7	L	6	65					BOR
1973 05 23.09		[12.5	NP	31.7	L	6	88					BOR
1973 06 03.11	S	10.2	NP	15.0	L	4	30	3.7		0.1	120	BOR
1973 06 03.11				31.7	L	6	55	2.4	3			BOR
1973 07 08.09	S	6.5	NO	5.0	B		10	7.3	2/			BOR
1973 07 12.09	S	9.8	NP	31.7	L	6	55	2.4	1			BOR
1973 07 12.09	S	9.6	NP	15.0	L	4	30	4.0				BOR
1973 07 13.10	S	9.8	AC	31.7	L	6	55	3.0	2			BOR
1973 07 24.09	S	11.0	NP	31.7	L	6	55	2.9	1			BOR
1973 07 25.09	S	11.3	NP	31.7	L	6	55	2.3	0			BOR
1973 07 30.09	S	11.5	AC	31.7	L	6	55	1.6	0			BOR
1973 08 06.09		[10.0		31.7	L	6	55					BOR
1973 08 14.06		[9.5		31.7	L	6	55					BOR
1973 08 17.05		[10.0		31.7	L	6	55					BOR
1973 08 29.04		[11.5		31.7	L	6	55					BOR
1973 09 07.07		[10.0		31.7	L	6	55					BOR
1973 09 22.02		[12.0		31.7	L	6	55					BOR

Periodic Comet Tempel 1 (1972 V = 1972a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 05 05.07	S	11.8	AC	31.7	L	6	55	1.0	1			BOR
1972 05 06.11	S	11.5	AC	31.7	L	6	55	1.0	4			BOR

Periodic Comet Tempel 1 (1972 V = 1972a) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 05 12.09	S	11.1	AC	31.7	L	6	55	1.2	3			BOR
1972 05 12.09	S	10.7	AC	15.0	L	4	51					BOR
1972 05 14.08	S	11.0	AC	31.7	L	6	55	1.5	4			BOR
1972 06 08.10	S	11.3	AC	31.7	L	6	55	1.2	1			BOR
1972 06 12.10	S	10.7	AC	15.0	L	4	51	2				BOR
1972 06 12.10	S	11.0	AC	31.7	L	6	55	1.5	2			BOR

Periodic Comet Honda-Mrkos-Pajdušáková (1969 V = 1974 XVI)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 08 24.40		[10.5		15.0	L	8	50					BOR
1969 09 10.39	S	8.3	AC	5.0	B		16	3	2			BOR
1969 09 12.39	S	8.3	AC	5.0	B		16	2	3			BOR
1969 09 14.39	S	8.3	AC	5.0	B		16	2	3			BOR
1969 09 14.39	E	8.5	AC	15.0	L	8	50					BOR
1969 09 21.40	S	8.1	AC	5.0	B		16	& 3.5				BOR
1974 11 15.97		[12.0	AC	31.7	L	6	55					BOR
1974 12 04.97	S	10.5	AC	31.7	L	6	88	1.6	1			BOR
1974 12 09.96	S	9.9	MP	31.7	L	6	55	1.5	1/			BOR
1974 12 18.96	S	8.9	MP	31.7	L	6	55	1.8	4/			BOR
1974 12 22.95	S	8.8:	S	31.7	L	6	55					BOR
1974 12 26.96	S	8.6	S	31.7	L	6	65	0.8	2/			BOR
1974 12 28.95	S	8.3	S	31.7	L	6	65	0.8	3			BOR
1974 12 30.95	S	7.8	S	8.0	B		15	3.1				BOR
1974 12 30.95	S	8.0	S	31.7	L	6	55	1.4	4/			BOR
1975 01 02.95	S	7.8	S	31.7	L	6	55	1.2	4			BOR
1975 01 02.95	S	7.7	S	8.0	B		15	2.0		?	75	BOR
1975 01 02.95	S	7.6	S	15.0	L	4	21	2.0	5/			BOR

Periodic Comet d'Arrest (1976 XI = 1976e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 06 28.12	S	11.9	AC	31.7	L	6	65	1.3	0			BOR
1976 07 03.14	S	11.5	AC	31.7	L	6	65	1.3	0/			BOR
1976 07 05.24	S	11.3	AC	31.7	L	6	65	1.7	2			BOR
1976 07 06.25	S	11.1	AC	31.7	L	6	65	2.1	1			BOR
1976 07 15.09	S	10.1	AC	31.7	L	6	65	4.0	2			BOR
1976 07 16.11	S	9.8	NP	31.7	L	6	55	4.4	1			BOR
1976 07 18.12	S	9.4	NO	31.7	L	6	55	4.7	3			BOR
1976 07 18.12	S	9.4	NO	8.0	B		15					BOR
1976 07 19.11	S	9.4	NO	31.7	L	6	55	6	1			BOR
1976 07 20.10	S	9.5	NO	31.7	L	6	55	5	1/			BOR
1976 07 23.11	S	9.0	NO	31.7	L	6	55	6.5	1			BOR
1976 07 23.11	S	8.5	NO	5.0	B		10	10				BOR
1976 07 23.26	S	7.3	S	5.0	B		10	20				BOR
1976 07 26.11	S	7.7	NO	5.0	B		10	13.5	2/	?	320	BOR
1976 07 27.11	S	7.6	NO	5.0	B		10	14				BOR
1976 07 27.11				31.7	L	6	55	11		1.0	325	BOR
1976 07 29.08				31.7	L	6	55	6.5	3	0.4	310	BOR
1976 07 29.08	S	6.7	NO	5.0	B		10	15				BOR
1976 08 02.17	S	6.4	NO	5.0	B		10	24				BOR
1976 08 03.17	S	6.2	NO	5.0	B		10	24				BOR
1976 08 03.17				31.7	L	6	55	11	5			BOR
1976 08 03.17	S	6.0	NO	0.0	E		1	&30				BOR

Periodic Comet d'Arrest (1976 XI = 1976e) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 08 05.29				31.7	L	6	55	13	3	0.5	300	BOR
1976 08 05.29	S	5.9	NO	0.0	E		1	40				BOR
1976 08 05.29	S	6.0	NO	5.0	B		10	26				BOR
1976 08 17.10	S	5.7	Y	5.0	B		10	15	3			BOR
1976 08 18.11	S	5.7	Y	5.0	B		10	15	3			BOR
1976 08 19.14	S	5.7	Y	5.0	B		10	25	2/			BOR
1976 08 20.14	S	5.6	Y	5.0	B		10	&20	3			BOR
1976 08 25.16	S	5.4	NO	5.0	B		10	&21	2/			BOR
1976 08 30.24	S	5.1	NO	5.0	B		10	18				BOR
1976 08 30.24				31.7	L	6	55	9	3	?	290	BOR
1976 08 30.24	S	5.0	NO	0.0	E		1					BOR
1976 08 31.24	S	4.9	NO	0.0	E		1					BOR
1976 08 31.24	S	5.0	NO	5.0	B		10	20	3/	?	290	BOR
1976 09 20.23	S	5.9	NO	5.0	B		10	10.5	2/			BOR
1976 09 22.23	S	6.1	NO	5.0	B		10	9.6	3			BOR
1976 09 23.23	S	6.1	NO	5.0	B		10	9.6	3			BOR
1976 09 25.22	S	6.1	NO	5.0	B		10	8.0	2			BOR
1976 10 15.12	S	7.6:	NO	5.0	B		10	8.5	1			BOR
1976 10 18.16	S	7.3	NO	5.0	B		10	9.4				BOR
1976 10 18.16	S	8.2	NO	31.7	L	6	55	4.7	2			BOR
1976 10 27.16	S	8.8	NO	31.7	L	6	55	6.5	0/			BOR
1976 10 27.16	S	7.9	NO	5.0	B		10	9				BOR
1976 10 28.12	S	9.0	NO	31.7	L	6	55	4	1			BOR
1976 10 28.12	S	8.1	NO	5.0	B		10	8				BOR
1976 11 13.09	S	9.9	AC	31.7	L	6	55	3.2	0/			BOR
1976 11 14.10	S	10.1	AC	31.7	L	6	55	3	1			BOR
1976 11 14.10				12.0	B		20	6.5				BOR
1976 11 17.08	S	10.3	AC	31.7	L	6	55	3	0			BOR
1976 11 19.09	S	10.5	AC	31.7	L	6	55	3	0/			BOR
1976 11 21.10	S	10.2	AC	31.7	L	6	55	4.5	0			BOR
1976 12 14.02	S	11.3	AC	31.7	L	6	55	3	0			BOR
1976 12 16.05	S	11.6:	AC	31.7	L	6	55	2	0			BOR
1976 12 19.01	[	11.7	AC	31.7	L	6	55					BOR
1976 12 25.04	[	11.5	AC	31.7	L	6	55					BOR

Periodic Comet Giacobini-Zinner (1972 VI = 1972d)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 05 12.26	[	12.0		31.7	L	6	65					BOR
1972 06 08.30	S	10.2	AC	15.0	L	4	38	1.5				BOR
1972 06 08.30				31.7	L	6	65	2	3	0.03	265	BOR
1972 06 11.30				31.7	L	6	55	1.3	4/	0.05	270	BOR
1972 06 11.30	S	10.2	AC	15.0	L	4	38					BOR
1972 07 26.30	S	9.7	NO	15.0	L	4	38	1				BOR
1972 07 26.30	S	9.9	NO	31.7	L	6	55	1	3	0.07	275	BOR
1972 08 05.33	S	9.5	NO	15.0	L	4	38	2	2	0.05	275	BOR
1972 08 10.33	S	9.6	AC	15.0	L	4	38	1				BOR
1972 08 10.33	S	9.5	AC	5.0	B		10					BOR
1972 08 10.33				31.7	L	6	55	1	3/	0.1	275	BOR
1972 08 20.35				31.7	L	6	55	3	4	0.07	290	BOR
1972 08 20.35	S	9.7	AC	15.0	L	4	38					BOR
1972 08 21.32	S	9.7	AC	15.0	L	4	38					BOR
1972 08 21.32	S	10.3	AC	31.7	L	6	55	1.8	3	0.1	275	BOR
1972 09 05.37	S	9.9	AC	31.7	L	6	55	1.5	3	0.05	300	BOR

Periodic Comet Giacobini-Zinner (1972 VI = 1972d) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 09 06.37	S	10.2	AC	31.7	L	6	55	1.5	3	0.1	280	BOR
1972 09 06.37	S	10.0	AC	15.0	L	4	38					BOR
1972 09 06.37	S	10.2	AC	12.0	B		20					BOR
1972 09 15.37	S	11.2	AC	31.7	L	6	55	0.8	3	0.03	270	BOR
1972 09 15.37	B	11.4	AC	31.7	L	6	55					BOR
1972 09 18.37	S	11.3	AC	31.7	L	6	55	1.2	2	0.03	275	BOR
1972 09 18.37	B	11.5	AC	31.7	L	6	55					BOR
1972 10 03.40	S	11.4	AC	31.7	L	6	55	0.7	2	0.03	280	BOR
1972 10 09.38	S	11.7	AC	31.7	L	6	55	1	2	0.02	270	BOR
1972 10 09.38	B	11.9	AC	31.7	L	6	55					BOR
1972 10 10.38	B	11.9	AC	31.7	L	6	55					BOR
1972 10 10.38	S	11.7	AC	31.7	L	6	55	1	3	0.03	275	BOR
1972 10 18.39	S	11.8	AC	31.7	L	6	55	1	2/	0.05	275	BOR
1972 11 16.39	S	13.1	AC	31.7	L	6	55	0.7	0			BOR

Periodic Comet Forbes (1974 IX = 1974a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1974 07 17.29	S	12.6	AC	31.7	L	6	88	1.3	0			BOR
1974 07 21.28	S	12.6	AC	31.7	L	6	88	1.5	0			BOR
1974 07 22.28	S	12.6	AC	31.7	L	6	88	& 0.8	0			BOR
1974 08 15.31	S	12.9	AC	31.7	L	6	88	1.5	0			BOR
1974 08 16.34	S	12.9	AC	31.7	L	6	88	1.0	0			BOR

Periodic Comet West-Kohoutek-Ikemura (1975 IV = 1975b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 03 05.07	S	12.3	AC	31.7	L	6	65	1.2	1/			BOR
1975 03 09.07	S	12.5	AC	31.7	L	6	88	1.1	1			BOR
1975 03 10.03	S	12.5	AC	31.7	L	6	65	1.5	1			BOR
1975 03 16.06	S	12.6	AC	31.7	L	6	110	0.8	1			BOR

Periodic Comet Faye (1969 VI = 1977 IV)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 09 21.28	S	11.6	AC	25.4	L	8	65	3	4			BOR
1969 09 21.28				55.9	M	10	85			0.3	280	BOR
1969 10 05.21	S	10.8	AC	25.4	L	8	65	1.5	2			BOR
1969 10 18.23	S	12.0	AC	25.4	L	8	65	1.5	2/			BOR
1969 10 18.23	S	11.6	AC	15.0	L	4	33	1.5				BOR
1969 12 06.22	S	11.6	AC	25.4	L	8	65	1	1			BOR
1969 12 06.22				55.9	M	10	85	1.5	5			BOR
1969 12 17.31				55.9	M	10	85	1.25	4/			BOR
1969 12 17.31	S	11.4	AC	25.4	L	8	65	1.5	1			BOR
1970 01 10.19	S	12.0:	AC	25.4	L	8	65	0.8				BOR
1976 12 13.99	S	12.8	AC	31.7	L	6	88	1.0	0/			BOR
1976 12 18.99	S	12.8	AC	31.7	L	6	88	0.7	0			BOR
1977 01 08.99	S	12.7	AC	31.7	L	6	88	0.8	0			BOR
1977 01 11.98	S	12.5	AC	31.7	L	6	88	1.0	1/			BOR

Periodic Comet Comas Solá (1969 VIII = 1968g)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1969 09 21.38	S	13.6	AC	55.9	M	10	132	0.5	0			BOR

Periodic Comet Kearns-Kwee (1972 XI = 1971c)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1972 12 12.22	S	12.8	AC	31.7	L	6	146	0.8	0			BOR
1973 01 02.15	S	12.8	AC	31.7	L	6	146	0.7	1			BOR
1973 01 03.15	S	12.8	AC	31.7	L	6	55	1.1	1			BOR
1973 01 10.09	S	13.0	AC	31.7	L	6	146	0.7	1			BOR
1973 01 22.05	S	13.1	AC	31.7	L	6	146	0.8	0			BOR
1973 01 26.09	S	13.0	AC	31.7	L	6	146	& 0.4	1			BOR

Periodic Comet Boethin (1975 I = 1975a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1975 02 09.00	S	11.3	AC	31.7	L	6	55	2.0	1			BOR
1975 02 10.00	S	11.3	AC	31.7	L	6	55	1.9	1			BOR
1975 02 15.01	S	11.2	AC	31.7	L	6	55	1.8	0/			BOR
1975 03 05.03	S	12.5	AC	31.7	L	6	65	1.4	1			BOR
1975 03 06.02	S	12.4	AC	31.7	L	6	65	1.6	0			BOR
1975 03 07.02	S	12.5	AC	31.7	L	6	65	2.1	0			BOR
1975 03 10.04	S	12.6	AC	31.7	L	6	88	1.2	0			BOR

Periodic Comet Klemola (1976 X = 1976j)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1976 08 31.25	[	12.0	AC	31.7	L	6	65					BOR
1976 09 14.07	S	12.1	AC	31.7	L	6	88	1.1	1			BOR
1976 09 20.10	S	12.5	AC	31.7	L	6	88	1.4	1			BOR
1976 09 22.10	S	12.3	AC	31.7	L	6	88	1.5	1			BOR
1976 09 23.24	S	12.3	AC	31.7	L	6	88	1.3	1/			BOR
1976 09 25.18	S	12.4	AC	31.7	L	6	88	1.6	3			BOR

++

Cometary Photometric Parameters*

COMET	H	n	H	obs	notes
1960 II	7.21 (0.10)	6.64 (0.70)	7.18 (0.52)	7	
1962 VIII			1.08	1	
1963 I			6.45 (0.13)	4	
1964 VI			8.62 (0.03)	2	
1964 VIII			7.60 (0.24)	3	
1964 IX			6.95 (0.08)	3	
1965 VIII	6.23 (0.06)	3.46 (0.12)		17	1
1966 IV			6.24	1	
1966 V			4.61 (0.12)	13	2
1967 II	9.35 (0.10)	0.93 (0.43)	8.90 (0.65)	5	
1967 XIII			10.69 (0.08)	2	
1968 I	4.49 (0.09)	3.69 (0.13)		33	#
1968 IV			10.60	1	
1968 V			9.85	1	
1968 VI	5.68 (0.14)	5.22 (0.61)		25	3

Cometary Photometric Parameters* (Cont.)

COMET	H	n	H	obs	notes
1968 VII			7.25 (0.24)	7	#
1969 I			4.0	1	#
1969 V	13.98 (0.49)	8.35 (0.85)	11.49 (0.21)	4	4
1969 VI			9.32 (0.41)	5	5
1969 VII	7.81 (0.04)	2.33 (0.32)	7.83 (0.24)	5	6
1969 VIII			8.61	1	#
1969 IX	6.50 (0.07)	2.93 (0.16)		14	7
1970 II	3.50 (0.04)	3.48 (0.05)		30	8
1970 III	7.88 (0.22)	2.31 (0.25)		6	9
1970 X	7.95 (0.08)	3.09 (0.40)	8.05 (0.25)	4	
1970 XV	5.88 (0.06)	2.33 (0.18)		28	10
	4.51 (0.08)	3.54 (0.09)		16	
1971 II			[9.84 (0.22)]	10	11
1971 V			6.51 (0.21)	8	
1972 V			9.12 (0.29)	6	
1972 VI	9.42 (0.09)	3.93 (0.36)		16	
1972 VIII	[-3.70 (0.93)]	[10.88 (0.78)]	4.50 (0.33)	11	
1972 IX			2.54 (0.23)	13	
1972 XI			8.33 (0.08)	6	
1973 II	4.03 (0.20)	6.02 (0.23)		14	
1973 VI					12
1973 VII			8.81 (0.18)	8	
1973 XII	5.47 (0.03)	2.46 (0.08)		13	13
	6.19 (0.05)	2.37 (0.09)		24	
1974 III	7.31 (0.03)	3.07 (0.06)		44	14
1974 V			[11.20 (0.60)]	6	11
1974 IX			10.28 (0.06)	5	
1974 XVI	11.25 (0.21)	4.14 (0.40)		8	
1975 I	9.16 (0.15)	6.05 (0.49)	9.76 (0.21)	7	
1975 IV			9.59 (0.08)	4	
1975 IX	7.08 (0.07)	3.38 (0.15)		27	
1975 X			9.80 (0.34)	6	
1975 XII			5.17 (0.15)	9	
1975 XI	8.74 (0.05)	3.01 (0.11)		13	
1976 IV			11.24 (0.37)	9	15
1976 VI	4.18 (0.04)	3.12 (0.06)		54	16
1976 X			9.67 (0.12)	5	
1976 XI				38	17
1977 IV			8.38 (0.10)	4	

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* Headings described in text; "obs" is number of observations utilized.
The parenthetical quantities are probable errors.
NOTES are given on the following page.

NOTES:

1 Observation of Oct. 13 approximate, not used in calculations.
2 Observations of Sept. 6 and 7 due to flare, not used in calculations.
3 Observation of Oct. 4.99 inferior, not used in calculations.
4 Only binocular observations used in calculations.
5 Observation of Oct. 5 inferior, not used.
6 Only binocular observations used.
7 Observations of Feb. 8, 13, and 14 due to flare, not used.
8 Observation of July 22 inferior, not used in calculations.
9 Only those observations made with 25.4-cm reflector were used.
10 Brightness permanently altered by flare in 1970 Nov. The two formulae represent pre- and post-flare lightcurves.
11 P/Encke's lightcurve cannot be represented by the standard formula.
12 Observations are only of the two great flares.
13 Distinct break in lightcurve at perihelion; formulae are pre- and post-perihelion.
14 Observation of Mar. 15 not used in calculations.
15 Observation of Mar. 8 not used.
16 Observations of Feb. 23 and 24 not used (pre-flare data).
17 P/d'Arrest's lightcurve cannot be represented by standard power-law formula.
\+ The empirically-determined correction from the naked eye to 6.78-cm is -0.2 mag.
\# Parameters so denoted included observations made with a 55.9-cm Maksutov (Key letter = M) which were reduced assuming the aperture correction proposed by Morris (1973) for reflectors.

****

BOOK REVIEW: INTRODUCTION TO COMETS

Introduction to Comets, by John C. Brandt and Robert D. Chapman, 1981, Cambridge University Press, 246 pp.

Brandt and Chapman have put together an interesting book which can be of use to both the professional astronomer and the layman. However, Introduction to Comets has many deficiencies and problems which limit its usefulness. Brandt and Chapman have allowed many errors to creep into their book -- some are typographical, some are apparently due to a lack of research.

For some time, there has been a need to add to the literature some reliable work which thoroughly describes what we know about comets today, as so much progress has been made in the study of comets during the past 10 to 20 years. And there is a need for such a work to be readable by a large audience, not only specialists in the field of cometary astronomy. The authors had these ideas in mind when writing the book, as indicated in the Preface. Some who have recently reviewed this book in other journals have stated that the authors achieved their goals, but it seems that those reviewers either did not read the book thoroughly or do not have a good combined knowledge of comets and of what kind of readership to which such a book should be addressed.

The first chapter, "Comets in history", and the last three chapters, "(Spacecraft) Missions to comets", "Are comets dangerous?", and "Comet lore", are all fairly readable, even for a high-school student. Other chapters deal extensively with cometary physics and make extensive use of formulae in the discussion. These sections appear more suited to the professional rather than the layperson. Thus, the chapters are very uneven as far as their intended-readership. (Cont. on page 104)

RECENT NEWS CONCERNING COMETS

(Cont. from page 78)

teurs visually until 1985, and will probably not be seen photographically until 1984.

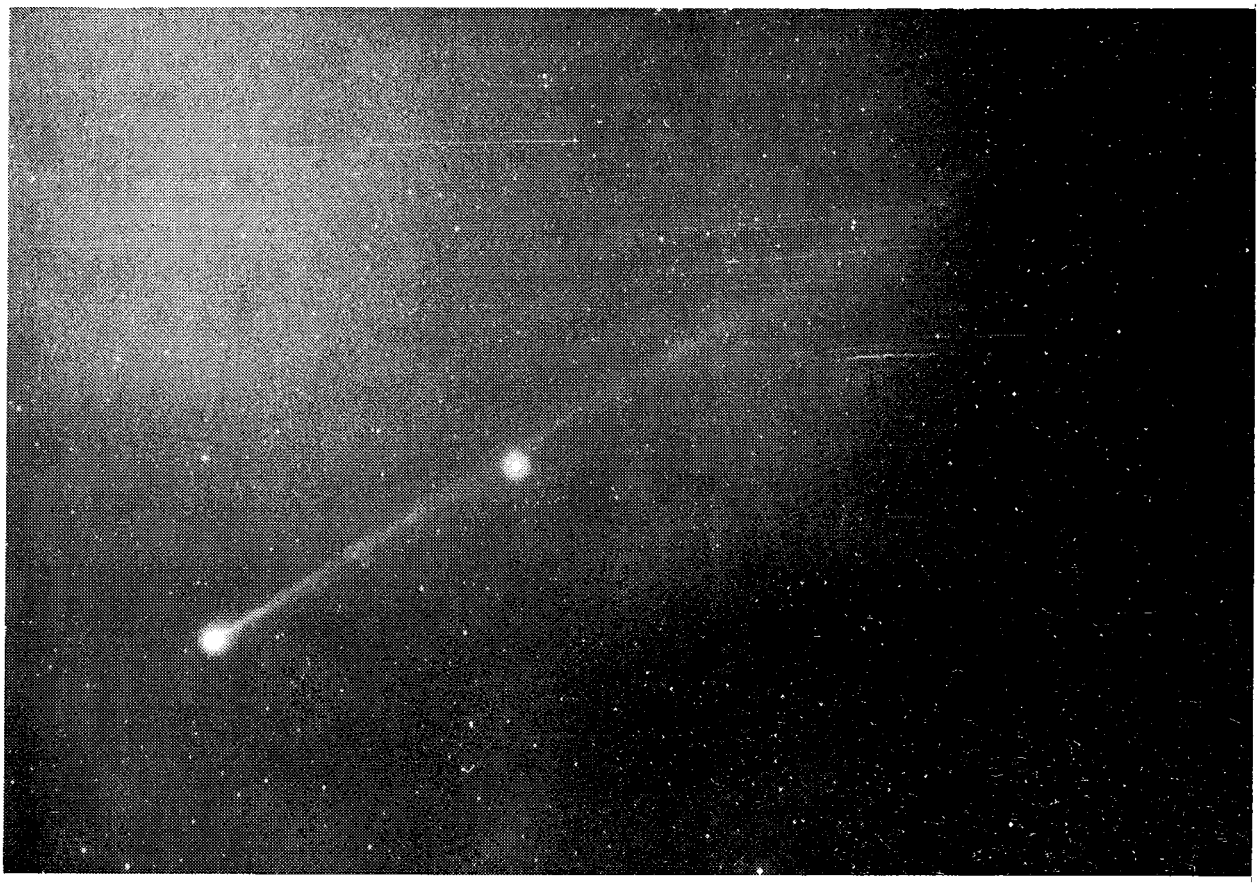
Observers at Kitt Peak National Observatory have apparently confirmed the recovery from observations made October 18 and 20. Further information is available on IAU Circulars Nos. 3737 and 3742.

[The Editors thank Dennis Meredith of the Caltech news bureau for the photograph and the above information.]

News has been released by NASA that, although the U.S. will not be sending a space probe to P/Halley, it will send one of its solar orbiting satellites to P/comet Giacobini-Zinner in the latter half of 1985. More details on this will be given in a future issue.

Naval Research Laboratory scientists have reported the discovery of two more sungrazing comets with the earth-orbiting SOLWIND coronagraph (see ICQ 3, 98). The latest two objects both encountered the sun in 1981, on Jan. 27 and July 20 UT, and like comet 1979 XI, neither apparently survived their close approaches to the sun. These discoveries cast an interesting new light on the whole subject of comets approaching close to the sun, as there may be an incredibly high number of these faint objects over a relatively short period of time, also increasing the possibility of the perihelion passage of a much brighter member of the sungrazing group in the not-so-distant future!

Comet Austin 1982g has faded as it recedes from the sun, and its location in the morning sky has caused many observers to stop viewing it; the



RECENT NEWS CONCERNING COMETS

decrease in the number of observations is evident in the Tabulation of Comet Observations elsewhere in this issue. The photograph on page 102 was taken by J. E. Bortle, Stormville, NY, beginning Aug. 22.0597 UT (3-min exposure), with an 8-inch f/1.5 Schmidt camera and hypered Kodak 2415 film; the tail in the photo extends beyond 5 degrees in length.

Observers generally noted comet 1982g fading to total visual magnitude 10 and becoming quite diffuse by mid-October.

P/Churyumov-Gerasimenko 1982f has been a very noticeable object that will be nicely placed for observation for months to come. This object is easily detectable in a small telescope as a moderately-condensed comet with an interesting coma extending to some 1′ from the condensation itself. Now around 10th magnitude, this apparition is quite favorable (see Tabulation of Observations elsewhere in this issue), and an ephemeris is provided below, based on elements by Brian G. Marsden on IAU Circular 3743 (perturbations by all nine planets and nongravitational effects taken into account).

P/d'Arrest 1982e has been observed by several visual observers as a very diffuse, large object which is quite difficult to see, even though it has been brighter than 10th magnitude (see Tabulation of Observations).

--D.W.E.G. (11/11/82)

ORBITAL ELEMENTS AND EPHEMERIS FOR P/CHURYUMOV-GERASIMENKO 1982f (see text):

T = 1982 Nov. 12.0996 ET
ω = 11°.3244
Ω = 50.3592 } 1950.0
i = 7.1130

q = 1.306142 AU
e = 0.629153
P = 6.61 years

Date	ET	R. A. (1950)	Decl.	Delta	r	Elong.	Mag.
1982	11 17	06h30m14	+29°30'8	0.397	1.307	136°9	10.2
1982	11 22	06 40.45	+31 08.3				
1982	11 27	06 49.35	+32 42.3	0.391	1.318	142.4	10.2
1982	12 02	06 56.72	+34 11.3				
1982	12 07	07 02.47	+35 33.6	0.396	1.339	148.6	10.3
1982	12 12	07 06.60	+36 47.4				
1982	12 17	07 09.21	+37 51.1	0.413	1.370	155.2	10.4
1982	12 22	07 10.52	+38 43.1				
1982	12 27	07 10.84	+39 22.6	0.444	1.410	160.6	10.7
1983	01 01	07 10.50	+39 49.1				
1983	01 06	07 09.82	+40 03.0	0.489	1.457	162.5	11.1
1983	01 11	07 09.10	+40 04.9				
1983	01 16	07 08.65	+39 56.1	0.549	1.510	159.5	11.5
1983	01 21	07 08.70	+39 38.1				
1983	01 26	07 09.41	+39 12.5	0.626	1.569	153.4	11.9
1983	01 31	07 10.84	+38 41.1				
1983	02 05	07 13.00	+38 05.2	0.718	1.632	146.2	12.4
1983	02 10	07 15.88	+37 26.0				
1983	02 15	07 19.46	+36 44.3	0.826	1.699	138.9	12.9
1983	02 20	07 23.68	+36 01.0				
1983	02 25	07 28.49	+35 16.5	0.948	1.768	131.6	13.4

Mag. = m_1 = 11.0 + 5 log Delta + 10 log r

BOOK REVIEW: INTRODUCTION TO COMETS

(Cont. from page 101)

The writing style is often puzzling, awkward, and inconsistent. For example, names of individuals are sometimes given with first names, sometimes with first initials, and sometimes with nothing but the last name (e.g., the first time that F. L. Whipple is mentioned, pp. 44-5). Topics tend to jump around too much, and often the reader is left wondering what is actually being said (e.g., the last 2 sentences in paragraph 2 on p. 46). Indeed, sometimes too much knowledge is assumed of the reader.

The historical section leaves much to be desired. For example, the authors ambiguously put present-day knowledge together with outdated historical material, as in the last paragraph on page 35 (concerning Halley's Comet). Ambiguity is also present, for example, in paragraph 2 on p. 19, in the discussion of Descartes' "vortices". Overall, the first chapter is much too brief, and it leaves too many important historical events untouched.

Other examples of errors are evident in Fig. 3.1, p. 60, where an IAU Circular is called a telegram; on page 69, paragraph 2, where the peak in Fig. 3.6 is wrongly stated; in the text on pp. 70-72, where the figures referred to are wrong; and the inconsistencies on pp. 123-4 and elsewhere, in which periodic comet Schwassmann-Wachmann 1 is wrongly abbreviated at times to just "Schwassmann-Wachmann" (Arabic numerals are used with comets' names, not Roman numerals).

Most of the formulae presented are poorly explained. For example, "the planetary disturbing function", which is presented in the equation for nongravitational motion, is not defined. How is the reader supposed to know what such an obscure term means? It would be better in many cases for the authors to just cite specific references.

The sad lack of useful discussion of cometary photometry takes much credibility away from the book, and highlights the relatively narrow scope of the book. The recent work by astronomers such as Michael A'Hearn, Robert Millis, and others, concerning photoelectric photometry, is grossly neglected. Some reference should have been made not only to visual photometry, but also to the valuable data obtained in Arizona by Elizabeth

Roemer over a period of many years on the so-called nuclear brightness of comets.

In their tiny discussion of photometry, the authors did manage to mix up nuclear and total magnitudes (p. 76) and to provide a poorly-constructed light curve of P/Encke (p. 114). The discussion of cometary outburst (pp. 123-4) is much too short; no mention is even made of P/Tuttle-Giacobini-Kresák's 1973 outburst of 10 magnitudes in a matter of hours, from total magnitude 14 to 4.

Chapter 7, "Recent comets and some current developments", is lacking in content. The authors should have provided a much more extensive discussion of comets Kobayashi-Berger-Milon, West, and Bradfield. There is actually a heading, "Bradfield", for comet 19791, which precedes all of three short sentences!

In conclusion, the type of format and writing style which Brandt and Chapman should have used is that successfully used by Arne Henden and Ronald Kaitchuck in their excellent new book, Astronomical Photometry. Henden and Kaitchuck do an admirable job of keeping a potentially-messy topic in a well-organized, easily-read format which is of tremendous use to readers.

The cost of Introduction to Comets is prohibitive -- $45.00 hard-bound. If one wishes to get a good, fairly-readable book overviewing cometary astronomy for a decent price, buy the new book Comets (Wilkening, ed., Univ. of Ariz. Press, 1982) for only $29.95, which has more than 750 well-organized pages. We will review this latter book in an upcoming issue.

--Daniel Green

TABULATION OF COMET OBSERVATIONS

OBSERVATIONS OF COMETS.

The headings for the tabulated data are as follows: "DATE (UT)" = Date and time to hundredths of a day in Universal Time (see p. YY for explanation of UT). "MM" = the method employed for estimating the total visual magnitude (B = Bobrovnikoff, E = Beyer, I = In-focus, M = Morris, S = Sidgwick or In-out; also, P stands for photographic magnitude, and photoelectrically-determined values fall under L, U, and V for the standard U, B, and V, respectively, with photoelectric V assumed for "W"). "MAG." = total visual magnitude estimate; A colon indicates that the observation is only approximate, due to bad weather conditions, etc. "RF" = reference for magnitude estimates (see page 64 of last issue and new additions below). "AP." = aperture in centimeters of the instrument used for the observations, usually given to tenths. "T" = type of instrument used for the observation (cf. ICQ 2, 26 and 4, 64). "F/" and "PWR" are the focal ratio and power or magnification, respectively, of the instrument used for the observation. "COMA" = estimated coma diameter of the comet in minutes of arc. An ampersand (&) indicates an approximate estimate. "DC" = degree of condensation on a scale where 9 = stellar and 0 = diffuse; a slash (/) indicates a value midway between the given number and the next-higher integer. "TAIL" = estimated tail length in degrees; again, an ampersand indicates a rough estimate. "PA" = estimated measured position angle of the tail in degrees (north = 0, east = 90). "OBS" = the observer who made the observation (see below). An asterisk between the DATE and MM columns indicates that the observation is an updated version of one already published in a previous issue of the ICQ, THE COMET QUARTERLY, or THE COMET.

A complete listing of the Observer Key (as published during the past 4 years in the ICQ), the Reference Key, the Source Key, and the Instrument Key, is available as a computer printout from the Editor for $2.00 postpaid. Unfortunately, the length of the Observer Key (now some 500 observers) does not permit us to republish it in the ICQ in the near future; the entire set of Keys will be republished sometime within the next 3-5 years.

NEW ADDITION TO THE INSTRUMENT KEY: M = Maksutov telescope.

NEW ADDITIONS TO THE REFERENCE KEY:

AE = Planetary magnitudes from the American Ephemeris & Nautical Almanac (for use with bright comets)
AN = Comparison-star sequences as published by M. Beyer in articles in Astronomisches Nachrichten
NS = "Magnitudes and Colors of Stars North of +80 ", by Seares, Ross, and Joyner (1941, Carnegie Institution Publication 532)
SC = Sky Catalogue 2000.0 (Sky Publishing)

NEW ADDITIONS TO THE OBSERVER KEY (cf. ICQ 4, 65):

BEM	C. S. BEMBRICK, AUSTRALIA
HAR02	PHIL HARRINGTON, NY, U.S.A.
LOV	T. LOVEJOY, AUSTRALIA
MAR01	JOSEPH N. MARCUS, OH, U.S.A.
SMI05	TRENT SMITH, AUSTRALIA

Comet Bowell (1980b)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 06 13.54	S	11.8	A	20	L	7	50	0.8	4			LOV
1982 06 20.54	S	11.6	A	20	L	7	50	0.8	4			LOV
1982 07 09.39	S	11.4	A	20	L	7	50	1.5	3	0.01		LOV
1982 07 16.40	S	11.8	A	20	L	7	50	1	3			LOV
1982 07 20.58	S	12.0	V	25	L	9	70	0.75	2			CLA
1982 07 24.74	S	12.4	V	31	L	7	105	0.75	0			CLA
1982 07 24.82	S	12.4	V	32	L	8	110	0.75	1			PEA
1982 08 15.56	S	12.4	V	25	L	9	110	0.5	2			CLA
1982 08 17.62	S	12.5	V	25	L	9	110	0.75	1			CLA

Comet Austin (1982g)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 07 01.73	S	9.5	V	7.8	R	8	30					JON
1982 07 01.73	S	9.9	V	31.7	L	5	86	2.5	4			JON
1982 07 02.75	S	9.1	V	7.8	R	8	30					JON
1982 07 02.75				31.7	L	5	86	2	4			JON
1982 07 03.76	S	9.2	V	7.8	R	8	30					JON
1982 07 03.76				31.7	L	5	86	3	3			JON
1982 07 03.80	S	8.8	A	20	L	7	50	3	4			LOV
1982 07 04.75	S	9.1	V	7.8	R	8	30					JON
1982 07 05.75	S	10.4	V	31.7	L	5	86					JON
1982 07 07.75	S	9.8	V	31.7	L	5	86	& 2				JON
1982 07 08.75	S	9.0	V	7.8	R	8	30					JON
1982 07 08.80	S	8.5	A	20	L	7	50		5			LOV
1982 07 09.76	S	8.8	V	7.8	R	8	30					JON
1982 07 10.75	S	8.4	V	4.5	R	6	13					JON
1982 07 10.75	S	8.6	V	7.8	R	8	30					JON
1982 07 11.75	S	8.4	V	7.8	R	8	30					JON
1982 07 11.75	S	8.4	V	4.5	R	6	13					JON
1982 07 12.88	S	7.9	A	10.0	L	9	38	& 6	5			SMI05
1982 07 14.74	* S	7.8	V	4.5	R	6	13					JON
1982 07 14.74				31.7	L	5	86	3.5	4			JON
1982 07 15.74	S	7.4	V	4.5	R	6	13					JON
1982 07 16.74	S	7.3	V	4.5	R	6	13					JON
1982 07 17.81	S	7.0	SP	20	L	7	50	5	6	0.25		LOV
1982 07 18.75	S	7.3	V	4.5	R	6	13					JON
1982 07 19.81	S	6.4	SP	0.0	E		1	10	6	0.25		LOV
1982 07 21.75	S	6.6	V	4.5	R	6	13					JON
1982 07 22.74	S	6.4	V	4.5	R	6	13					JON
1982 07 23.74	S	6.3	V	4.5	R	6	13					JON
1982 07 23.74	S	6.2	V	5.0	B		3					JON
1982 07 24.75	S	6.2	V	5.0	B		3					JON
1982 07 24.75	M	6.2	V	4.5	R	6	13					JON
1982 07 24.75	S	6.3	V	4.5	R	6	13					JON
1982 07 26.83	S	6.6	A	25	L	6	56	& 5.5	5			TAB
1982 07 26.84	M	6.8	A	25	L	6	56	& 5.5	5			TAB
1982 07 27.76	S	6.1	V	5.0	B		3					JON
1982 07 28.89	S	6.0	A	20.0	L	6	50	5	6			SMI05
1982 07 30.79	B	5.8	A	7 0	R	16	66		2			BEM
1982 07 30.80	S	5.1	SP	0.0	E		1	15	6/	1.0		LOV
1982 07 31.79	B	5.7	A	10	R	15	64		2			BEM

Comet Austin (1982g) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 07 31.80	S	5.0	SP	0.0	E		1	14	6/	1.5		LOV
1982 07 31.88	S	5.4	A	10.0	L	9	38	7.5	7			SMI05
1982 08 01.76	B	5.4	A	10	R	15	64					BEM
1982 08 01.80	S	4.9	SP	0.0	E		1	12	7	2.7	225	LOV
1982 08 02.76	S	5.7	Y	5.0	B		3					JON
1982 08 02.79	B	5.2	A	10	R	15	64		2			BEM
1982 08 03.76		5.3	Y	5.0	B		3					JON
1982 08 03.93	S	4.9	A	10.0	L	9	38	8	7			SMI05
1982 08 05.92	S	4.2	A	10.0	L	9	38	8	7			SMI05
1982 08 07.81	S	4.5	SP	0.0	E		1		7	>1	300	LOV
1982 08 08.76		4.6	AT	5.0	B		3					JON
1982 08 19.07	B	4.7	A	3.5	B		7					MAR01
1982 08 19.17	B	5.2	S	15.0	L	5	24	4	6			MAC
1982 08 19.85	S	5.0	A	10 8	L	4	15					KRA01
1982 08 19.87		4.4	A	4 8	R	3		3.6		0.5	23	KRA01
1982 08 22.07	B	4.8	A	3.5	B		7					MAR01
1982 08 22.1		5.5:		20.0	L					&0.5		HAR02
1982 08 22.10	B	5.1:	A	7.0	B	5	10	&30		&1.7	10	WIL01
1982 08 22.18	B	5.5	S	15.0	L	5	24	6	6	0.65	37	MAC
1982 08 23.10	B	5.7	Y	7.0	B	5	10	& 7		1.0	20	WIL01
1982 08 23.88	S	4.5:	SP	5 8	B	4	10					KRA01
1982 08 24.09	B	5.4	Y	7.0	B	5	10	& 8		0.9	25	WIL01
1982 08 25.91	S	5.0:	SP	5 8	B	4	10		6			KRA01
1982 08 26.05	S	5.3	AA	5.0	B		7					DEY
1982 08 27.90	S	5.2:	A	5 8	B	4	10					KRA01
1982 08 28.06	B	5.4	A	3.5	B		7					MAR01
1982 08 28.10	B	6.3	Y	7.0	B	5	10	& 4.5		0.7	28	WIL01
1982 08 28.85	B	5.7	S	5.0	B		7					MER
1982 08 28.85		5.2	A	4 8	R	3						KRA01
1982 08 28.86	S	5.5	A	5 0	B	4	10		6			KRA01
1982 08 28.86				15.0	L	5	25	3.1	4	0.33	35	MER
1982 08 29.19	S	5.6	A	8.0	B		11	7.0	6	0.25	40	SPR
1982 08 29.84	S	5.9	SP	5 0	B	4	10					KRA01
1982 08 29.85	B	5.8	S	5.0	B		7					MER
1982 08 29.86				15.0	L	5	25	3.5	3	0.75	33	MER
1982 08 31.17	B	5.7	S	15.0	L	5	24	4	7			MAC
1982 09 01.85	B	6.2	S	5.0	B		7					MER
1982 09 01.86				15.0	L	5	25	3.7	2	0.3	36	MER
1982 09 02.18	S	6.2	A	8.0	R	4	19	6.0	6	0.20	40	SPR
1982 09 02.88	B	6.3	S	5.0	B		7					MER
1982 09 03.18	S	6.3	A	20.0	L	10	65	6.0	6	0.20	42	SPR
1982 09 03.85	B	6.3	S	5.0	B		7					MER
1982 09 04.0	S	5.8	A	3.5	B		7	5	7			LYN
1982 09 04.08	S	6.2	AA	8.0	B		20					DEY
1982 09 04.43	S	6.3	V	12.0	L	8	33	5	5			SAK
1982 09 04.82	S	6.0	SP	5 0	B	4	10		7			KRA01
1982 09 04.85	S	6.2	A	5 0	B	4	10					KRA01
1982 09 04.98	S	6.0	SC	11	L	6	34	5	6	1.5	40	LYN
1982 09 05.03	O	6.2	AA	5.0	B		10					GLE
1982 09 05.03	O	6.2	AA	5.0	B		10					GLE01
1982 09 05.08	B	6.7	A	7.0	B	5	10	8				WIL01
1982 09 05.16	B	6.1	S	15.0	L	5	24	6	7	0.70	38	MAC
1982 09 05.18	S	6.5	A	20.0	L	10	65	6.0	6	0.25	44	SPR

Comet Austin (1982g) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 05.43	S	6.3	V	12.0	L	8	33	5	4			SAK
1982 09 06.0	S	6.2	SC	11	L	6	138	5	6	1.5	40	LYN
1982 09 06.03	O	6.3	AA	5.0	B		10					GLE01
1982 09 06.03	O	6.3	AA	5.0	B		10					GLE
1982 09 06.04	S	6.6	AA	8.0	B		20					DEY
1982 09 06.08	B	6.3	A	7.0	B	5	10	10		2.6	36	WIL01
1982 09 06.19	S	6.5	A	20.0	L	10	65	6.5	6	0.20	40	SPR
1982 09 07.02	O	6.2	AA	5.0	B		10					GLE
1982 09 07.02	O	6.4	AA	5.0	B		10					GLE01
1982 09 07.18	S	6.4	A	8.0	B		11	7.0	5	0.10	40	SPR
1982 09 09.03	B	6.5	AA	8.0	B		20					MOR
1982 09 09.03	M	6.5	AA	5.0	B		12	8	7	3.5	33	MOR
1982 09 09.03				5.0	B		12			?1.5	55	MOR
1982 09 09.03	M	6.5	AA	8.0	B		20	6	7	3.5	33	MOR
1982 09 09.03	I	6.6	AA	1.5	B		6		9			MOR
1982 09 09.06	S	6.3:	AA	8.0	B		20					GRE
1982 09 09.06	M	6.2:	AA	8.0	B		20		7	&0.5		GRE
1982 09 09.84	B	6.7	S	5.0	B		7					MER
1982 09 10.05	S	6.4	AA	8.0	B		20	& 6	4/	&1		GRE
1982 09 10.05	M	6.4	AA	8.0	B		20					GRE
1982 09 10.18	S	6.7	A	25.0	L	5	38	5.5	5	0.20	35	SPR
1982 09 10.82	S	7.0	A	5 0	B	4	10					KRA01
1982 09 10.83	S	7.1	A	10 8	L	4	24		5/			KRA01
1982 09 10.84	B	6.6	S	5.0	B		7					MER
1982 09 11.00	M	6.7	AA	8.0	B		20	6	7	2.33	30	MOR
1982 09 11.02	M	6.7	AA	5.0	B		12	8	6/	2.33	30	MOR
1982 09 11.02	I	6.8	AA	1.5	B		6		9			MOR
1982 09 11.05	B	7.0:	AA	8.0	B		20					GRE
1982 09 11.05	M	6.4	AA	8.0	B		20	& 6	5/	&1		GRE
1982 09 11.05	S	6.4	AA	8.0	B		20					GRE
1982 09 11.08	B	7.0	A	7.0	B	5	10	& 8		2.3	24	WIL01
1982 09 11.82	B	6.7	S	5.0	B		7					MER
1982 09 11.83	S	7.0	S	15.0	L	5	25	3.5	2	0.25	46	MER
1982 09 12.00	M	6.7	AA	8.0	B		20		7			MOR
1982 09 12.01				25	L	7	68	1.3				MOR
1982 09 12.02	O	6.7	AA	5.0	B		10					GLE
1982 09 12.02	M	6.4	AA	8.0	B		20	&10	5/	&0.5		GRE
1982 09 12.02	S	6.4	AA	8.0	B		20					GRE
1982 09 12.02	O	6.7	AA	5.0	B		10					GLE01
1982 09 12.02	B	6.8	AA	8.0	B		20					GRE
1982 09 12.08	B	7.0	A	7.0	B	5	10	& 8		2.9	24	WIL01
1982 09 12.81	B	6.7	S	5.0	B		7					MER
1982 09 12.97	S	6.7	A	11	L	6	34	2.5	7			LYN
1982 09 13.01	S	6.7	AA	5.0	B		10					GRE
1982 09 13.01	M	6.7	AA	5.0	B		10	& 7	4	&0.5		GRE
1982 09 13.01	M	6.8	AA	8.0	B		20	6	6/	1		MOR
1982 09 13.02	M	6.8	AA	8.0	B		20	& 8	4	&1		GRE
1982 09 13.02				25	L	7	68	1.2				MOR
1982 09 13.02	S	6.8	AA	8.0	B		20					GRE
1982 09 13.18	S	7.0	A	20.0	L	7	65	4.75	5	0.10	30	SPR
1982 09 13.82	B	6.8	S	5.0	B		7					MER
1982 09 14.01	M	6.9	AA	8.0	B		20		6			MOR
1982 09 14.18	S	7.0	A	25.0	L	5	38	5.0	5	0.12	30	SPR
1982 09 14.81	B	6.9	S	5.0	B		7					MER

Comet Austin (1982g) Cont.

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 14.81	S	7.0	A	10 8	L	4	15		6/			KRA01
1982 09 15.00	M	6.9	AA	8.0	B		20					GRE
1982 09 15.00	B	7.0	AA	8.0	B		20	& 9	4	&1.5		GRE
1982 09 15.00	S	7.0	AA	8.0	B		20					GRE
1982 09 15.01	M	6.9	AA	8.0	B		20	6	6	1.5		MOR
1982 09 15.01				25	L	7	68	1.25	6			MOR
1982 09 15.18	S	7.2	A	20.0	L	10	65	5.0	5	0.15	30	SPR
1982 09 15.81	B	7.0	S	5.0	B		7					MER
1982 09 16.18	S	7.2	A	8.0	R	4	37	4.5	5	0.10	25	SPR
1982 09 16.81	B	7.1	S	5.0	B		7					MER
1982 09 17.18	S	7.3	A	8.0	R	4	19	4.0	4	0.10	25	SPR
1982 09 17.81	B	7.2	S	5.0	B		7					MER
1982 09 18.0	S	6.9	A	20	R	8	52	4.5	7	0.33	40	LYN
1982 09 18.02	M	7.3	AA	8.0	B		20	7	7	2	35	MOR
1982 09 18.02				25	L	7	68	1.85	6/			MOR
1982 09 18.04	M	7.0	AA	8.0	B		20	& 8	4/	&0.5		GRE
1982 09 18.04	S	7.0	AA	8.0	B		20					GRE
1982 09 18.06	B	7.2	SP	7.0	B	5	10					WIL01
1982 09 18.17	S	7.3	A	15.0	L	4	38	4.5	5	0.08	25	SPR
1982 09 18.81	B	7.3	S	5.0	B		7					MER
1982 09 19.16	S	7.5	A	20.0	L	10	65	4.0	4	0.5	20	SPR
1982 09 20.0	S	6.9	A	11	L	6	34	4	7	0.25	40	LYN
1982 09 20.02	M	7.4	AA	8.0	B		20	7	7	2	38	MOR
1982 09 20.02				25	L	7	68	1.4				MOR
1982 09 20.02	I	7.6:	AA	1.5	B		6					MOR
1982 09 20.88	B	7.6	S	5.0	B		7					MER
1982 09 22.06	B	7.9	NO	7.0	B	5	10					WIL01
1982 09 22.79	S	8.3	S	10 8	L	4	24	& 3				KRA01
1982 09 23.15	S	7.9	A	25.0	L	5	38	3.75	4			SPR
1982 09 24.00	M	8.3	S	25	L	7	68		5/			MOR
1982 09 24.01	S	8.0:	S	8.0	B		20					MOR
1982 09 24.15	S	7.9	A	20.0	L	10	65	3.5	4			SPR
1982 09 24.81	S	8.3	S	26.0	L	6	39	5.7	1			MER
1982 09 25.79	B	8.0	S	5.0	B		7					MER
1982 09 25.80	B	8.2	S	15.0	L	5	25	5.4	2	0.20	44	MER
1982 09 26.82	B	8.3	S	5.0	B		7					MER
1982 09 26.83	B	8.5	S	15.0	L	5	25	& 6	1	0.28	44	MER
1982 09 28.81	B	8.9	S	15.0	L	5	25	& 7	1	0.20	25	MER
1982 09 29.12	S	8.4	A	15.0	L	4	38	2.75	3			SPR
1982 09 30.13	S	8.2	A	20.0	L	10	65	2.5	4			SPR
1982 10 01.12	S	8.4	A	20.0	L	10	81	2.25	3			SPR
1982 10 02.99	S	8.8	S	25	L	7	68		5			MOR
1982 10 03.11	S	8.6	A	20.0	L	10	81	2.25	3			SPR
1982 10 04.99	M	8.6	S	25	L	7	68	2.2	5			MOR
1982 10 05.11	S	8.9	A	20.0	L	10	81	2.0	3			SPR
1982 10 05.99	M	8.6	S	25	L	7	68		5			MOR
1982 10 06.99	S	8.8:	S	25	L	7	68		5			MOR
1982 10 10.11	S	9.3	A	20.0	L	10	81	1.75	2			SPR
1982 10 11.12	S	9.4	A	20.0	L	10	81	1.65	2			SPR
1982 10 12.12	S	9.5	A	20.0	L	10	113	1.75	2			SPR
1982 10 13.11	S	9.6	A	20.0	L	10	113	2.0	2			SPR
1982 10 14.11	S	9.6	A	20.0	L	10	113	2.0	1			SPR
1982 10 15.11	S	9.8	A	20.0	L	10	81	1.75	1			SPR
1982 10 17.13	S	10.0	A	20.0	L	10	81	1.50	1			SPR
1982 10 28.40	S	10.0	AC	25	L	7	68	3	2			MOR

Periodic Comet Grigg-Skjellerup (1982a)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 05 15.09	S	10.0	A	15.0	R	5	31	4.5				MOR03
1982 05 22.10	S	9.5	A	15.0	R	5	31	7				MOR03

Periodic Comet d'Arrest (1982e)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 12.83	S	10.7	A	26.0	L	6	130	1.2	4			MER
1982 09 14.85	S	10.6	A	26.0	L	6	130	1.7	3			MER
1982 09 15.83	S	10.4	A	26.0	L	6	130	& 1.5	3			MER
1982 10 14.98	S	9.7	S	7.0	B		10	2.0				DEA
1982 10 17.98	S	9.2	S	7.0	B		10	3.0				DEA
1982 10 20.02	S	9.2	S	7.0	B		10	3.0				DEA
1982 10 20.04	S	9.3	AA	20.3	L	6	72	3.5	1			MOR
1982 10 20.04	S	9.9	AA	20.3	L	6	72	& 3.2	1/			GRE
1982 11 08.00	S	9.9	AA	25	L	7	68	3	0/			MOR

Periodic Comet Churyumov-Gerasimenko (1982f)

DATE (UT)	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1982 09 18.26	S	12.9	AC	25	L	7	103	1.0	5			MOR
1982 09 19.25	S	12.9	AC	25	L	7	103	1.2	5			MOR
1982 10 12.19	M	11.6	AC	25	L	7	103	1.7	5			MOR
1982 10 15.88	S	10.7	A	14.0	L	5	75	& 3	2			MER
1982 10 16.24	M	11.8	AC	25	L	7	103	1.1	6			MOR
1982 10 18.15	M	11.5	AC	25	L	7	103	1.5	5			MOR
1982 10 19.89	S	10.2	A	26.0	L	6	63	& 3	3	0.05	266	MER
1982 10 20.17	M	11.3	AC	20.3	L	6	72	& 1.7	4/			GRE
1982 10 20.17	M	11.3	AC	25	L	7	103	1.75	4/	?	250	MOR
1982 10 20.17	S	11.2	AC	20.3	L	6	72					GRE
1982 10 22.17	M	10.8	AC	25	L	7	103	2	6			MOR
1982 10 22.20	S	11.4	AC	22.9	R	12	211					GRE
1982 10 22.20	M	11.4	AC	22.9	R	12	211	& 1.4	5			GRE
1982 10 23.23	M	11.2	AC	25	L	7	103	1.3	7			MOR
1982 10 23.28	S	11.1	A	20.0	L	10	81	1.75	3			SPR
1982 10 24.04	B	12.5:	AC	22.9	R	12	274					GRE
1982 10 24.05	S	11.1	AC	22.9	R	12	274	& 1.5	3/			GRE
1982 10 24.08	M	11.5	AC	22.9	R	12	274					GRE
1982 10 24.20	M	11.3	AC	25	L	7	103	1.4	7	0.02	250	MOR
1982 10 25.19	S	10.9	AC	22.9	R	12	274	& 1.7	3			GRE
1982 10 25.19	M	11.4	AC	22.9	R	12	274					GRE
1982 10 27.19	M	10.9	AC	22.9	R	12	211					GRE
1982 10 27.19	B	12.4	AC	22.9	R	12	211					GRE
1982 10 27.19	S	10.9	AC	22.9	R	12	211	& 1.7	4/			GRE
1982 10 27.33	M	11.1	AC	25	L	7	103	1.2	7			MOR
1982 10 28.16	M	11.5	AC	22.9	R	12	211					GRE
1982 10 28.16	B	12.5	AC	22.9	R	12	211					GRE
1982 10 28.16	S	10.9	AC	22.9	R	12	211	& 1.8	5	?		GRE
1982 10 28.41	M	11.1	AC	25	L	7	103	1.2	7/			MOR
1982 11 08.13	B	10.7	AC	25	L	7	103					MOR
1982 11 08.13	M	10.7	AC	25	L	7	103	1.25	7	0.02	270	MOR
1982 11 08.14	B	10.7	AC	25	L	7	68					MOR
1982 11 09.21	M	10.4	AC	25	L	7	103	1.2	6/			MOR
1982 11 10.18				25	L	7	103			<0.01	135	MOR
1982 11 10.18	M	10.3	AC	25	L	7	103	1.0	7/	0.01	270	MOR

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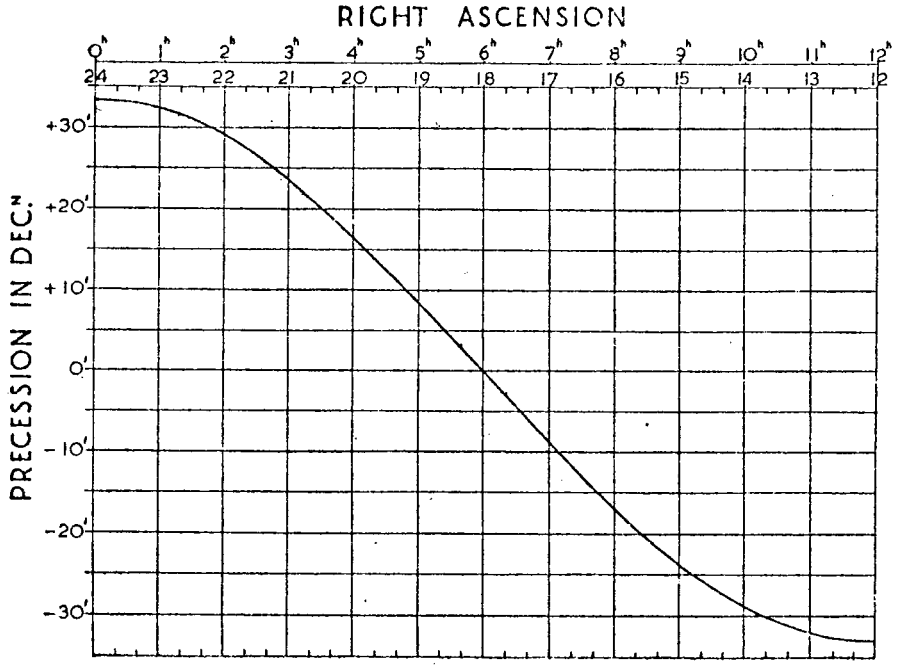
PRECESSION FOR 100 YEARS

Observers using a star catalogue in which the positions are given for one of the earlier equinoxes may apply corrections for precession by means of the two diagrams given here. These are arranged to give the corrections in right ascension and declination *for one hundred years* so that other intervals may be conveniently worked by proportion.

The diagram on the next page gives the correction in R.A. in minutes of time on the vertical axis. Curves are drawn for each 10° of declination—full lines for northern, and broken lines for southern declinations—and the R.A. is read along the horizontal axes. The diagram below gives the correction in declination. This is a function of the R.A. alone, and the correction is read on the vertical axis. *The corrections are always to be added algebraically.* Thus to correct the position of γ Centauri, the position of which in 1900 is given as $12^h\ 36^m{\cdot}0$, $-48°\ 25'$, we have to add on the correction for 49 years. It is sufficiently accurate to use one half of the correction from the diagrams, so that we have:—

	h	m	°	′
Position (1900)	12	36·0	− 48	25
Half correction		+ 2·7		− 16
Position (1949)	12	38·7	− 48	41

In the same way, corrections can be made for any other interval, usually with an accuracy of one or two minutes of arc.



PRECESSION FOR 100 YEARS (Cont. from page 111)