

Optical behavior of 20 violently variable extragalactic radio sources*

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(Received 9 June 1975; revised 12 August 1975)

A 7-yr photometric study of nearly 200 extragalactic radio sources has confirmed 20 of these objects as violent optical variables. Light curves and photometric data are given for these 20 sources, which are placed in one of four categories according to the type of variability displayed.

INTRODUCTION

SINCE 1968 photographic observations of nearly 200 quasistellar sources and related objects have been conducted at Rosemary Hill Observatory with the 76-cm reflector. The following is a report of the photometric history of the 20 most active objects in this program.

Most objects are photographed at the $f/4$ Newtonian focus; with unfiltered Kodak 103a-0 plates that have been nitrogen baked (Scott and Smith 1974), a sky-limited m_{pg} of about 20 is reached in 10–12 min. While the majority of objects are photographed in m_{pg} , several of the more active sources have been monitored in the photographic U , B , V , and I . Ultraviolet and blue magnitudes are obtained by combining baked 103a-0 plates with Schott UG-2 and GG 385 filters, respectively. Visual magnitudes are obtained by combining baked Kodak IIa-D emulsion with a Schott GG 495 filter, while ammonia-hypered Kodak I-N plates combined with a Schott RG-8 filter are used to obtain infrared (I) magnitudes. These plate and filter combinations are discussed by Stock and Williams (1966). Hackney (1973) has shown that the systematic deviation of the Rosemary Hill system from the Johnson UBV system lies within the normal scatter of the observations.

Comparison sequences from the literature were used when available; in other cases sequences were obtained by photographic transfers from clusters or selected areas (SAs) for which photoelectric or photographic calibrations were available from the literature. A typical sequence consists of eight to ten stars whose magnitudes bracket the magnitude range of the object. Plates are read on a Cuffey iris astrophotometer; preliminary magnitudes are obtained with an on-line Hewlett-Packard 9810A calculator that fits a parabolic or linear least-squares calibration curve to the comparison-star magnitudes and iris readings. Final magnitudes are obtained from an IBM 370/165 computer analysis that smooths the comparison-star magnitudes for the field errors of the telescope. The error quoted in

Table II is the rms scatter of the comparison-star magnitudes around the calibration curve.

The 20 objects discussed in this paper are classified as “optically violent variables” (OVVs) by the criteria of Penston and Cannon (1970); i.e., they exhibit intensity changes of a magnitude or more on a time scale of days or weeks. They comprise about 14% of the total number of objects monitored in enough detail to define their behavior, in good agreement with the figure of 12% derived from an earlier analysis of the Rosemary Hill data by Folsom *et al.* (1971a).

I. RESULTS

The 20 OVV sources are listed in Table I with their 1950.0 coordinates, the variability subclass (discussed in Sec. II), and references to finder charts. The results of the observations are summarized in Table II, where the first column records the UT date of the observation to the nearest day. The Julian date is given in column two to the nearest thousandth of a day. The third column records the observed magnitude, and the associated error of each observation is shown in column four. Column five indicates the magnitude system in which the exposure was made; plates taken in m_{pg} are denoted by a “P” in this column, while U , B , V , and I indicate plates taken in the color system described above. The magnitude variations of each object are shown graphically in Fig. 1. Except for the final four objects, the light curves are arranged by right ascension. For those objects for which observations had been made at different times in both m_{pg} and m_B , the two sets of data are plotted together with an empirically determined correction being added to the m_{pg} points to convert them to the m_B scale. Of the final four objects, two are plotted in three colors and one, OJ 287, in four colors.

In the following remarks the 20 sources are considered individually. A short history, the light curve, and the method of calibration of each object are discussed. Unless otherwise noted, all data from selected areas were taken from Brun (1957).

OB 338: Attention was called to the optical variability of this QSO by Folsom *et al.* (1971b). It shows one well-

* Rosemary Hill Observatory Contribution No. 60.

TABLE I. Positional and variability subclass data for the 20 sources.

Object	$\alpha(1950)$	$\delta(1950)$	Finder reference	Sub-class
OB 338	00 ^h 24 ^m 01 ^s .5	+34°51'58"	(1)	IV
PKS 0420-01	04 20 43.1	-01 27 32	(2)	IV
3C 120	04 30 31.6	+05 14 53	(3), (11)	III
PKS 0518+16	05 18 16.5	+16 35 28	(4)	III
PKS 0735+17	07 35 14.3	+17 49 12	(5), (13)	III
PKS 0736+01	07 36 43.0	+01 44 00	(6)	I
PKS 0906+01	09 06 35.7	+01 33 53	(7)	I
ON 231	12 19 01.1	+28 30 36	(5)	I
OQ 208	14 04 46.8	+28 41 27	(5)	I (?)
PKS 1514-24	15 14 45.0	-24 11 20	(8)	I (?)
NRAO 512	16 38 49.0	+39 53 00	(9)	III
3C 371	18 07 18.3	+69 48 56	(3)	III
OX 074	21 44 43.2	+09 15 43	(1)	III
PKS 2209+08	22 09 32.6	+08 04 29	(10)	I
3C 446	22 23 10.5	-05 12 23	(11)	IV
3C 454.3	22 51 29.2	+15 52 54	(3), (11)	III (?)
BL Lac	22 00 39.0	+42 02 08	(12)	I
3C 345	16 41 17.7	+39 54 11	(11)	II
OJ 287	08 51 57.5	+20 18 00	(13)	II
PKS 2345-16	23 45 27.2	-16 48 11	(14)	IV

- (1) Folsom *et al.* (1971b).
- (2) Bolton and Ekers (1966).
- (3) Folsom *et al.* (1971a).
- (4) Sandage *et al.* (1965).
- (5) Wing (1973).
- (6) Bolton and Kinman (1966).
- (7) Folsom and Smith (1969).
- (8) Bolton *et al.* (1965).
- (9) Folsom *et al.* (1970).
- (10) Clarke *et al.* (1966).
- (11) Angione (1971).
- (12) Bertaud *et al.* (1973).
- (13) Blake (1970).
- (14) Kinman *et al.* (1967).

defined maximum in 1970, although subsequent outbursts might have been missed because of the time scatter of the observations. The object shows no slowly varying component. The radio spectrum is slightly peaked (Kraus *et al.* 1968). A comparison sequence was calibrated by photographic transfer from SA 20.

PKS 0420-01: This QSO has exhibited variability at both radio and optical wavelengths. Dent and Kojoian (1972) and Medd *et al.* (1972) reported a steady decline in intensity at centimeter wavelengths between 1968 and 1971. Medd *et al.* (1972) describe the spectrum as having a centimeter excess. In general, the Florida light curve is characterized by rapid fluctuations of about 0^m.5 on a time scale of the order of a month. However, at the time of writing the object is undergoing an impressive burst of activity with an increase in average intensity of nearly 2^m.0, the largest such outburst observed for this object. It is also interesting to note that the average optical intensity *increased* by nearly a magnitude during the centimeter-wavelength decline mentioned above. The comparison

sequence was calibrated by photographic transfer from SA 96.

3C 120: Folsom *et al.* (1971a) classified the Seyfert galaxy 3C 120 as an OVV. The Florida light curve suggests a slow, long-term decline in average intensity of about a magnitude in addition to short-term excursions of the order of $\pm 0^m.5$. A comparison sequence was generated from the combined sequences of Kinman (1968) and Angione (1971).

PKS 0518+16: This QSO, which is also designated 3C 138, shows well-defined maxima in 1970-1971 and 1973-1974. There is an indication of a slow rise and fall in minimum brightness over the 4-yr observing period, reaching its peak at about the time of the 1973-1974 flare. Peach (1969) found only a 0^m.1 optical variation in one year, while Medd *et al.* (1972) found little change at 6.6 and 10.7 GHz. The comparison sequence was calibrated by photographic transfer from SA 74.

PKS 0735+17: The optical counterpart of PKS 0735+17 was identified by Blake (1970); an alternative designation is VRO 17.17.02. This source has exhibited extremely violent optical activity and is one of the most active objects on the Rosemary Hill program. The average range of optical fluctuations seems to be about 0^m.5 on a time scale of a few weeks. Occasionally much greater variations occur. In early 1974 the object flared nearly 1^m.5 and then rapidly declined to the preflare level. There is some indication of a long-term modulation of average intensity, with a minimum in 1973. The lineless spectrum (Burbidge and Strittmatter 1972) and violent short-term optical activity suggest that PKS 0735+17 belongs to the lacertid class. A comparison sequence was calibrated by photographic transfer from SA 76.

PKS 0736+01: An alternative designation for the QSO PKS 0736+01 is OI 061. Medd *et al.* (1972) reported large variations at 6.6 and 10.7 GHz with three well-defined maxima occurring in 1968, 1969, and 1970, and they describe its spectrum as having a centimeter excess. The Florida light curve suggests variations of 0^m.5 on a time scale of weeks or months, with an overall range of about 1^m.0. Except for a single point in late 1969 there is little indication of any long-term trend. A comparison sequence was calibrated by photographic transfer from SA 99.

OJ 287: This compact extragalactic source, whose lineless spectrum (Burbidge and Strittmatter 1972) and rapid variability classify it as a lacertid, has shown the largest long-term change in intensity of any object on the Florida program. Since 1971 it has declined more than 3^m.25 in the photographic ultraviolet, blue, and visual (Smith *et al.* 1975). The overall rate of decline and level of activity appear less in the infrared; however, the burst of activity in early 1975 is clearly visible in the infrared curve. Rapid and violent short-term fluctuations superimposed upon a slowly varying long-term component characterize the optical behavior of OJ 287. The average intensity now appears to have

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TABLE II. Results of observations of 20 OVV sources.

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
OB 338									
10/14/69	508.667	19.31	0.18	P	12/19/70	939.618	20.23	0.15	P
11/13/69	538.667	19.31	0.29	P	12/28/70	949.604	19.72	0.21	P
12/01/69	556.603	19.53	0.20	P	8/03/71	1166.858	19.59	0.03	P
9/10/70	839.764	19.69	0.11	P	12/15/71	1300.649	19.21	0.25	P
9/25/70	854.722	19.25	0.16	P	11/28/72	1649.579	19.62	0.22	P
9/30/70	859.757	19.50	0.32	P	9/05/73	1930.854	19.59	0.17	P
10/26/70	885.703	19.27	0.13	P	10/20/73	1975.676	19.27	0.27	P
11/20/70	910.667	18.74	0.15	P	12/19/73	2035.564	19.43	0.25	P
11/29/70	919.677	19.32	0.24	P	10/13/74	2333.658	19.16	0.24	P
12/01/70	921.642	19.45	0.19	P	12/11/74	2392.614	19.44	0.36	P
12/03/70	923.649	19.14	0.32	P	2/14/75	2457.528	19.83	0.22	P
PKS 0420-01									
12/04/69	559.604	19.38	0.29	P	11/03/72	1624.843	18.40	0.22	P
1/29/70	615.597	19.05	0.16	P	1/27/73	1709.539	18.82	0.14	P
2/08/70	625.588	19.18	0.16	P	3/04/73	1745.557	18.80	0.20	P
2/10/70	627.639	19.14	0.16	P	9/05/73	1930.907	18.82	0.15	P
9/29/70	858.840	18.52	0.12	P	10/04/73	1959.869	18.84	0.09	P
10/02/70	861.845	19.05	0.22	P	10/24/73	1979.774	18.61	0.14	P
10/05/70	864.847	18.83	0.13	P	11/02/73	1988.779	18.57	0.18	P
10/09/70	868.839	18.47	0.28	P	11/23/73	2009.769	18.35	0.45	P
10/11/70	870.825	19.00	0.12	P	11/23/73	2009.782	18.68	0.29	P
11/02/70	892.826	18.72	0.15	P	12/02/73	2018.801	18.73	0.17	P
11/06/70	896.781	18.66	0.12	P	12/18/73	2034.602	18.82	0.12	P
11/26/70	916.667	18.82	0.17	P	12/22/73	2038.676	18.81	0.18	P
11/30/70	920.722	18.52	0.28	P	12/29/73	2045.675	19.22	0.23	P
12/21/70	941.654	18.74	0.13	P	1/16/74	2063.681	18.76	0.09	P
12/29/70	949.639	18.65	0.10	P	2/11/74	2089.544	18.84	0.10	P
1/20/71	971.642	18.71	0.12	P	9/24/74	2314.879	17.68	0.36	P
1/29/71	980.622	18.70	0.08	P	10/18/74	2338.829	17.75	0.15	P
2/17/71	999.578	18.82	0.13	P	10/27/74	2347.853	18.34	0.30	P
2/21/71	1003.557	18.79	0.16	P	11/24/74	2375.826	17.37	0.10	P
3/19/71	1029.549	18.61	0.13	P	11/25/74	2376.655	17.00	0.12	P
3/28/71	1038.545	18.35	0.07	P	12/11/74	2392.655	17.27	0.19	P
10/15/71	1239.799	18.88	0.10	P	12/18/74	2399.681	17.74	0.07	P
11/25/71	1280.815	18.83	0.14	P	1/04/75	2416.653	17.89	0.19	P
12/10/71	1295.691	18.68	0.17	P	1/16/75	2428.610	18.18	0.36	P
12/15/71	1300.675	19.03	0.16	P	2/03/75	2446.663	17.97	0.20	P
2/07/72	1354.569	19.06	0.07	P	2/12/75	2455.563	17.97	0.08	P
3/13/72	1389.597	19.09	0.19	P	3/02/75	2473.573	17.53	0.22	P
10/09/72	1599.856	18.65	0.19	P	3/06/75	2477.600	16.92	0.12	P
3C 120									
12/09/69	563.714	13.93	0.15	P	11/22/71	1277.747	15.04	0.05	B
12/30/69	585.646	14.20	0.04	P	11/22/71	1277.767	14.96	0.03	B
1/09/70	595.633	14.06	0.04	P	11/22/71	1277.781	14.92	0.05	B
1/29/70	615.574	14.19	0.17	P	11/22/71	1277.799	14.89	0.06	B
1/31/70	617.660	13.81	0.14	P	11/22/71	1277.813	14.95	0.05	B

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
3C 120 continued									
2/08/70	625.621	13.88	0.13	P	11/22/71	1277.826	14.93	0.03	B
2/10/70	627.662	13.88	0.20	P	11/22/71	1277.841	14.95	0.04	B
8/04/70	802.887	14.61	0.14	P	11/22/71	1277.855	14.83	0.03	B
8/31/70	829.887	14.43	0.21	P	11/22/71	1277.876	14.90	0.04	B
9/07/70	836.884	14.62	0.19	P	11/22/71	1277.896	14.85	0.03	B
9/12/70	841.887	14.59	0.14	P	11/22/71	1277.912	14.86	0.03	B
9/26/70	855.808	14.76	0.09	P	11/22/71	1277.926	14.87	0.04	B
9/30/70	859.860	14.49	0.07	P	3/06/72	1382.576	15.01	0.09	B
10/03/70	862.874	14.48	0.23	P	9/08/72	1568.878	14.59	0.21	B
10/11/70	870.860	14.74	0.14	P	10/05/72	1595.781	14.93	0.14	B
11/02/70	892.849	14.56	0.09	P	10/08/72	1598.890	14.79	0.08	B
11/06/70	896.818	14.45	0.11	P	10/14/72	1604.852	14.90	0.16	B
11/08/70	898.785	14.68	0.09	P	10/16/72	1606.756	14.72	0.15	B
11/26/70	916.699	14.32	0.08	P	11/01/72	1622.821	14.95	0.20	B
11/29/70	919.721	14.59	0.16	P	11/16/72	1637.847	14.84	0.08	B
12/19/70	939.660	14.23	0.08	P	12/03/72	1654.753	14.64	0.15	B
1/20/71	971.624	14.24	0.08	P	12/04/72	1655.804	14.86	0.06	B
1/29/71	980.617	14.49	0.20	P	12/04/72	1655.817	14.74	0.09	B
2/14/71	996.547	14.46	0.08	P	12/04/72	1655.832	14.83	0.10	B
2/17/71	999.599	14.33	0.09	P	12/04/72	1655.843	14.88	0.05	B
2/19/71	1001.582	14.65	0.19	P	12/05/72	1656.778	14.85	0.08	B
2/21/71	1003.580	14.27	0.21	P	12/05/72	1656.787	14.74	0.06	B
3/19/71	1029.572	14.33	0.11	P	12/05/72	1656.875	14.81	0.21	B
3/23/71	1033.563	14.18	0.20	P	12/09/72	1660.726	14.80	0.17	B
3/28/71	1038.563	14.15	0.17	P	12/09/72	1660.744	14.84	0.20	B
9/10/71	1204.895	14.52	0.15	P	12/09/72	1660.771	14.87	0.07	B
9/30/71	1224.876	14.50	0.13	P	12/09/72	1660.790	14.96	0.13	B
10/16/71	1240.799	15.04	0.12	B	12/09/72	1660.809	14.94	0.07	B
10/19/71	1243.852	14.95	0.03	B	12/09/72	1660.822	14.95	0.03	B
10/26/71	1250.837	14.89	0.05	B	12/09/72	1660.837	14.89	0.05	B
11/08/71	1263.627	15.05	0.05	B	12/09/72	1660.850	14.82	0.04	B
11/14/71	1269.771	14.94	0.08	B	12/09/72	1660.867	14.86	0.05	B
11/14/71	1269.859	15.18	0.10	B	12/09/72	1660.880	14.82	0.06	B
11/17/71	1272.828	14.79	0.05	B	12/09/72	1660.899	14.80	0.12	B
11/18/71	1273.765	15.20	0.10	B	12/09/72	1660.912	14.90	0.09	B
11/18/71	1273.776	15.10	0.08	B	1/02/73	1684.724	14.89	0.15	B
11/18/71	1273.792	15.06	0.03	B	1/23/73	1705.559	14.97	0.07	B
11/18/71	1273.803	15.09	0.03	B	1/29/73	1711.603	15.01	0.06	B
11/18/71	1273.817	15.21	0.07	B	3/04/73	1745.580	15.06	0.12	B
11/18/71	1273.836	15.14	0.08	B	9/05/73	1930.892	15.18	0.14	B
11/18/71	1273.861	15.02	0.03	B	9/08/73	1933.865	15.36	0.20	B
11/18/71	1273.872	14.99	0.05	B	9/24/73	1949.860	15.33	0.08	B
11/18/71	1273.894	15.00	0.03	B	9/30/73	1955.906	15.47	0.17	B
11/18/71	1273.905	14.99	0.03	B	10/08/73	1963.842	15.08	0.10	B
11/18/71	1273.922	14.95	0.05	B	10/24/73	1979.792	15.37	0.04	B
11/18/71	1273.935	14.89	0.04	B	10/27/73	1982.758	15.45	0.06	B
11/19/71	1274.802	14.87	0.10	B	10/31/73	1986.837	15.46	0.09	B
11/19/71	1274.812	14.87	0.10	B	11/03/73	1989.733	15.16	0.10	B
11/19/71	1274.821	14.87	0.10	B	11/03/73	1989.813	15.34	0.06	B
11/19/71	1274.830	14.87	0.05	B	11/20/73	2006.763	15.58	0.16	B
11/19/71	1274.840	14.86	0.08	B	11/24/73	2010.701	15.32	0.03	B
11/19/71	1274.853	14.84	0.09	B	12/02/73	2018.699	15.30	0.09	B
11/19/71	1274.868	14.79	0.05	B	12/18/73	2034.701	15.48	0.30	B
11/19/71	1274.877	14.79	0.05	B	12/19/73	2035.617	15.11	0.04	B
11/19/71	1274.890	14.86	0.04	B	12/24/73	2041.610	15.13	0.12	B

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
3C 120 continued									
11/19/71	1274.912	14.95	0.03	B	1/15/74	2062.628	15.23	0.10	B
11/21/71	1276.753	15.06	0.05	B	2/09/74	2088.622	14.70	0.20	B
11/21/71	1276.761	15.05	0.07	B	2/09/74	2088.545	14.86	0.05	B
11/21/71	1276.769	15.08	0.06	B	2/11/74	2089.563	14.92	0.10	B
11/21/71	1276.777	15.02	0.06	B	2/14/74	2092.549	15.17	0.15	B
11/21/71	1276.788	15.08	0.04	B	2/14/74	2092.624	15.04	0.09	B
11/21/71	1276.796	15.06	0.07	B	2/15/74	2093.561	15.14	0.10	B
11/21/71	1276.805	15.02	0.07	B	2/19/74	2097.572	15.17	0.07	B
11/21/71	1276.813	15.01	0.03	B	3/19/74	2125.570	14.98	0.06	B
11/21/71	1276.826	15.06	0.05	B	10/18/74	2338.847	15.31	0.04	B
11/21/71	1276.833	14.99	0.03	B	11/12/74	2363.803	15.29	0.08	B
11/21/71	1276.842	14.98	0.08	B	11/24/74	2375.847	15.25	0.18	B
11/21/71	1276.851	14.94	0.05	B	12/11/74	2392.672	15.28	0.14	B
11/21/71	1276.857	14.98	0.04	B	12/18/74	2399.664	15.14	0.03	B
11/21/71	1276.872	14.98	0.03	B	1/03/75	2415.620	14.92	0.18	B
11/21/71	1276.881	14.97	0.03	B	1/31/75	2443.564	15.05	0.21	B
11/21/71	1276.888	14.92	0.03	B	2/05/75	2448.628	15.15	0.09	B
11/21/71	1276.903	14.95	0.03	B	2/12/75	2455.580	15.00	0.08	B
11/21/71	1276.910	14.94	0.03	B	3/02/75	2473.585	15.17	0.10	B
11/21/71	1276.919	14.85	0.03	B	3/08/75	2479.546	14.97	0.14	B
11/21/71	1276.926	14.87	0.03	B	4/06/75	2508.595	15.46	0.07	B
PKS 0518+16									
12/03/70	923.764	19.01	0.17	P	11/05/72	1626.826	18.79	0.17	P
12/05/70	925.795	19.21	0.14	P	1/23/73	1705.581	19.13	0.18	P
12/21/70	941.667	19.34	0.16	P	10/08/73	1963.886	19.01	0.29	P
12/23/70	943.674	19.68	0.32	P	12/02/73	2018.820	18.78	0.14	P
12/27/70	947.722	19.04	0.10	P	12/18/73	2034.649	19.02	0.09	P
12/29/70	949.663	19.55	0.14	P	12/22/73	2038.714	18.05	0.23	P
1/04/71	955.781	18.91	0.22	P	12/29/73	2045.711	18.92	0.20	P
1/27/71	978.622	18.87	0.06	P	1/02/74	2049.838	18.50	0.19	P
1/29/71	980.688	19.18	0.17	P	1/15/74	2062.688	18.79	0.24	P
2/14/71	996.563	19.35	0.18	P	1/20/74	2067.551	18.93	0.18	P
2/19/71	1001.615	19.36	0.14	P	2/15/74	2093.597	18.92	0.19	P
3/23/71	1033.583	19.34	0.13	P	2/23/74	2101.607	18.99	0.11	P
10/16/71	1240.830	19.17	0.19	P	3/14/74	2120.543	18.97	0.11	P
11/26/71	1281.759	18.85	0.13	P	10/21/74	2341.817	18.88	0.28	P
12/10/71	1295.712	18.96	0.13	P	11/23/74	2374.770	19.61	0.17	P
12/13/71	1298.772	18.79	0.08	P	12/10/74	2391.725	19.03	0.18	P
1/10/72	1326.651	18.88	0.12	P	12/18/74	2399.699	19.14	0.12	P
2/07/72	1354.611	18.44	0.11	P	1/16/75	2428.628	19.19	0.33	P
3/06/72	1382.602	18.77	0.10	P	2/03/75	2446.681	19.13	0.14	P
4/04/72	1411.553	19.19	0.18	P	2/14/75	2457.667	19.26	0.15	P
10/09/72	1599.874	19.24	0.18	P	3/06/75	2477.635	19.07	0.26	P
PKS 0735+17									
11/06/70	896.833	15.60	0.10	P	1/02/74	2049.858	16.25	0.07	P
11/26/70	916.715	15.36	0.11	P	1/15/74	2062.706	15.90	0.09	P
12/07/70	927.808	15.48	0.12	P	1/20/74	2067.590	15.89	0.09	P
1/22/71	973.690	16.08	0.11	P	1/27/74	2074.751	15.77	0.10	P

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
PKS 0735+17 continued									
12/10/71	1295.732	15.85	0.15	P	1/29/74	2076.771	15.45	0.11	P
12/26/71	1311.789	16.45	0.07	P	2/14/74	2092.666	15.07	0.12	P
3/10/72	1386.726	16.02	0.16	P	2/19/74	2097.690	15.15	0.12	P
4/15/72	1422.605	16.42	0.11	P	3/14/74	2120.572	15.64	0.12	P
10/13/72	1603.896	16.00	0.11	P	3/25/74	2131.593	16.07	0.11	P
11/05/72	1626.852	16.36	0.12	P	4/11/74	2148.555	16.34	0.11	P
1/26/73	1708.659	15.62	0.33	P	10/18/74	2338.906	15.66	0.18	P
3/25/73	1766.649	16.79	0.07	P	11/23/74	2374.000	15.59	0.16	P
4/22/73	1794.563	15.59	0.08	P	12/18/74	2399.746	15.37	0.11	P
4/28/73	1800.587	15.31	0.14	P	1/08/75	2420.658	15.20	0.05	P
4/30/73	1802.569	15.58	0.17	P	1/17/75	2429.553	15.12	0.14	P
5/01/73	1803.606	15.57	0.18	P	2/01/75	2444.607	15.70	0.10	P
5/02/73	1804.595	15.42	0.16	P	2/03/75	2446.697	15.76	0.13	P
11/24/73	2010.849	16.13	0.10	P	2/10/75	2453.594	15.74	0.16	P
12/05/73	2021.824	16.22	0.43	P	3/03/75	2474.627	15.66	0.11	P
12/19/73	2035.749	16.41	0.06	P	3/10/75	2481.594	15.82	0.09	P
PKS 0736+01									
12/11/69	567.010	16.71	0.31	P	12/19/73	2035.765	15.86	0.09	P
11/08/70	898.810	15.88	0.12	P	1/02/74	2049.885	15.73	0.08	P
11/26/70	916.764	15.97	0.08	P	1/24/74	2071.694	15.80	0.09	P
12/07/70	927.842	15.97	0.06	P	2/19/74	2097.717	16.04	0.09	P
1/22/71	973.754	15.62	0.25	P	3/14/74	2120.587	16.08	0.14	P
1/29/71	980.710	15.96	0.09	P	3/21/74	2127.547	16.14	0.16	P
2/17/71	999.697	16.13	0.14	P	4/11/74	2148.578	15.88	0.11	P
3/23/71	1033.624	15.87	0.32	P	10/21/74	2341.865	15.93	0.06	P
1/26/73	1708.682	15.76	0.08	P	11/23/74	2374.832	16.32	0.07	P
3/04/73	1745.610	16.30	0.10	P	12/18/74	2399.761	16.06	0.09	P
3/25/73	1766.649	15.99	0.08	P	1/08/75	2420.710	15.44	0.14	P
4/21/73	1793.569	16.10	0.03	P	2/03/75	2446.714	16.01	0.06	P
5/01/73	1803.567	15.84	0.09	P	2/10/75	2453.611	15.58	0.16	P
5/02/73	1804.574	15.76	0.13	P	3/03/75	2474.639	15.65	0.06	P
12/02/73	2018.842	15.73	0.08	P	3/10/75	2481.609	15.67	0.09	P
PKS 0906+01									
9/30/70	859.897	16.73	0.11	P	3/29/71	1039.605	16.83	0.15	P
10/03/70	862.886	16.87	0.19	P	3/31/71	1041.736	17.08	0.08	P
10/05/70	864.899	16.77	0.10	P	5/18/71	1089.577	17.04	0.10	P
10/09/70	868.885	16.32	0.18	P	5/19/71	1090.576	16.68	0.07	P
10/11/70	870.906	16.08	0.12	P	5/20/71	1091.577	16.63	0.08	P
11/02/70	892.913	16.46	0.09	P	5/20/71	1091.621	16.70	0.10	B
11/06/70	896.882	16.77	0.05	P	5/21/71	1092.580	16.69	0.09	P
11/08/70	898.894	17.01	0.07	P	5/22/71	1093.580	16.41	0.08	P
11/09/70	899.885	17.38	0.16	B	5/26/71	1097.576	16.78	0.09	P
11/26/70	916.867	16.98	0.06	B	6/18/71	1120.576	16.58	0.21	P
11/28/70	918.854	17.13	0.13	P	6/21/71	1123.576	16.73	0.18	P
11/29/70	919.837	17.12	0.09	P	10/19/71	1243.916	17.51	0.10	B
12/03/70	923.875	16.67	0.11	P	11/26/71	1281.922	17.71	0.06	B
12/05/70	925.906	16.48	0.10	P	12/15/71	1300.899	17.47	0.08	B

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
PKS 0906+01 continued									
12/08/70	928.826	16.72	0.08	P	12/25/71	1310.840	17.60	0.06	B
12/23/70	943.757	17.31	0.20	P	2/20/72	1367.830	17.46	0.05	B
12/29/70	949.698	16.92	0.06	P	3/10/72	1386.773	17.24	0.09	B
1/01/71	952.744	16.87	0.06	P	3/15/72	1391.649	17.52	0.10	B
1/01/71	952.805	17.08	0.06	B	4/03/72	1410.578	17.13	0.05	B
1/04/71	955.814	16.72	0.14	P	4/11/72	1418.614	17.11	0.10	B
1/16/71	967.601	16.83	0.06	P	5/02/72	1439.591	17.16	0.09	B
1/20/71	971.705	16.30	0.05	P	11/03/72	1624.871	17.90	0.11	B
1/22/71	973.776	16.27	0.13	P	1/02/73	1684.835	17.88	0.13	B
1/22/71	973.833	16.60	0.10	B	1/14/73	1696.865	17.92	0.09	B
1/23/71	974.865	16.79	0.07	P	1/29/73	1711.748	17.68	0.09	B
1/25/71	976.799	16.89	0.12	P	3/04/73	1745.688	17.89	0.09	B
1/26/71	977.724	16.78	0.10	P	3/10/73	1751.665	17.67	0.24	B
1/27/71	978.830	16.88	0.05	P	4/22/73	1794.616	17.82	0.07	B
1/29/71	980.771	16.68	0.17	P	4/28/73	1800.610	17.71	0.11	B
1/30/71	981.688	16.61	0.18	P	5/01/73	1803.629	17.25	0.08	B
1/30/71	981.731	16.70	0.10	B	12/19/73	2035.834	17.38	0.08	B
2/02/71	984.822	16.48	0.06	P	1/04/74	2051.938	17.69	0.12	B
2/02/71	984.781	16.67	0.04	B	1/24/74	2071.842	17.11	0.07	B
2/14/71	996.590	16.62	0.09	P	1/27/74	2074.784	17.24	0.10	B
2/17/71	999.694	17.04	0.15	P	1/29/74	2076.828	17.67	0.09	B
2/19/71	1001.719	17.22	0.11	P	2/19/74	2097.737	17.33	0.17	B
2/20/71	1002.646	17.23	0.12	P	2/24/74	2102.723	17.30	0.10	B
2/21/71	1003.683	17.26	0.11	P	3/14/74	2120.652	17.35	0.10	B
2/21/71	1003.771	17.36	0.09	B	3/19/74	2125.654	17.34	0.10	B
2/22/71	1004.756	17.36	0.12	P	4/11/74	2148.621	17.09	0.08	B
2/24/71	1006.653	17.36	0.03	P	4/23/74	2160.653	16.79	0.11	B
2/24/71	1006.637	17.17	0.53	B	4/28/74	2165.768	16.58	0.18	B
2/27/71	1009.529	17.31	0.05	P	11/24/74	2375.926	17.38	0.07	B
2/27/71	1009.590	17.64	0.05	B	12/19/74	2400.863	17.19	0.11	B
3/01/71	1011.667	17.34	0.11	P	1/10/75	2422.833	17.26	0.09	B
3/03/71	1013.772	17.37	0.08	P	1/18/75	2430.750	17.55	0.11	B
3/04/71	1014.781	17.37	0.03	P	2/6/75	2446.743	17.56	0.12	B
3/17/71	1027.540	17.07	0.06	P	2/08/75	2451.820	17.78	0.21	B
3/17/71	1027.594	17.31	0.05	B	2/10/75	2453.716	17.39	0.19	B
3/19/71	1029.670	16.74	0.16	P	2/16/75	2459.784	17.63	0.10	B
3/21/71	1031.542	16.61	0.09	P	3/06/75	2477.684	17.39	0.18	B
3/23/71	1033.677	16.60	0.05	P	3/10/75	2481.673	17.82	0.09	B
3/26/71	1036.703	16.75	0.06	P	4/06/75	2508.649	17.69	0.07	B
3/28/71	1038.674	16.91	0.18	P	5/01/75	2533.566	18.60	0.15	B
ON 231									
2/22/72	1369.758	16.95	0.11	B	6/13/74	2211.694	17.25	0.17	B
3/21/72	1397.753	16.82	0.07	B	6/16/74	2214.603	17.12	0.18	B
5/02/72	1439.672	17.45	0.18	B	6/17/74	2215.642	17.43	0.09	B
6/11/72	1479.608	16.62	0.04	B	6/17/74	2215.708	17.32	0.23	B
6/28/73	1861.622	16.72	0.08	B	6/18/74	2216.615	17.26	0.20	B
6/30/73	1863.593	16.79	0.15	B	6/19/74	2217.604	17.27	0.16	B
7/03/73	1866.641	16.97	0.20	B	6/21/74	2219.632	16.89	0.19	B
7/25/73	1888.595	16.37	0.14	B	6/23/74	2221.670	17.03	0.18	B
7/26/73	1889.587	16.94	0.16	B	6/24/74	2222.637	17.06	0.05	B
1/27/74	2074.947	17.28	0.25	B	7/11/74	2239.632	16.66	0.39	B
3/21/74	2127.808	16.83	0.23	B	7/14/74	2242.637	16.97	0.26	B

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
ON 231 continued									
4/28/74	2165.828	17.24	0.15	B	7/15/74	2243.626	17.19	0.18	B
5/15/74	2182.724	16.95	0.25	B	7/16/74	2244.633	17.03	0.16	B
5/17/74	2184.661	16.87	0.11	B	7/17/74	2245.637	16.94	0.10	B
5/21/74	2188.742	16.70	0.21	B	7/20/74	2248.592	16.92	0.18	B
5/24/74	2191.651	16.54	0.13	B	2/07/75	2450.764	17.12	0.17	B
5/28/74	2195.744	17.03	0.17	B	3/13/75	2484.845	17.31	0.05	B
6/11/74	2209.699	17.38	0.12	B					
OQ 208									
4/22/69	333.000	15.54	0.03	P	5/11/74	2178.710	15.44	0.14	P
2/09/70	626.856	15.19	0.09	P	5/13/74	2180.706	15.76	0.05	P
3/15/70	660.835	14.96	0.15	P	5/15/74	2182.767	15.81	0.12	P
4/07/70	683.826	15.33	0.07	P	5/21/74	2188.772	15.79	0.06	P
5/11/70	717.765	14.91	0.08	P	5/28/74	2195.778	15.91	0.11	P
1/30/71	981.902	15.27	0.11	P	6/14/74	2212.644	15.54	0.10	P
5/25/71	1096.753	15.59	0.19	P	6/17/74	2215.726	15.84	0.09	P
2/18/74	2096.925	15.49	0.08	P	6/19/74	2217.635	15.67	0.10	P
3/31/74	2137.847	15.00	0.10	P	7/14/74	2242.685	15.88	0.08	P
4/14/74	2151.765	15.80	0.12	P	7/22/74	2250.667	15.90	0.11	P
4/19/74	2156.828	15.72	0.06	P	8/14/74	2273.571	15.64	0.11	P
4/20/74	2157.744	15.81	0.09	P	2/09/75	2452.910	15.56	0.18	P
4/23/74	2160.810	15.74	0.11	P	3/20/75	2491.892	15.33	0.10	P
4/30/74	2167.785	15.39	0.09	P	4/19/75	2521.840	15.43	0.21	P
5/01/74	2168.815	15.77	0.11	P					
PKS 1514-24									
2/20/72	1367.931	16.03	0.14	B	4/19/74	2156.851	16.08	0.09	B
4/18/72	1425.806	15.98	0.23	B	4/28/74	2165.858	15.92	0.05	B
7/09/72	1507.624	16.59	0.07	B	5/19/74	2186.763	15.74	0.23	B
3/04/73	1745.932	15.99	0.23	B	6/14/74	2212.716	16.01	0.06	B
3/18/73	1759.890	15.97	0.28	B	6/16/74	2214.716	15.91	0.08	B
4/09/73	1781.812	15.63	0.05	B	6/17/74	2215.750	16.11	0.14	B
4/28/73	1800.770	15.58	0.04	B	6/18/74	2216.733	16.00	0.10	B
5/02/73	1804.703	15.38	0.11	B	6/19/74	2217.737	16.09	0.20	B
5/12/73	1814.661	15.69	0.44	B	6/21/74	2219.737	16.02	0.16	B
6/01/73	1834.690	15.48	0.41	B	6/23/74	2221.740	16.03	0.21	B
6/10/73	1843.676	16.13	0.28	B	7/11/74	2239.656	16.04	0.19	B
6/23/73	1856.685	16.11	0.08	B	7/15/74	2243.623	15.68	0.10	B
6/27/73	1860.665	16.07	0.09	B	7/16/74	2244.688	15.75	0.15	B
6/30/73	1863.667	15.64	0.08	B	7/17/74	2245.694	15.92	0.15	B
7/03/73	1866.704	15.57	0.15	B	7/20/74	2248.646	15.96	0.10	B
7/25/73	1888.608	15.17	0.39	B	2/09/75	2452.933	15.24	0.16	B
7/26/73	1889.606	15.56	0.27	B	4/17/75	2519.847	15.35	0.21	B
7/26/73	1889.617	15.16	0.26	B					
3/01/74	2107.926	15.91	0.06	B					
NRAO 512									
5/07/70	713.750	17.60	0.10	P	8/26/71	1189.735	17.18	0.28	P
5/31/70	737.680	17.62	0.09	P	8/26/71	1189.751	17.28	0.41	P

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
NRAO 512 continued									
6/03/70	740.704	16.54	0.16	P	8/27/71	1190.615	17.46	0.16	P
6/05/70	742.694	17.81	0.09	P	9/11/71	1205.549	17.40	0.06	P
6/06/70	743.621	18.19	0.06	P	9/13/71	1207.619	17.52	0.15	P
6/06/70	743.857	18.04	0.13	P	9/15/71	1209.551	17.57	0.06	P
6/07/70	744.780	17.89	0.05	P	9/19/71	1213.535	17.84	0.08	P
6/08/70	745.769	18.11	0.11	P	9/22/71	1216.559	17.65	0.23	P
6/09/70	746.725	17.95	0.11	P	9/25/71	1219.587	18.09	0.16	P
6/11/70	748.753	17.93	0.11	P	10/09/71	1233.535	17.82	0.16	P
6/13/70	750.760	17.74	0.07	P	10/11/71	1235.519	17.86	0.13	P
6/15/70	752.800	17.81	0.16	P	10/12/71	1236.546	17.96	0.11	P
6/16/70	753.821	17.78	0.15	P	10/16/71	1240.510	17.41	0.12	P
6/27/70	764.609	17.49	0.11	P	10/19/71	1243.528	17.65	0.16	P
6/27/70	764.734	17.54	0.11	P	10/22/71	1246.518	17.27	0.10	P
6/29/70	766.635	17.58	0.31	P	1/25/72	1341.925	17.84	0.14	P
6/29/70	766.737	18.03	0.16	P	2/14/72	1361.948	17.85	0.06	P
6/30/70	767.599	17.61	0.11	P	3/14/72	1390.896	17.91	0.09	P
6/30/70	767.831	17.70	0.08	P	3/21/72	1397.890	17.90	0.17	P
7/01/70	768.602	18.00	0.15	P	4/16/72	1423.839	17.32	0.13	P
7/07/70	774.604	17.92	0.15	P	4/18/72	1425.849	17.17	0.07	P
7/09/70	776.762	17.96	0.13	P	5/21/72	1458.875	18.06	0.06	P
7/11/70	778.800	18.17	0.16	P	6/03/72	1471.635	17.63	0.11	P
7/12/70	779.769	18.25	0.12	P	6/04/72	1472.716	17.28	0.09	P
7/15/70	782.809	18.42	0.13	P	6/09/72	1477.606	17.44	0.18	P
7/31/70	798.769	18.18	0.13	P	6/14/72	1482.751	17.95	0.13	P
8/02/70	800.588	18.16	0.09	P	7/03/72	1501.601	17.77	0.13	P
8/04/70	802.705	18.20	0.26	P	7/08/72	1506.709	18.05	0.13	P
8/22/70	820.569	17.98	0.14	P	7/18/72	1516.724	17.77	0.04	P
8/23/70	821.566	17.97	0.15	P	8/03/72	1532.616	17.77	0.10	P
8/24/70	822.604	18.01	0.16	P	8/11/72	1540.574	17.67	0.10	P
8/25/70	823.678	18.18	0.09	P	9/03/72	1563.572	18.01	0.09	P
8/26/70	824.567	18.28	0.20	P	9/05/72	1565.569	17.88	0.11	P
8/27/70	825.565	18.04	0.14	P	9/08/72	1568.568	18.01	0.20	P
8/30/70	828.563	18.10	0.15	P	10/01/72	1592.537	17.63	0.14	P
8/31/70	829.571	18.49	0.16	P	10/07/72	1597.542	17.61	0.15	P
9/01/70	830.580	18.36	0.16	P	10/10/72	1601.536	17.75	0.23	P
9/01/70	830.597	18.68	0.16	P	11/03/72	1624.511	17.42	0.12	P
9/02/70	831.563	17.90	0.25	P	11/04/72	1625.512	17.44	0.11	P
9/03/70	832.553	18.13	0.09	P	11/05/72	1626.507	17.60	0.25	P
9/05/70	834.594	18.45	0.06	P	11/05/72	1626.529	17.67	0.12	P
9/06/70	835.604	18.46	0.11	P	3/04/73	1745.909	18.05	0.12	P
9/20/70	849.542	18.46	0.10	P	4/09/73	1781.877	18.30	0.07	P
9/21/70	850.535	18.41	0.13	P	4/28/73	1800.794	18.46	0.08	P
9/22/70	851.537	18.46	0.08	P	5/02/73	1804.817	18.26	0.06	P
9/30/70	859.531	18.32	0.11	P	5/11/73	1813.812	18.55	0.10	P
9/31/70	860.549	18.39	0.06	P	5/22/73	1824.677	18.23	0.16	P
10/03/70	862.537	18.38	0.09	P	5/26/73	1828.684	18.51	0.05	P
10/05/70	864.576	18.18	0.31	P	6/01/73	1834.659	18.26	0.09	P
10/22/70	881.558	17.98	0.09	P	6/05/73	1838.756	18.51	0.37	P
10/26/70	885.524	18.64	0.13	P	6/10/73	1843.821	17.98	0.26	P
11/02/70	892.519	18.63	0.16	P	6/21/73	1854.651	18.21	0.26	P
11/18/70	908.515	18.10	0.31	P	6/23/73	1856.615	18.24	0.08	P
1/01/71	952.934	18.50	0.11	P	6/25/73	1858.674	18.21	0.27	P
1/27/71	978.937	18.59	0.07	P	6/27/73	1860.721	18.38	0.10	P
1/29/71	980.942	18.37	0.06	P	6/30/73	1863.707	18.24	0.19	P
1/30/71	981.928	18.55	0.07	P	7/03/73	1866.726	18.61	0.17	P
2/24/71	1006.928	18.50	0.05	P	7/08/73	1871.739	18.00	0.10	P

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
NRAO 512 continued									
2/27/71	1009.862	18.32	0.07	P	7/11/73	1874.823	17.98	0.24	P
3/04/71	1014.932	18.40	0.06	P	7/24/73	1887.664	18.27	0.16	P
3/23/71	1033.873	18.78	0.14	P	7/25/73	1888.672	18.16	0.11	P
3/28/71	1038.858	18.44	0.06	P	7/26/73	1889.643	17.99	0.12	P
3/31/71	1041.890	18.50	0.07	P	8/21/73	1915.563	18.20	0.23	P
4/02/71	1043.851	18.36	0.11	P	8/23/73	1917.563	18.71	0.11	P
4/25/71	1066.817	18.25	0.08	P	8/29/73	1923.569	18.13	0.17	P
5/03/71	1074.828	18.53	0.08	P	8/31/73	1925.612	18.11	0.15	P
5/05/71	1076.835	18.26	0.07	P	9/18/73	1943.553	17.96	0.14	P
5/19/71	1090.692	18.54	0.05	P	9/24/73	1949.616	18.27	0.15	P
5/20/71	1091.774	18.29	0.04	P	9/30/73	1955.583	18.33	0.11	P
5/21/71	1092.735	18.23	0.07	P	2/24/74	2102.901	18.35	0.13	P
5/22/71	1093.731	18.29	0.08	P	3/31/74	2137.865	18.06	0.09	P
5/23/71	1094.753	18.41	0.14	P	4/19/74	2156.871	17.96	0.06	P
5/25/71	1096.798	18.36	0.08	P	4/20/74	2157.825	18.25	0.16	P
5/26/71	1097.735	18.49	0.07	P	4/23/74	2160.840	18.26	0.17	P
5/31/71	1102.735	18.80	0.07	P	4/30/74	2167.808	17.67	0.07	P
6/01/71	1103.818	18.53	0.04	P	5/01/74	2168.852	17.83	0.15	P
6/03/71	1105.793	18.38	0.05	P	5/17/74	2184.753	17.59	0.11	P
6/18/71	1120.669	18.46	0.06	P	5/21/74	2188.872	17.88	0.26	P
6/21/71	1123.813	18.61	0.11	P	5/22/74	2189.724	18.21	0.14	P
6/22/71	1124.711	18.41	0.09	P	5/24/74	2191.767	18.06	0.08	P
6/24/71	1126.677	18.46	0.04	P	5/26/74	2193.774	17.72	0.18	P
6/26/71	1128.723	18.60	0.07	P	6/13/74	2211.722	17.97	0.15	P
6/27/71	1129.781	18.38	0.09	P	6/17/74	2215.688	18.19	0.09	P
6/30/71	1132.769	18.62	0.08	P	6/19/74	2217.694	17.72	0.48	P
7/02/71	1134.742	18.66	0.11	P	6/21/74	2219.676	18.42	0.13	P
7/15/71	1147.591	18.19	0.13	P	7/11/74	2239.659	18.41	0.14	P
7/17/71	1149.625	18.56	0.06	P	7/14/74	2242.638	18.24	0.15	P
7/21/71	1153.631	18.45	0.08	P	7/16/74	2244.597	18.50	0.14	P
7/29/71	1161.728	18.48	0.06	P	8/14/74	2273.575	18.68	0.59	P
8/14/71	1177.586	17.94	0.13	P	8/18/74	2277.571	18.35	0.27	P
8/20/71	1183.656	17.50	0.24	P	9/12/74	2302.548	18.34	0.09	P
8/22/71	1185.573	17.43	0.08	P	10/13/74	2333.524	18.04	0.16	P
8/23/71	1186.569	17.11	0.11	P	3/20/75	2491.917	18.25	0.13	P
8/24/71	1187.569	17.27	0.24	P	4/18/75	2520.872	18.15	0.16	P

3C 371

12/15/68	205.000	15.65	0.08	P	9/03/72	1563.594	14.67	0.11	P
12/29/68	219.000	15.27	0.11	P	9/08/72	1568.645	14.82	0.12	P
2/25/69	277.000	15.66	0.07	P	10/02/72	1592.583	14.80	0.10	P
3/20/69	300.000	15.10	0.12	P	10/07/72	1597.603	14.98	0.12	P
4/13/69	324.799	15.71	0.07	P	10/11/72	1601.605	14.67	0.14	P
6/08/69	380.000	15.11	0.08	P	4/11/73	1783.891	14.97	0.10	P
7/11/69	413.723	15.43	0.15	P	6/04/73	1837.766	14.74	0.11	P
8/21/69	454.816	15.98	0.12	P	6/27/73	1860.742	15.06	0.13	P
9/05/69	469.000	15.74	0.24	P	7/08/73	1871.778	14.83	0.13	P
10/18/69	507.551	15.13	0.28	P	8/23/73	1917.726	14.90	0.11	P
11/06/69	531.635	15.21	0.08	P	9/18/73	1943.587	15.01	0.26	P
4/07/70	683.904	15.26	0.06	P	9/30/73	1955.624	14.95	0.16	P
5/02/70	708.797	15.10	0.13	P	4/21/74	2158.884	15.21	0.16	P
5/07/70	713.787	15.22	0.11	P	4/30/74	2167.845	15.41	0.10	P

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
3C 371 continued									
5/11/70	717.825	15.25	0.22	P	5/19/74	2186.813	15.03	0.16	P
5/31/70	737.711	14.87	0.19	P	5/22/74	2189.770	15.74	0.18	P
6/05/70	742.735	15.24	0.31	P	5/24/74	2191.820	15.37	0.14	P
6/10/70	747.791	14.80	0.27	P	5/26/74	2193.807	15.87	0.15	P
7/07/70	774.666	14.96	0.18	P	5/30/74	2197.781	15.51	0.27	P
8/02/70	800.679	14.96	0.05	P	6/14/74	2212.775	15.43	0.09	P
8/23/70	821.600	14.63	0.15	P	6/20/74	2218.794	15.06	0.20	P
8/27/70	825.589	14.88	0.17	P	7/16/74	2244.701	15.22	0.17	P
9/03/70	832.613	14.80	0.20	P	7/22/74	2250.694	15.49	0.19	P
9/20/70	849.000	14.71	0.08	P	8/13/74	2272.635	14.93	0.18	P
10/01/70	860.596	15.00	0.09	P	8/18/74	2277.625	15.33	0.13	P
10/03/70	862.587	15.03	0.35	P	9/09/74	2299.576	15.35	0.13	P
5/03/71	1074.868	15.38	0.07	P	10/11/74	2331.543	15.14	0.21	P
5/20/71	1091.808	15.13	0.12	P	4/20/75	2522.827	14.71	0.08	P
6/27/71	1129.756	15.36	0.18	P	5/07/75	2539.810	14.71	0.16	P
7/17/71	1149.667	14.99	0.15	P	5/16/75	2548.870	14.34	0.27	P
7/18/71	1150.680	14.74	0.07	P	6/07/75	2570.767	14.32	0.12	P
7/21/71	1153.713	14.91	0.19	P	6/13/75	2576.815	14.27	0.28	P
7/23/71	1155.589	14.89	0.05	P	6/18/75	2581.842	14.52	0.10	P
8/20/71	1183.631	15.32	0.22	P	7/04/75	2597.761	14.46	0.06	P
11/08/71	1263.566	15.24	0.07	P	7/05/75	2598.794	14.81	0.20	P
6/09/72	1477.727	15.02	0.09	P	7/08/75	2601.741	14.74	0.27	P
7/09/72	1507.812	14.59	0.07	P	7/09/75	2602.749	14.95	0.12	P
8/09/72	1538.590	14.55	0.12	P	7/10/75	2603.785	15.03	0.23	P
OX 074									
5/13/70	719.875	16.81	0.08	P	12/15/71	1300.565	17.79	0.09	P
7/30/70	797.844	17.28	0.09	P	7/18/72	1516.770	17.71	0.12	P
8/23/70	821.000	16.58	0.16	P	8/03/72	1532.670	17.61	0.13	P
8/27/70	825.621	17.24	0.10	P	8/08/72	1537.866	17.87	0.21	P
8/29/70	827.696	17.17	0.27	P	8/14/72	1543.709	17.84	0.08	P
8/30/70	828.810	17.10	0.17	P	8/17/72	1546.724	17.52	0.08	P
9/01/70	830.632	17.30	0.12	P	9/03/72	1563.656	17.76	0.10	P
9/03/70	832.698	17.31	0.13	P	9/11/72	1571.615	17.61	0.19	P
9/06/70	835.690	17.14	0.17	P	10/02/72	1592.619	17.64	0.12	P
9/22/70	851.608	17.36	0.17	P	10/08/72	1598.615	17.58	0.14	P
9/22/70	851.000	17.30	0.12	P	11/03/72	1624.583	17.53	0.25	P
9/26/70	855.604	17.09	0.13	P	11/27/72	1648.506	17.24	0.43	P
9/27/70	856.648	17.32	0.11	P	11/28/72	1649.503	17.55	0.13	P
9/28/70	857.609	17.13	0.17	P	6/30/73	1863.812	16.80	0.19	P
10/05/70	864.701	17.04	0.07	P	7/08/73	1871.802	17.80	0.17	P
10/22/70	881.621	17.30	0.08	P	8/10/73	1904.821	17.14	0.15	P
10/26/70	885.597	17.26	0.05	P	9/01/73	1926.768	17.48	0.14	P
11/02/70	892.562	17.39	0.09	P	9/21/73	1946.582	17.55	0.14	P
11/18/70	908.537	17.39	0.06	P	10/04/73	1959.749	16.85	0.11	P
11/28/70	918.610	17.56	0.15	P	10/19/73	1974.555	17.67	0.19	P
12/19/70	939.528	17.49	0.09	P	11/28/73	2014.560	17.65	0.12	P
5/05/71	1076.874	17.65	0.11	P	5/01/74	2168.881	17.72	0.26	P
5/20/71	1091.794	17.74	0.19	P	5/19/74	2186.869	17.26	0.14	P
6/03/71	1105.847	17.56	0.06	P	5/22/74	2189.831	17.58	0.16	P
6/20/71	1122.831	17.78	0.06	P	6/17/74	2215.866	17.86	0.17	P
6/30/71	1132.815	17.56	0.12	P	7/17/74	2245.823	16.98	0.11	P
7/24/71	1156.849	17.64	0.11	P	8/14/74	2273.735	16.98	0.13	P

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
OX 074 continued									
8/31/71	1194.849	17.72	0.26	P	8/16/74	2275.758	17.07	0.34	P
9/19/71	1213.738	17.51	0.15	P	9/09/74	2299.640	16.99	0.09	P
10/12/71	1236.617	17.67	0.10	P	10/09/74	2329.619	17.34	0.13	P
11/15/71	1270.568	17.50	0.09	P	12/09/74	2390.557	17.71	0.12	P
PKS 2209+08									
8/08/69	441.641	17.71	0.08	P	10/26/70	885.611	17.86	0.13	P
8/19/69	452.677	17.90	0.13	P	11/20/70	910.528	17.95	0.06	P
8/21/69	454.844	17.86	0.23	P	11/22/70	912.522	18.01	0.14	P
8/26/69	459.833	17.79	0.08	P	6/03/71	1105.859	18.04	0.08	P
9/05/69	469.792	17.72	0.12	P	7/25/71	1157.823	17.95	0.14	P
10/08/69	502.750	17.89	0.05	P	11/15/71	1270.596	17.80	0.16	P
11/09/69	534.628	17.89	0.18	P	12/11/71	1296.559	17.96	0.11	P
11/30/69	555.618	17.79	0.10	P	7/18/72	1516.794	17.72	0.11	P
11/30/69	556.499	17.69	0.11	P	9/08/72	1568.792	17.79	0.15	P
6/13/70	750.817	18.29	0.16	P	10/05/72	1595.599	18.10	0.09	P
7/12/70	779.825	17.96	0.17	P	7/08/73	1871.821	18.28	0.25	P
8/02/70	800.830	17.67	0.03	P	9/19/73	1944.626	18.04	0.10	P
8/04/70	802.760	17.57	0.17	P	10/19/73	1974.569	17.83	0.20	P
8/25/70	823.701	17.63	0.17	P	7/17/74	2245.847	17.78	0.21	P
8/27/70	825.667	17.78	0.13	P	9/11/74	2301.635	18.05	0.22	P
8/31/70	829.823	17.90	0.28	P	10/11/74	2331.591	17.99	0.19	P
9/21/70	850.604	18.01	0.17	P	12/10/74	2392.498	17.78	0.27	P
9/25/70	854.701	18.03	0.10	P					
3C 446									
12/22/68	212.000	17.82	0.09	P	12/25/73	2041.506	17.35	0.20	B
6/14/69	386.000	18.09	0.11	P	9/11/74	2301.656	15.49	0.10	B
6/24/69	396.781	17.69	0.10	P	9/15/74	2305.633	15.60	0.22	B
7/07/69	409.747	17.41	0.12	P	9/16/74	2306.785	15.97	0.04	B
7/25/69	427.868	17.56	0.27	P	9/24/74	2314.735	16.69	0.14	B
10/03/70	862.646	17.06	0.16	P	10/09/74	2329.639	16.59	0.12	B
9/15/71	1209.701	17.73	0.11	B	10/10/74	2330.647	17.04	0.07	B
8/16/72	1545.829	17.95	0.16	B	10/13/74	2333.640	16.42	0.09	B
9/15/72	1575.719	17.85	0.03	B	10/18/74	2338.759	16.99	0.08	B
10/09/72	1599.610	18.01	0.11	B	10/21/74	2341.683	17.05	0.10	B
9/19/73	1944.643	17.83	0.06	B	12/04/74	2385.516	16.86	0.10	B
3C 454.3									
8/20/71	1183.792	16.36	0.07	B	10/21/73	1976.613	16.72	0.11	B
9/01/71	1195.878	16.72	0.10	B	11/28/73	2014.600	16.97	0.16	B
7/22/72	1520.812	17.05	0.09	B	12/22/73	2038.510	16.84	0.05	B
8/11/72	1540.737	16.93	0.07	B	5/22/74	2189.918	16.93	0.17	B
9/13/72	1573.705	16.18	0.26	B	7/17/74	2245.881	17.16	0.05	B
10/02/72	1592.656	17.11	0.06	B	8/14/74	2273.779	17.15	0.42	B
10/08/72	1598.638	17.10	0.04	B	9/12/74	2302.723	16.96	0.12	B
11/03/72	1624.641	16.97	0.08	B	10/10/74	2330.671	17.05	0.08	B
8/25/73	1919.784	16.80	0.17	B	11/13/74	2364.583	17.18	0.06	B
8/10/73	1904.839	16.56	0.10	B	12/04/74	2385.537	16.83	0.07	B
9/07/73	1932.796	16.79	0.07	B	12/09/74	2390.596	17.06	0.05	B
9/24/73	1949.650	16.68	0.06	B					
BL Lac									
6/24/71	1126.835	15.35	0.06	U	8/08/72	1537.794	15.05	0.14	U
7/17/71	1149.699	15.48	0.10	U	8/12/72	1541.737	15.50	0.28	U
7/21/71	1153.856	15.34	0.11	U	8/14/72	1543.794	15.80	0.16	U

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
BL Lac continued									
7/25/71	1157.781	15.78	0.08	U	8/16/72	1545.783	15.99	0.17	U
8/14/71	1177.684	15.42	0.13	U	9/03/72	1563.694	16.01	0.11	U
8/20/71	1183.720	15.51	0.18	U	9/04/72	1564.715	16.23	0.38	U
8/26/71	1189.805	15.46	0.09	U	9/08/72	1568.687	15.60	0.13	U
8/31/71	1194.778	15.20	0.06	U	9/18/72	1578.749	15.57	0.17	U
9/01/71	1195.799	14.88	0.03	U	10/01/72	1591.622	16.08	0.23	U
9/02/71	1196.853	14.34	0.17	U	10/07/72	1597.634	15.68	0.24	U
9/13/71	1207.669	15.30	0.15	U	10/19/72	1609.647	15.67	0.21	U
9/15/71	1209.662	15.16	0.07	U	10/20/72	1610.637	16.38	0.37	U
9/19/71	1213.669	15.39	0.08	U	11/03/72	1624.549	15.28	0.20	U
9/22/71	1216.668	15.15	0.12	U	11/04/72	1625.551	15.77	0.16	U
9/25/71	1219.742	15.85	0.11	U	11/05/72	1626.563	15.08	0.32	U
9/27/71	1221.754	15.78	0.03	U	5/01/73	1803.849	15.65	0.13	U
9/29/71	1223.796	15.81	0.07	U	5/11/73	1813.869	14.95	0.08	U
9/30/71	1224.797	15.49	0.05	U	6/04/73	1837.856	15.21	0.08	U
10/12/71	1236.703	15.97	0.05	U	6/07/73	1840.840	14.95	0.13	U
10/16/71	1240.667	16.11	0.03	U	7/03/73	1866.911	15.61	0.34	U
10/19/71	1243.672	15.68	0.07	U	7/11/73	1874.843	16.03	0.19	U
11/08/71	1263.509	15.85	0.11	U	7/25/73	1888.721	15.86	0.10	U
11/08/71	1263.600	16.06	0.15	U	9/05/73	1930.790	16.06	0.17	U
11/14/71	1269.537	16.20	0.19	U	9/22/73	1947.661	16.32	0.14	U
11/14/71	1269.646	16.11	0.07	U	10/28/73	1983.710	15.76	0.12	U
11/15/71	1270.512	16.03	0.07	U	11/24/73	2010.598	16.02	0.12	U
11/15/71	1270.683	16.37	0.14	U	12/19/73	2035.533	16.04	0.15	U
11/16/71	1271.738	15.66	0.35	U	5/21/74	2188.847	15.23	0.19	U
12/14/71	1299.581	15.56	0.14	U	5/24/74	2191.877	15.41	0.16	U
4/18/72	1425.900	14.78	0.07	U	5/26/74	2193.880	14.86	0.18	U
5/21/72	1458.792	15.77	0.15	U	5/30/74	2197.887	15.33	0.03	U
6/15/72	1483.831	15.37	0.29	U	6/17/74	2215.797	15.24	0.12	U
6/22/72	1490.767	15.68	0.23	U	6/29/74	2227.882	15.77	0.07	U
7/13/72	1511.808	15.79	0.48	U	12/10/74	2391.535	16.57	0.08	U
6/24/71	1126.828	15.60	0.08	B	8/09/73	1903.799	15.47	0.08	B
7/17/71	1149.692	15.83	0.07	B	8/09/73	1903.805	15.48	0.09	B
7/21/71	1153.847	15.40	0.04	B	8/09/73	1903.808	15.63	0.11	B
7/25/71	1157.774	15.85	0.09	B	8/09/73	1903.812	15.61	0.10	B
8/14/71	1177.677	15.56	0.09	B	8/09/73	1903.816	15.54	0.08	B
8/20/71	1183.710	15.31	0.07	B	8/09/73	1903.821	15.50	0.09	B
8/26/71	1189.797	15.61	0.07	B	8/09/73	1903.824	15.68	0.08	B
8/31/71	1194.770	15.18	0.05	B	8/09/73	1903.828	15.66	0.05	B
9/01/71	1195.788	14.88	0.06	B	8/09/73	1903.831	15.64	0.11	B
9/02/71	1196.846	14.79	0.08	B	8/09/73	1903.837	15.56	0.11	B
9/13/71	1207.661	15.28	0.06	B	8/09/73	1903.840	15.56	0.04	B
9/15/71	1209.656	15.49	0.09	B	8/09/73	1903.853	15.59	0.13	B
9/19/71	1213.662	15.54	0.11	B	8/09/73	1903.856	15.58	0.16	B
9/22/71	1216.661	15.43	0.06	B	8/09/73	1903.860	15.56	0.10	B
9/25/71	1219.735	16.13	0.04	B	8/09/73	1903.864	15.58	0.05	B
9/27/71	1221.741	15.80	0.07	B	8/09/73	1903.867	15.79	0.06	B
9/29/71	1223.787	15.84	0.05	B	8/09/73	1903.872	15.63	0.03	B
9/30/71	1224.790	15.66	0.13	B	8/09/73	1903.876	15.61	0.03	B
10/12/71	1236.694	16.02	0.05	B	8/09/73	1903.880	15.51	0.03	B
10/16/71	1240.660	16.02	0.06	B	8/09/73	1903.885	15.77	0.03	B
10/19/71	1243.665	15.77	0.04	B	8/09/73	1903.890	15.63	0.03	B
10/26/71	1250.779	15.98	0.05	B	8/09/73	1903.894	15.75	0.08	B
11/08/71	1263.503	16.05	0.08	B	8/09/73	1903.897	15.77	0.11	B
11/08/71	1263.593	16.04	0.06	B	8/09/73	1903.901	15.91	0.12	B
11/14/71	1269.524	16.20	0.07	B	8/09/73	1903.904	15.83	0.54	B
11/14/71	1269.635	16.02	0.04	B	8/29/73	1923.798	16.60	0.23	B
11/15/71	1270.503	16.08	0.10	B	9/02/73	1927.701	16.12	0.13	B

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
BL Lac continued									
11/15/71	1270.674	16.48	0.09	B	9/05/73	1930.694	16.44	0.05	B
11/16/71	1271.722	15.97	0.03	B	9/05/73	1930.783	16.05	0.05	B
11/18/71	1273.569	15.58	0.03	B	9/22/73	1947.661	16.37	0.08	B
11/18/71	1273.576	15.67	0.03	B	9/30/73	1955.670	16.42	0.08	B
11/18/71	1273.585	15.70	0.04	B	10/02/73	1957.769	16.48	0.04	B
11/18/71	1273.592	15.63	0.05	B	10/02/73	1957.774	16.75	0.10	B
11/18/71	1273.603	15.70	0.03	B	10/02/73	1957.779	16.60	0.11	B
11/18/71	1273.611	15.66	0.05	B	10/02/73	1957.783	16.65	0.03	B
11/18/71	1273.631	15.65	0.09	B	10/02/73	1957.788	16.77	0.15	B
11/18/71	1273.642	15.63	0.06	B	10/02/73	1957.794	16.58	0.04	B
11/18/71	1273.651	15.63	0.03	B	10/02/73	1957.797	16.60	0.09	B
11/18/71	1273.659	15.74	0.03	B	10/02/73	1957.818	16.60	0.14	B
11/18/71	1273.670	15.68	0.03	B	10/02/73	1957.822	16.45	0.14	B
11/18/71	1273.678	15.57	0.06	B	10/02/73	1957.826	16.93	0.09	B
11/18/71	1273.687	15.72	0.07	B	10/02/73	1957.831	16.85	0.19	B
11/18/71	1273.694	15.62	0.04	B	10/02/71	1957.835	16.98	0.04	B
11/18/71	1273.703	15.74	0.04	B	10/02/73	1957.840	16.42	0.08	B
11/18/71	1273.712	15.78	0.03	B	10/02/73	1957.847	16.64	0.15	B
11/18/71	1273.719	15.88	0.08	B	10/02/73	1957.851	16.92	0.11	B
11/17/71	1273.730	15.83	0.03	B	10/02/73	1957.856	16.54	0.07	B
11/19/71	1274.669	15.58	0.04	B	10/02/73	1957.860	16.81	0.12	B
11/19/71	1274.681	15.58	0.03	B	10/02/73	1957.865	16.62	0.07	B
11/19/71	1274.692	15.64	0.03	B	10/02/73	1957.870	16.89	0.04	B
11/19/71	1274.701	15.58	0.03	B	10/02/73	1957.876	16.72	0.05	B
11/19/71	1274.710	15.71	0.04	B	10/02/73	1957.880	16.72	0.06	B
11/19/71	1274.718	15.74	0.03	B	10/02/73	1957.884	16.47	0.11	B
11/19/71	1274.730	15.75	0.03	B	10/02/73	1957.889	16.33	0.06	B
11/19/71	1274.752	15.79	0.05	B	10/02/73	1957.894	16.35	0.23	B
11/19/71	1274.765	15.72	0.11	B	10/04/73	1959.540	16.54	0.15	B
11/20/71	1275.504	16.26	0.09	B	10/04/73	1959.542	16.47	0.12	B
11/20/71	1275.515	16.47	0.04	B	10/04/73	1959.545	16.53	0.10	B
11/20/71	1275.521	16.34	0.10	B	10/04/73	1959.549	16.53	0.15	B
11/20/71	1275.535	16.31	0.11	B	10/04/73	1959.553	16.43	0.12	B
11/20/71	1275.544	16.20	0.07	B	10/04/73	1959.556	16.39	0.17	B
11/20/71	1275.558	16.49	0.05	B	10/04/73	1959.566	16.32	0.08	B
11/20/71	1275.566	16.50	0.04	B	10/04/73	1959.569	16.50	0.17	B
11/20/71	1275.584	16.22	0.03	B	10/04/73	1959.573	16.50	0.12	B
11/20/71	1275.592	16.45	0.11	B	10/04/73	1959.576	16.33	0.13	B
11/20/71	1275.603	16.23	0.11	B	10/04/73	1959.579	16.30	0.12	B
11/20/71	1275.612	16.33	0.13	B	10/04/73	1959.583	16.49	0.15	B
11/20/71	1275.625	16.43	0.10	B	10/04/73	1959.588	16.27	0.09	B
11/20/71	1275.637	16.38	0.03	B	10/04/73	1959.592	16.26	0.05	B
11/20/71	1275.646	16.36	0.04	B	10/04/73	1959.595	16.56	0.11	B
11/20/71	1275.654	16.37	0.05	B	10/04/73	1959.598	16.23	0.07	B
11/21/71	1276.501	16.09	0.04	B	10/04/73	1959.606	16.43	0.12	B
11/21/71	1276.508	16.11	0.05	B	10/04/73	1959.609	16.52	0.07	B
11/21/71	1276.515	16.09	0.05	B	10/04/73	1959.612	16.77	0.07	B
11/21/71	1276.522	16.07	0.03	B	10/04/73	1959.615	16.75	0.13	B
11/21/71	1276.528	16.03	0.05	B	10/04/73	1959.623	16.42	0.06	B
11/21/71	1276.535	16.08	0.06	B	10/04/73	1959.626	16.63	0.12	B
11/21/71	1276.546	16.07	0.03	B	10/04/73	1959.630	16.45	0.15	B
11/21/71	1276.552	16.15	0.03	B	11/04/73	1959.633	16.51	0.04	B
11/21/71	1276.560	16.08	0.03	B	10/04/73	1959.656	16.50	0.03	B
11/21/71	1276.566	16.16	0.03	B	10/04/73	1959.658	16.57	0.06	B
11/21/71	1276.576	16.16	0.05	B	10/04/73	1959.661	16.68	0.04	B
11/21/71	1276.583	15.98	0.03	B	10/04/73	1959.665	16.88	0.09	B
11/21/71	1276.592	16.06	0.03	B	10/04/73	1959.670	16.46	0.06	B
11/21/71	1276.598	15.94	0.03	B	10.04/73	1959.673	16.49	0.05	B

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
BL Lac continued									
11/21/71	1276.604	16.02	0.03	B	10/04/73	1959.677	16.38	0.03	B
11/21/71	1276.610	16.00	0.03	B	10/04/73	1959.680	16.41	0.04	B
11/21/71	1276.629	16.04	0.03	B	10/04/73	1959.686	16.49	0.06	B
11/21/71	1276.635	16.07	0.04	B	10/04/73	1959.690	16.45	0.04	B
11/21/71	1276.643	16.09	0.06	B	10/04/73	1959.694	16.40	0.06	B
11/21/71	1276.649	16.09	0.04	B	10/04/73	1959.697	16.55	0.05	B
11/21/71	1276.656	16.07	0.03	B	10/04/73	1959.705	16.65	0.03	B
11/21/71	1276.662	16.05	0.03	B	10/04/73	1959.708	16.35	0.04	B
11/21/71	1276.676	16.04	0.05	B	10/04/73	1959.713	16.50	0.04	B
11/21/71	1276.682	16.11	0.06	B	10/04/73	1959.717	16.43	0.03	B
11/21/71	1276.692	16.06	0.05	B	10/28/73	1983.699	15.74	0.04	B
11/21/71	1276.701	16.09	0.07	B	10/31/73	1986.593	16.02	0.08	B
11/21/71	1276.714	16.09	0.07	B	11/24/73	2010.591	16.36	0.12	B
11/21/71	1276.721	16.15	0.04	B	12/19/73	2035.526	16.19	0.06	B
11/22/71	1277.506	15.85	0.03	B	5/21/74	2188.838	15.29	0.06	B
11/22/71	1277.520	15.82	0.03	B	5/24/74	2191.872	15.74	0.05	B
11/22/71	1277.535	15.91	0.03	B	5/26/74	2193.874	15.22	0.14	B
11/22/71	1277.544	15.88	0.03	B	5/28/74	2195.819	15.70	0.14	B
11/22/71	1277.561	15.89	0.04	B	5/30/74	2197.881	15.50	0.10	B
11/22/71	1277.572	15.97	0.03	B	6/17/74	2215.781	15.59	0.06	B
11/22/71	1277.585	15.77	0.03	B	6/17/74	2215.790	15.57	0.07	B
11/22/71	1277.597	15.88	0.03	B	6/18/74	2216.774	15.81	0.06	B
11/22/71	1277.609	15.88	0.04	B	6/18/74	2216.792	15.70	0.03	B
11/22/71	1277.625	15.85	0.04	B	6/18/74	2216.812	15.71	0.07	B
11/22/71	1277.641	15.85	0.05	B	6/19/74	2217.751	15.55	0.06	B
11/22/71	1277.653	15.82	0.03	B	6/20/74	2218.799	15.44	0.05	B
11/22/71	1277.682	15.86	0.03	B	6/21/74	2219.792	15.82	0.03	B
11/22/71	1277.696	15.90	0.03	B	6/23/74	2221.776	15.60	0.05	B
11/22/71	1277.710	15.92	0.04	B	6/23/74	2221.785	15.82	0.11	B
11/22/71	1277.722	15.96	0.04	B	6/23/74	2221.794	15.78	0.07	B
12/14/71	1299.571	15.77	0.10	B	6/23/74	2221.802	15.84	0.07	B
4/18/72	1425.889	15.04	0.06	B	6/23/74	2221.810	15.91	0.07	B
6/15/72	1483.823	15.57	0.09	B	6/23/74	2221.820	15.62	0.10	B
6/22/72	1490.765	15.76	0.11	B	6/23/74	2221.831	15.73	0.06	B
7/13/72	1511.798	15.70	0.04	B	6/23/74	2221.840	15.74	0.07	B
7/19/72	1517.819	15.69	0.03	B	6/23/74	2221.848	15.81	0.06	B
7/22/72	1520.777	15.24	0.23	B	6/23/74	2221.856	15.72	0.03	B
8/03/72	1532.701	15.21	0.06	B	6/23/74	2221.865	15.86	0.07	B
8/07/72	1536.791	15.33	0.06	B	6/23/74	2221.874	15.82	0.05	B
8/08/72	1537.794	15.36	0.15	B	6/23/74	2221.882	15.66	0.03	B
8/09/72	1538.701	15.66	0.13	B	6/23/74	2221.890	15.86	0.06	B
8/09/72	1538.753	15.82	0.12	B	6/23/74	2221.899	15.70	0.10	B
8/10/72	1539.688	15.74	0.14	B	6/23/74	2221.907	15.64	0.08	B
8/11/72	1540.764	15.57	0.09	B	6/28/74	2226.831	15.80	0.03	B
8/12/72	1541.691	15.68	0.09	B	6/29/74	2227.823	15.80	0.03	B
8/13/72	1542.791	16.00	0.17	B	6/29/74	2227.861	15.86	0.03	B
8/14/72	1543.755	16.01	0.13	B	6/30/74	2228.854	15.94	0.03	B
8/15/72	1544.613	15.53	0.07	B	6/30/74	2228.861	16.00	0.04	B
8/15/72	1544.621	15.56	0.03	B	7/14/74	2242.736	15.66	0.05	B
8/16/72	1545.770	15.65	0.15	B	7/14/74	2242.757	15.73	0.03	B
8/17/72	1546.744	15.33	0.13	B	7/15/74	2243.713	15.86	0.05	B
8/19/72	1548.558	15.72	0.16	B	7/15/74	2343.804	15.97	0.03	B
8/23/72	1552.667	15.58	0.16	B	7/15/74	2243.810	15.94	0.03	B
9/02/72	1562.658	16.18	0.05	B	7/15/74	2243.815	15.86	0.06	B
9/03/72	1563.685	16.11	0.09	B	7/15/74	2243.820	16.13	0.03	B
9/04/72	1564.705	16.22	0.16	B	7/16/74	2244.760	15.83	0.09	B
9/05/72	1565.711	16.17	0.11	B	7/16/74	2244.771	16.15	0.04	B
9/06/72	1566.545	15.80	0.11	B	7/16/74	2244.781	15.99	0.04	B

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
BL Lac continued									
9/08/72	1568.676	15.89	0.04	B	7/16/74	2244.792	16.01	0.07	B
9/09/72	1569.534	15.75	0.03	B	7/16/74	2244.802	15.92	0.05	B
9/11/72	1571.682	15.96	0.09	B	7/16/74	2244.813	15.98	0.03	B
9/12/72	1572.569	15.80	0.03	B	7/16/74	2244.823	15.95	0.07	B
9/18/72	1578.647	15.90	0.07	B	7/16/74	2244.833	15.99	0.06	B
9/18/72	1578.739	15.66	0.08	B	7/16/74	2244.844	16.04	0.08	B
10/01/72	1591.612	15.99	0.07	B	7/17/74	2245.830	16.06	0.05	B
10/07/72	1597.624	16.16	0.07	B	7/17/74	2245.837	16.07	0.03	B
10/19/72	1609.630	15.57	0.14	B	7/18/74	2246.862	15.56	0.05	B
10/20/72	1610.619	15.54	0.09	B	7/19/74	2247.740	15.80	0.06	B
11/03/72	1624.538	15.25	0.16	B	7/19/74	2247.747	15.72	0.05	B
11/04/72	1625.538	15.19	0.12	B	7/19/74	2247.819	15.75	0.03	B
11/05/72	1626.547	15.59	0.19	B	7/19/74	2247.835	15.78	0.03	B
12/04/72	1655.716	15.22	0.11	B	7/20/74	2248.747	15.96	0.03	B
12/06/72	1657.576	15.26	0.09	B	7/20/74	2248.756	15.97	0.06	B
12/07/72	1658.598	15.32	0.15	B	7/20/74	2248.767	16.17	0.05	B
12/09/72	1660.495	15.48	0.08	B	7/24/74	2252.753	16.20	0.04	B
4/28/73	1800.833	15.47	0.04	B	7/24/74	2252.760	16.28	0.03	B
5/02/73	1804.849	15.76	0.06	B	7/24/74	2252.772	16.24	0.07	B
5/11/73	1813.860	15.07	0.04	B	7/24/74	2252.788	16.29	0.03	B
6/01/73	1834.862	14.41	0.11	B	7/24/74	2252.806	16.26	0.04	B
6/04/73	1837.847	15.36	0.16	B	7/27/74	2255.747	16.38	0.03	B
6/07/73	1840.835	15.01	0.13	B	7/27/74	2255.758	16.36	0.06	B
6/30/73	1863.782	15.24	0.08	B	7/27/74	2255.819	16.43	0.03	B
7/03/73	1866.906	15.54	0.08	B	7/27/74	2255.830	16.39	0.04	B
7/06/73	1869.914	15.61	0.09	B	9/11/74	2301.709	16.09	0.15	B
7/11/73	1874.835	15.75	0.12	B	9/12/74	2302.622	16.25	0.08	B
7/25/73	1888.715	15.96	0.10	B	10/10/74	2330.556	16.17	0.18	B
7/26/73	1889.705	16.15	0.12	B	10/16/74	2336.576	16.09	0.07	B
8/09/73	1903.789	15.67	0.08	B	10/16/74	2336.587	16.10	0.07	B
8/09/73	1903.793	15.64	0.07	B	10/18/74	2338.670	16.35	0.05	B
8/09/73	1903.797	15.68	0.16	B	12/10/74	2391.529	16.61	0.03	B
6/24/71	1126.816	14.47	0.03	V	8/17/72	1546.754	14.30	0.05	V
7/17/71	1149.709	14.55	0.05	V	8/19/72	1548.565	14.59	0.08	V
7/21/71	1153.868	14.26	0.03	V	9/03/72	1563.706	14.91	0.04	V
7/25/71	1157.792	14.66	0.08	V	9/04/72	1564.729	14.93	0.04	V
8/14/71	1177.669	14.38	0.05	V	9/05/72	1565.719	14.76	0.06	V
8/20/71	1183.733	14.22	0.07	V	9/08/72	1568.701	14.71	0.03	V
8/26/71	1189.816	14.47	0.07	V	9/11/72	1571.700	14.71	0.12	V
8/31/71	1194.790	14.19	0.05	V	9/12/72	1572.577	14.32	0.16	V
9/02/71	1196.838	13.84	0.06	V	9/18/72	1578.731	14.50	0.05	V
9/13/71	1207.657	14.31	0.03	V	10/01/72	1591.636	14.74	0.18	V
9/15/71	1209.646	14.34	0.07	V	10/07/72	1597.647	14.79	0.10	V
9/19/71	1213.656	14.34	0.04	V	10/19/72	1609.662	14.87	0.09	V
9/25/71	1219.728	14.98	0.05	V	11/03/72	1624.560	14.09	0.05	V
9/27/71	1221.763	14.70	0.05	V	11/05/72	1626.581	14.18	0.08	V
9/29/71	1223.781	14.79	0.06	V	12/04/72	1655.731	14.04	0.29	V
9/30/71	1224.808	14.47	0.09	V	12/09/72	1660.508	14.37	0.05	V
10/12/71	1236.692	14.80	0.10	V	5/01/73	1803.868	14.66	0.06	V
10/16/71	1240.676	15.02	0.05	V	5/11/73	1813.883	13.96	0.04	V
10/19/71	1243.687	14.62	0.09	V	6/04/73	1837.867	14.16	0.11	V
10/26/71	1250.764	14.83	0.03	V	6/07/73	1840.826	13.99	0.04	V
11/08/71	1263.517	14.89	0.03	V	7/03/73	1866.899	14.31	0.03	V
11/08/71	1263.588	14.87	0.03	V	7/25/73	1888.730	14.73	0.03	V
11/14/71	1269.547	15.05	0.05	V	9/05/73	1930.801	15.12	0.04	V
11/14/71	1269.623	15.05	0.05	V	9/22/73	1947.650	15.06	0.06	V
11/15/71	1270.523	15.15	0.08	V	10/28/73	1983.722	14.86	0.03	V

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
BL Lac continued									
11/15/71	1270.667	15.14	0.09	V	11/23/73	2009.887	15.26	0.05	V
11/16/71	1271.751	14.78	0.03	V	12/19/73	2035.535	15.15	0.04	V
12/14/71	1299.593	14.61	0.04	V	5/21/74	2188.830	14.16	0.08	V
4/18/72	1425.906	14.10	0.07	V	5/24/74	2191.878	14.49	0.03	V
5/21/72	1458.885	14.83	0.03	V	5/26/74	2193.877	14.21	0.04	V
6/15/72	1483.815	14.49	0.05	V	5/30/74	2197.901	14.45	0.05	V
6/22/72	1490.785	14.69	0.05	V	6/17/74	2215.807	14.49	0.10	V
8/08/72	1537.818	14.34	0.06	V	6/17/74	2215.810	14.50	0.03	V
8/09/72	1538.728	14.47	0.17	V	6/19/74	2217.810	14.44	0.03	V
8/10/72	1539.707	14.59	0.06	V	6/21/74	2219.768	14.75	0.03	V
8/11/72	1540.775	14.41	0.10	V	6/28/74	2226.845	14.84	0.17	V
8/11/72	1540.789	14.36	0.09	V	6/29/74	2227.837	14.74	0.03	V
8/12/72	1541.717	14.69	0.06	V	7/15/74	2243.776	14.94	0.04	V
8/13/72	1542.801	14.76	0.20	V	7/19/74	2247.807	14.73	0.05	V
8/14/72	1543.773	14.49	0.13	V	7/24/74	2252.819	15.31	0.03	V
8/16/72	1545.796	14.43	0.09	V	12/10/74	2391.547	15.62	0.09	V
3C 345									
6/22/71	1124.747	15.85	0.25	U	6/03/72	1471.618	15.82	0.35	U
7/04/71	1136.827	15.26	0.08	U	6/04/72	1472.690	16.00	0.20	U
7/18/71	1150.601	15.35	0.35	U	6/09/72	1477.657	15.52	0.38	U
7/21/71	1153.658	15.72	0.32	U	6/12/72	1480.663	15.91	0.13	U
8/14/71	1177.621	15.25	0.07	U	6/14/72	1482.709	15.95	0.21	U
8/27/71	1190.667	15.16	0.14	U	7/03/72	1501.633	15.52	0.19	U
9/11/71	1205.588	14.73	0.21	U	7/09/72	1507.731	16.55	0.53	U
9/15/71	1209.578	14.54	0.14	U	7/03/73	1866.756	16.31	0.29	U
9/19/71	1213.588	15.22	0.06	U	7/24/73	1887.693	16.50	0.23	U
9/25/71	1219.619	14.90	0.14	U	7/26/73	1889.686	16.10	0.04	U
10/09/71	1233.571	15.27	0.69	U	7/29/73	1892.583	16.54	0.12	U
10/11/71	1235.549	14.59	0.17	U	9/19/73	1944.548	16.56	0.38	U
10/12/71	1236.572	14.67	0.03	U	2/25/74	2103.925	16.46	0.25	U
10/16/71	1240.544	15.35	0.12	U	3/18/74	2124.831	16.45	0.18	U
10/19/71	1243.556	15.16	0.21	U	4/19/74	2156.849	16.21	0.08	U
10/22/71	1246.563	14.79	0.22	U	5/19/74	2186.838	16.13	0.12	U
2/13/72	1360.926	15.82	0.09	U	5/24/74	2191.793	16.36	0.09	U
2/22/72	1369.918	15.91	0.05	U	6/19/74	2217.713	16.65	0.60	U
3/21/72	1397.915	15.83	0.09	U	6/21/74	2219.705	16.11	0.40	U
4/18/72	1425.867	15.68	0.10	U	6/28/74	2226.798	15.97	0.21	U
5/21/72	1458.792	16.16	0.21	U					
9/20/70	849.559	16.91	0.08	P	6/12/72	1480.653	16.25	0.15	B
9/22/70	851.559	17.05	0.07	P	6/14/72	1482.701	16.41	0.20	B
9/23/70	852.542	16.97	0.15	P	7/03/72	1501.622	16.42	0.12	B
9/25/70	854.604	16.97	0.13	P	7/09/72	1507.719	15.45	0.25	B
10/01/70	860.569	17.04	0.21	P	7/18/72	1516.740	16.25	0.08	B
10/03/70	862.553	16.93	0.14	P	8/03/72	1532.587	16.50	0.16	B
10/26/70	885.536	16.91	0.14	P	8/11/72	1540.594	16.44	0.11	B
11/02/70	892.535	16.93	0.18	P	8/14/72	1543.601	16.19	0.08	B
1/30/71	981.942	16.81	0.07	P	9/03/72	1563.553	16.45	0.05	B
2/24/71	1006.938	16.79	0.11	P	9/05/72	1565.549	16.52	0.09	B
2/27/71	1009.875	16.68	0.12	P	9/08/72	1568.588	16.45	0.14	B
3/23/71	1033.881	16.72	0.07	P	10/02/72	1592.558	16.22	0.10	B
3/28/71	1038.889	16.62	0.07	P	10/07/72	1597.581	16.28	0.14	B
3/31/71	1041.899	16.28	0.04	P	10/11/72	1601.576	16.08	0.18	B
4/25/71	1066.831	16.46	0.07	P	3/04/73	1745.898	16.78	0.07	B
5/19/71	1090.701	16.28	0.03	P	4/09/73	1781.917	16.67	0.18	B

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
3C 345 continued									
5/21/71	1092.753	16.09	0.03	P	4/28/73	1800.808	16.77	0.04	B
5/31/71	1102.764	16.25	0.12	P	5/11/73	1813.831	16.87	0.13	B
6/22/71	1124.733	16.00	0.43	P	5/26/73	1828.703	16.78	0.08	B
6/22/71	1124.781	16.11	0.09	B	6/01/73	1834.638	16.71	0.03	B
6/24/71	1126.697	16.28	0.05	P	6/05/73	1838.732	16.85	0.15	B
6/27/71	1129.802	16.13	0.12	P	6/09/73	1842.809	16.91	0.25	B
6/30/71	1132.781	16.11	0.22	P	6/23/73	1856.631	16.63	0.05	B
7/02/71	1134.757	16.28	0.19	P	6/27/73	1860.697	16.95	0.16	B
7/04/71	1136.857	15.85	0.17	B	7/03/73	1866.750	16.98	0.24	B
7/15/71	1147.604	16.31	0.12	P	7/08/73	1871.722	16.68	0.15	B
7/17/71	1149.640	15.80	0.20	P	7/23/73	1886.714	16.95	0.14	B
7/18/71	1150.587	15.68	0.16	P	7/24/73	1887.686	16.73	0.12	B
7/18/71	1150.629	15.48	0.16	B	7/26/73	1889.661	16.81	0.27	B
7/21/71	1153.649	16.05	0.27	B	8/23/73	1917.580	16.81	0.14	B
7/29/71	1161.740	15.67	0.25	P	8/29/73	1923.578	16.80	0.07	B
8/14/71	1177.613	16.07	0.08	B	9/18/73	1943.537	16.99	0.17	B
8/27/71	1190.653	15.46	0.17	B	9/19/73	1944.542	16.89	0.18	B
9/11/71	1205.605	15.51	0.07	B	2/25/74	2103.768	16.89	0.08	B
9/15/71	1209.572	15.21	0.10	B	3/18/74	2124.824	16.72	0.03	B
9/19/71	1213.581	15.72	0.16	B	3/31/74	2137.881	16.83	0.08	B
9/22/71	1216.583	15.63	0.22	B	4/19/74	2156.843	16.71	0.11	B
9/25/71	1219.614	15.77	0.21	B	4/21/74	2158.866	16.71	0.14	B
10/09/71	1233.559	15.42	0.08	B	4/30/74	2167.822	16.72	0.19	B
10/11/71	1235.542	15.34	0.08	B	5/17/74	2184.733	16.67	0.06	B
10/12/71	1236.565	15.35	0.04	B	5/19/74	2186.831	16.76	0.07	B
10/19/71	1243.549	15.78	0.06	B	5/24/74	2191.793	16.86	0.04	B
10/22/71	1246.553	15.54	0.06	B	6/13/74	2211.701	16.83	0.06	B
2/13/72	1360.919	16.33	0.03	B	6/17/74	2215.744	16.84	0.17	B
2/22/72	1369.910	16.32	0.09	B	6/19/74	2217.708	16.59	0.13	B
3/14/72	1390.927	16.33	0.06	B	6/21/74	2219.694	16.82	0.10	B
3/21/72	1397.903	16.41	0.12	B	6/28/74	2226.789	16.65	0.07	B
4/18/72	1425.859	16.30	0.06	B	7/16/74	2244.613	16.86	0.17	B
5/21/72	1458.780	16.24	0.23	B	8/13/74	2272.597	16.64	0.12	B
6/03/72	1471.590	16.28	0.03	B	8/18/74	2277.597	16.69	0.24	B
6/03/72	1471.608	16.32	0.19	B	9/12/74	2302.571	16.60	0.06	B
6/04/72	1472.680	16.14	0.03	B	4/18/75	2520.859	16.67	0.04	B
6/09/72	1477.635	16.62	0.10	B					
6/22/71	1124.806	15.77	0.07	V	6/03/72	1471.597	15.97	0.12	V
7/04/71	1136.810	15.34	0.08	V	6/04/72	1472.703	15.97	0.09	V
7/18/71	1150.646	15.11	0.15	V	6/09/72	1477.686	16.06	0.11	V
7/21/71	1153.675	15.58	0.26	V	6/12/72	1480.684	16.00	0.15	V
8/14/71	1177.637	15.72	0.14	V	6/14/72	1482.728	16.11	0.24	V
8/27/71	1190.685	15.38	0.06	V	7/03/72	1501.647	15.66	0.17	V
9/11/71	1205.614	15.13	0.11	V	7/09/72	1507.744	15.71	0.14	V
9/15/71	1209.590	14.87	0.10	V	7/03/73	1866.741	16.89	0.23	V
9/19/71	1213.567	15.08	0.12	V	7/24/73	1887.699	17.24	0.08	V
9/22/71	1216.615	15.05	0.10	V	7/26/73	1889.674	16.91	0.22	V
9/25/71	1219.642	14.95	0.18	V	8/29/73	1923.594	16.83	0.14	V
10/09/71	1233.587	14.60	0.23	V	9/19/73	1944.559	16.57	0.21	V
10/11/71	1235.568	14.74	0.13	V	2/25/74	2103.934	16.89	0.13	V
10/12/71	1236.590	14.92	0.08	V	3/18/74	2124.840	16.73	0.12	V
10/16/71	1240.560	15.28	0.18	V	4/19/74	2156.860	16.48	0.04	V
10/19/71	1243.574	15.36	0.12	V	5/19/74	2186.847	16.70	0.09	V
10/22/71	1246.540	15.20	0.05	V	5/24/74	2191.803	16.44	0.07	V
2/13/72	1360.938	15.96	0.04	V	6/19/74	2217.725	16.79	0.06	V
2/22/72	1369.934	15.92	0.06	V	6/21/74	2219.747	16.53	0.10	V
3/21/72	1397.929	15.92	0.03	V	6/28/74	2226.855	16.37	0.23	V
5/21/72	1458.807	15.73	0.13	V	7/16/74	2244.628	16.75	0.14	V

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
OJ 287									
12/15/71	1300.865	12.85	0.29	U	2/05/73	1718.877	13.10	0.14	U
12/19/71	1304.855	12.69	0.19	U	2/06/73	1719.546	13.32	0.09	U
12/26/71	1311.869	12.10	0.33	U	2/06/73	1719.593	13.58	0.14	U
1/07/72	1323.683	12.13	0.14	U	2/06/73	1719.626	13.76	0.12	U
1/08/72	1324.713	12.62	0.11	U	2/06/73	1719.657	13.95	0.10	U
1/10/72	1326.746	11.99	0.13	U	2/06/73	1719.722	13.92	0.25	U
1/20/72	1336.741	12.82	0.23	U	2/06/73	1719.759	13.49	0.49	U
1/24/72	1340.905	12.32	0.07	U	2/06/73	1719.824	13.15	0.07	U
1/25/72	1341.820	12.14	0.05	U	2/06/73	1719.857	13.57	0.32	U
2/06/72	1353.703	12.17	0.09	U	2/06/73	1719.897	13.05	0.13	U
2/07/72	1354.663	12.35	0.07	U	2/07/73	1720.527	13.25	0.04	U
2/14/72	1361.565	12.43	0.12	U	2/07/73	1720.553	13.35	0.09	U
2/14/72	1361.581	12.37	0.12	U	2/07/73	1720.585	13.68	0.18	U
2/14/72	1361.603	12.40	0.05	U	2/07/73	1720.611	13.63	0.15	U
2/14/72	1361.637	12.45	0.08	U	2/07/73	1720.662	13.76	0.12	U
2/14/72	1361.666	12.35	0.04	U	2/07/73	1720.700	13.82	0.16	U
2/14/72	1361.690	12.43	0.04	U	2/07/73	1720.743	13.46	0.31	U
2/14/72	1361.705	12.35	0.08	U	2/07/73	1720.774	13.56	0.29	U
2/14/72	1361.786	12.24	0.10	U	2/07/73	1720.800	13.31	0.18	U
2/14/72	1361.807	12.29	0.04	U	2/07/73	1720.853	13.06	0.10	U
2/14/72	1361.840	12.29	0.07	U	2/08/73	1721.546	13.49	0.10	U
2/14/72	1361.860	12.37	0.03	U	2/08/73	1721.575	13.89	0.19	U
2/14/72	1361.885	12.31	0.09	U	2/08/73	1721.605	13.70	0.19	U
2/19/72	1366.524	12.55	0.08	U	2/08/73	1721.637	14.01	0.15	U
2/20/72	1367.726	12.20	0.11	U	2/08/73	1721.689	13.76	0.08	U
2/22/72	1369.784	12.35	0.21	U	2/08/73	1721.753	13.59	0.38	U
3/06/72	1382.658	12.27	0.13	U	2/08/73	1721.794	13.23	0.14	U
3/09/72	1385.776	12.42	0.09	U	2/08/73	1721.837	13.08	0.10	U
3/10/72	1386.647	12.26	0.07	U	4/06/73	1778.672	13.33	0.11	U
3/13/72	1389.654	12.23	0.34	U	4/20/73	1792.594	14.00	0.03	U
3/14/72	1390.781	12.25	0.09	U	4/21/73	1793.624	13.79	0.10	U
3/15/72	1391.677	12.15	0.26	U	10/27/73	1982.869	14.44	0.06	U
4/03/72	1410.644	12.18	0.18	U	11/02/73	1988.882	13.95	0.07	U
4/04/72	1411.695	12.60	0.14	U	11/06/73	1992.878	14.23	0.09	U
4/11/72	1418.594	12.60	0.22	U	1/04/74	2051.860	14.26	0.03	U
4/13/72	1420.576	12.94	0.24	U	1/24/74	2071.773	14.56	0.03	U
5/02/72	1439.567	12.59	0.44	U	2/23/74	2101.694	15.13	0.05	U
5/11/72	1448.620	12.73	0.21	U	2/25/74	2103.705	15.17	0.03	U
11/05/72	1626.908	13.36	0.22	U	3/01/74	2107.782	15.12	0.10	U
1/02/73	1684.899	12.41	0.16	U	3/14/74	2120.615	15.04	0.08	U
2/03/73	1716.746	13.00	0.10	U	4/12/74	2149.569	15.34	0.22	U
2/03/73	1716.776	13.02	0.08	U	5/11/74	2178.637	15.06	0.08	U
2/03/73	1716.826	13.04	0.18	U	5/13/74	2180.580	14.98	0.09	U
2/03/73	1716.860	13.02	0.14	U	5/15/74	2182.617	15.07	0.06	U
2/03/73	1716.917	13.01	0.13	U	5/21/74	2188.613	14.57	0.09	U
2/04/73	1717.764	13.28	0.16	U	5/22/74	2189.594	14.68	0.14	U
2/04/73	1717.828	13.25	0.17	U	5/24/74	2191.546	14.83	0.07	U
2/04/73	1717.858	13.27	0.18	U	10/21/74	2341.947	15.19	0.07	U
2/04/73	1717.894	13.07	0.12	U	11/23/74	2374.886	14.79	0.04	U
2/04/73	1717.931	12.99	0.10	U	12/18/74	2399.855	14.49	0.05	U
2/05/73	1718.531	13.00	0.03	U	1/08/75	2420.755	14.70	0.31	U
2/05/73	1718.564	13.08	0.03	U	1/10/75	2422.807	14.44	0.11	U
2/05/73	1718.593	13.10	0.07	U	1/21/75	2433.796	14.18	0.09	U
2/05/73	1718.626	13.16	0.05	U	2/08/75	2451.747	14.07	0.07	U
2/05/73	1718.681	13.19	0.12	U	3/02/75	2473.622	14.97	0.08	U
2/05/73	1718.716	13.31	0.11	U	3/07/75	2478.626	14.83	0.04	U
2/05/73	1718.758	13.30	0.21	U	3/09/75	2480.626	14.76	0.03	U
2/05/73	1718.789	13.35	0.24	U	4/02/75	2504.589	14.70	0.15	U
2/05/73	1718.819	13.16	0.09	U					

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
OJ 287 continued									
2/08/70	625.735	14.76	0.18	P	2/05/73	1718.749	13.95	0.23	B
4/30/70	706.625	14.02	0.17	P	2/05/73	1718.781	13.88	0.14	B
5/02/70	708.000	13.75	0.17	P	2/05/73	1718.811	13.86	0.07	B
11/08/70	898.881	12.82	0.20	P	2/05/73	1718.869	13.11	0.27	B
11/28/70	918.792	13.34	0.24	P	2/06/73	1719.538	14.05	0.03	B
11/29/70	919.854	12.93	0.24	P	2/06/73	1719.585	14.21	0.04	B
12/05/70	925.896	13.29	0.18	P	2/06/73	1719.617	14.25	0.11	B
12/23/70	943.781	12.80	0.27	P	2/06/73	1719.650	14.32	0.11	B
1/25/71	976.816	13.54	0.29	P	2/06/73	1719.715	14.18	0.09	B
2/19/71	1001.694	12.83	0.20	P	2/06/73	1719.752	14.17	0.33	B
3/26/71	1036.677	12.47	0.16	P	2/06/73	1719.815	13.89	0.16	B
5/19/71	1090.597	12.41	0.16	P	2/06/73	1719.850	14.24	0.34	B
12/15/71	1300.837	13.23	0.18	B	2/06/73	1719.891	13.82	0.21	B
12/19/71	1304.783	13.08	0.18	B	2/07/73	1720.519	13.90	0.05	B
12/26/71	1311.865	13.01	0.28	B	2/07/73	1720.546	13.94	0.05	B
1/07/72	1323.678	12.66	0.11	B	2/07/73	1720.578	14.12	0.10	B
1/08/72	1324.710	13.12	0.06	B	2/07/73	1720.603	14.34	0.11	B
1/10/72	1326.740	13.10	0.15	B	2/07/73	1720.653	14.34	0.07	B
1/20/72	1336.737	13.31	0.19	B	2/07/73	1720.692	14.16	0.04	B
1/24/72	1340.849	12.96	0.06	B	2/07/73	1720.734	14.23	0.20	B
1/25/72	1341.816	12.71	0.04	B	2/07/73	1720.766	14.17	0.19	B
2/06/72	1353.700	13.10	0.08	B	2/07/73	1720.792	14.09	0.15	B
2/07/72	1354.656	13.02	0.08	B	2/07/73	1720.842	14.06	0.21	B
2/14/72	1361.563	13.01	0.07	B	2/08/73	1721.539	14.09	0.15	B
2/14/72	1361.578	12.95	0.08	B	2/08/73	1721.567	14.46	0.16	B
2/14/72	1361.601	12.98	0.06	B	2/08/73	1721.598	14.55	0.17	B
2/14/72	1361.635	12.96	0.07	B	2/08/73	1721.630	14.45	0.15	B
2/14/72	1361.665	12.97	0.05	B	2/08/73	1721.679	14.23	0.04	B
2/14/72	1361.688	13.03	0.04	B	2/08/73	1721.744	14.16	0.32	B
2/14/72	1361.718	13.00	0.07	B	2/08/73	1721.787	14.22	0.29	B
2/14/72	1361.784	12.79	0.07	B	2/08/73	1721.829	13.99	0.10	B
2/14/72	1361.805	12.86	0.06	B	3/10/73	1751.601	14.11	0.06	B
2/14/72	1361.837	12.85	0.06	B	3/23/73	1764.574	14.30	0.04	B
2/14/72	1361.858	12.82	0.06	B	4/01/73	1773.564	13.95	0.07	B
2/14/72	1361.883	12.81	0.08	B	4/06/73	1778.660	14.15	0.09	B
2/19/72	1366.523	13.14	0.04	B	4/20/73	1792.585	14.53	0.06	B
2/19/72	1366.541	12.97	0.11	B	4/21/73	1793.617	14.47	0.08	B
2/20/72	1367.723	12.87	0.10	B	10/04/73	1959.898	15.19	0.03	B
2/22/72	1369.781	12.88	0.08	B	10/27/73	1982.864	15.19	0.23	B
3/06/72	1382.656	12.86	0.17	B	11/02/73	1988.865	14.73	0.06	B
3/09/72	1385.771	13.10	0.05	B	11/06/73	1992.875	14.85	0.04	B
3/10/72	1386.642	12.90	0.04	B	1/04/74	2051.856	14.97	0.03	B
3/13/72	1389.649	12.89	0.32	B	1/24/74	2071.769	15.08	0.09	B
3/14/72	1390.775	12.91	0.08	B	2/23/74	2101.686	15.90	0.03	B
3/15/72	1391.674	12.86	0.32	B	2/25/74	2103.698	15.89	0.06	B
4/03/72	1410.640	13.05	0.18	B	3/01/74	2107.776	15.79	0.07	B
4/04/72	1411.691	13.20	0.11	B	3/14/74	2120.607	15.62	0.04	B
4/09/72	1416.635	13.11	0.28	B	4/12/74	2149.566	15.80	0.17	B
4/11/72	1418.000	13.24	0.26	B	5/11/74	2178.623	15.62	0.11	B
4/13/72	1420.572	13.58	0.26	B	5/13/74	2180.594	16.06	0.03	B
4/15/72	1422.552	13.89	0.34	B	5/15/74	2182.606	15.62	0.06	B
5/02/72	1439.563	13.55	0.39	B	5/21/74	2188.603	15.51	0.11	B
5/11/72	1448.615	13.49	0.16	B	5/22/74	2189.583	15.30	0.06	B
11/05/72	1626.901	13.92	0.21	B	5/24/74	2191.535	15.33	0.07	B
1/02/73	1684.889	13.26	0.20	B	6/11/74	2209.637	15.64	0.04	B
1/14/73	1696.725	13.79	1.00	B	6/14/74	2212.587	15.40	0.16	B

VARIABLE RADIO SOURCES

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TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
OJ 287 continued									
2/01/73	1714.693	13.75	0.08	B	10/18/74	2338.895	16.05	0.06	B
2/03/73	1716.818	13.75	0.19	B	10/21/74	2341.911	16.27	0.05	B
2/03/73	1716.847	13.69	0.08	B	10/27/74	2347.906	16.09	0.06	B
2/03/73	1716.726	13.69	0.14	B	11/23/74	2374.875	15.34	0.05	B
2/03/73	1716.765	13.69	0.22	B	12/18/74	2399.843	15.26	0.05	B
2/03/73	1716.906	13.75	0.14	B	1/08/75	2420.746	15.17	0.25	B
2/03/73	1716.939	13.73	0.13	B	1/21/75	2433.801	14.87	0.03	B
2/04/73	1717.756	13.94	0.12	B	2/01/75	2444.667	14.91	0.13	B
2/04/73	1717.819	13.81	0.12	B	2/08/75	2451.740	14.80	0.03	B
2/04/73	1717.851	13.98	0.15	B	3/02/75	2473.614	15.66	0.11	B
2/04/73	1717.884	13.96	0.13	B	3/06/75	2477.710	15.64	0.07	B
2/04/73	1717.923	13.86	0.08	B	3/07/75	2478.619	15.82	0.06	B
2/05/73	1718.556	13.74	0.08	B	3/09/75	2480.619	15.46	0.03	B
2/05/73	1718.522	13.65	0.08	B	3/13/75	2484.710	16.19	0.19	B
2/05/73	1718.585	13.71	0.07	B	4/02/75	2504.582	15.37	0.09	B
2/05/73	1718.617	13.59	0.11	B	4/10/75	2512.655	15.34	0.06	B
2/05/73	1718.709	14.02	0.03	B					
12/15/71	1300.856	12.72	0.10	V	2/05/73	1718.835	13.40	0.08	V
12/19/71	1304.828	12.53	0.09	V	2/05/73	1718.886	13.36	0.13	V
12/26/71	1311.882	12.38	0.27	V	2/06/73	1719.566	13.33	0.07	V
1/07/72	1323.690	12.31	0.12	V	2/06/73	1719.605	13.72	0.16	V
1/09/72	1325.704	12.73	0.09	V	2/06/73	1719.635	13.70	0.17	V
1/10/72	1326.758	12.54	0.16	V	2/06/73	1719.672	13.67	0.16	V
1/20/72	1336.747	12.72	0.12	V	2/06/73	1719.733	13.76	0.20	V
1/24/72	1340.828	12.37	0.06	V	2/06/73	1719.771	13.66	0.30	V
1/25/72	1341.912	12.50	0.17	V	2/06/73	1719.837	13.39	0.13	V
2/05/72	1352.709	12.67	0.09	V	2/06/73	1719.872	13.29	0.08	V
2/07/72	1354.677	12.61	0.09	V	2/07/73	1720.537	13.33	0.06	V
2/14/72	1361.572	12.71	0.04	V	2/07/73	1720.563	13.34	0.03	V
2/14/72	1361.587	12.70	0.08	V	2/07/73	1720.595	13.56	0.11	V
2/14/72	1361.610	12.68	0.06	V	2/07/73	1720.621	13.56	0.08	V
2/14/72	1361.643	12.66	0.07	V	2/07/73	1720.672	13.55	0.15	V
2/14/72	1361.675	12.61	0.05	V	2/07/73	1720.710	13.63	0.10	V
2/14/72	1361.696	12.65	0.07	V	2/07/73	1720.753	13.63	0.28	V
2/14/72	1361.713	12.64	0.03	V	2/07/73	1720.783	13.56	0.20	V
2/14/72	1361.794	12.54	0.05	V	2/07/73	1720.810	13.51	0.27	V
2/14/72	1361.824	12.59	0.04	V	2/07/73	1720.866	13.24	0.14	V
2/14/72	1361.850	12.62	0.05	V	2/08/73	1721.555	13.62	0.13	V
2/14/72	1361.868	12.52	0.06	V	2/08/73	1721.584	13.94	0.19	V
2/14/72	1361.896	12.48	0.04	V	2/08/73	1721.616	13.78	0.14	V
2/19/72	1366.531	12.77	0.11	V	2/08/73	1721.648	13.78	0.10	V
2/20/72	1367.733	12.59	0.18	V	2/08/73	1721.700	13.62	0.11	V
2/22/72	1369.792	12.46	0.27	V	2/08/73	1721.762	13.71	0.31	V
3/06/72	1382.668	12.53	0.16	V	2/08/73	1721.806	13.58	0.21	V
3/09/72	1385.746	12.77	0.07	V	3/10/73	1751.782	13.67	0.06	V
3/10/72	1386.658	12.66	0.05	V	4/01/73	1773.587	13.35	0.09	V
3/13/72	1389.661	12.62	0.30	V	4/06/73	1778.681	13.57	0.14	V
3/14/72	1390.788	12.64	0.07	V	4/20/73	1792.603	13.99	0.09	V
3/15/72	1391.682	12.39	0.27	V	4/21/73	1793.633	13.89	0.08	V
4/03/72	1410.650	12.73	0.12	V	10/04/73	1959.902	14.96	0.08	V
4/04/72	1411.701	12.96	0.06	V	10/27/73	1982.876	14.80	0.17	V
4/11/72	1418.585	12.70	0.32	V	11/02/73	1988.881	14.45	0.17	V
4/13/72	1420.582	12.90	0.44	V	11/06/73	1992.885	14.69	0.04	V
4/15/72	1422.560	12.25	0.52	V	1/04/74	2051.867	14.95	0.07	V
5/02/72	1439.573	13.37	0.27	V	1/24/74	2071.781	14.46	0.08	V
5/11/72	1448.626	13.12	0.09	V	2/23/74	2101.705	15.28	0.03	V
11/05/72	1626.915	13.42	0.13	V	2/25/74	2103.714	15.37	0.10	V

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
OJ 287 continued									
1/02/73	1684.913	12.76	0.20	V	3/01/74	2107.791	15.35	0.04	V
2/01/73	1714.708	13.20	0.11	V	3/14/74	2120.626	15.35	0.04	V
2/03/73	1716.803	13.32	0.11	V	4/12/74	2149.562	15.04	0.21	V
2/03/73	1716.736	13.29	0.21	V	5/11/74	2178.657	14.92	0.06	V
2/03/73	1716.753	13.37	0.20	V	5/13/74	2180.606	15.75	0.03	V
2/03/73	1716.835	13.27	0.18	V	5/15/74	2182.629	14.72	0.16	V
2/03/73	1716.872	13.21	0.08	V	5/21/74	2188.624	15.27	0.04	V
2/03/73	1716.929	13.18	0.12	V	5/22/74	2189.608	14.96	0.10	V
2/04/73	1717.774	13.45	0.17	V	5/24/74	2191.559	15.15	0.14	V
2/04/73	1717.840	13.62	0.14	V	10/21/74	2341.922	15.66	0.07	V
2/04/73	1717.868	13.56	0.20	V	11/23/74	2374.856	15.47	0.07	V
2/04/73	1717.906	13.51	0.10	V	12/18/74	2399.865	15.02	0.07	V
2/04/73	1717.940	13.33	0.09	V	1/10/75	2422.750	14.83	0.11	V
2/05/73	1718.542	13.17	0.09	V	1/21/75	2333.813	14.59	0.04	V
2/05/73	1718.574	13.20	0.09	V	2/01/75	2444.632	14.54	0.04	V
2/05/73	1718.603	13.43	0.03	V	2/08/75	2451.757	14.67	0.05	V
2/05/73	1718.635	13.33	0.04	V	3/07/75	2478.635	15.46	0.13	V
2/05/73	1718.692	13.37	0.06	V	3/09/75	2480.635	14.55	0.20	V
2/05/73	1718.727	13.42	0.08	V	3/13/75	2484.729	13.89	0.34	V
2/05/73	1718.768	13.50	0.14	V	4/02/75	2504.601	15.07	0.06	V
2/05/73	1718.800	13.44	0.14	V					
5/13/73	1815.585	13.69	0.07	I	12/18/74	2399.892	14.01	0.05	I
11/06/73	1992.861	13.95	0.08	I	1/10/75	2422.788	13.83	0.03	I
1/04/74	2051.841	13.97	0.08	I	2/01/75	2444.651	13.87	0.06	I
1/24/74	2071.808	14.26	0.07	I	2/08/75	2451.788	13.70	0.08	I
3/01/74	2107.761	13.92	0.05	I	3/02/75	2473.642	14.53	0.03	I
5/11/74	2178.678	14.02	0.05	I	3/07/75	2478.651	13.58	0.13	I
5/21/74	2188.587	13.78	0.04	I	3/09/75	2480.649	14.11	0.03	I
10/27/74	2347.894	14.02	0.10	I	3/13/75	2484.761	13.73	0.10	I
11/23/74	2374.906	14.22	0.05	I					
PKS 2345-16									
10/10/69	504.691	17.00	0.09	P	7/21/71	1153.880	17.54	0.10	P
11/09/69	534.677	16.70	0.07	P	7/24/71	1156.867	17.53	0.06	P
11/12/69	537.691	16.58	0.16	P	8/20/71	1183.819	17.39	0.09	P
11/15/69	540.758	16.34	0.42	P	8/26/71	1189.842	17.34	0.09	P
11/30/69	555.590	15.86	0.14	P	8/27/71	1190.833	17.27	0.09	P
12/03/69	558.556	15.61	0.10	P	9/01/71	1195.849	17.53	0.08	P
12/05/69	560.512	15.87	0.06	P	9/13/71	1207.691	17.15	0.11	P
12/05/69	560.578	15.79	0.11	P	9/19/71	1213.767	17.36	0.08	P
12/05/69	560.599	16.49	0.11	P	9/27/71	1221.816	17.29	0.11	P
12/06/69	561.000	16.37	0.16	P	10/11/71	1235.674	17.25	0.05	P
12/08/69	563.507	16.33	0.11	P	11/14/71	1269.646	16.99	0.11	P
12/08/69	563.593	16.45	0.13	P	12/14/71	1299.608	17.24	0.06	P
12/30/69	585.563	16.55	0.08	P	1/10/72	1326.508	17.24	0.12	P
1/09/70	595.521	15.97	0.18	P	1/18/72	1334.521	17.07	0.15	P
1/11/70	597.531	16.12	0.12	P	7/18/72	1516.867	17.41	0.03	P
1/29/70	615.526	16.05	0.13	P	7/20/72	1518.869	17.38	0.13	P
1/31/70	617.533	15.56	0.18	P	8/11/72	1540.817	16.96	0.10	P
2/08/70	625.526	16.01	0.08	P	8/16/72	1545.893	16.97	0.08	P
6/09/70	746.860	17.23	0.11	P	9/04/72	1564.844	17.17	0.12	P
6/11/70	748.857	17.02	0.18	P	9/12/72	1572.673	17.17	0.09	P
6/16/70	753.860	16.84	0.17	P	9/18/72	1578.802	17.22	0.14	P
7/01/70	768.832	17.02	0.19	P	10/02/72	1592.681	17.34	0.09	P
7/07/70	774.865	16.68	0.13	P	10/08/72	1598.679	17.19	0.11	P
7/11/70	778.856	16.81	0.14	P	10/09/72	1599.659	17.26	0.14	P
7/15/70	782.000	16.93	0.08	P	10/11/72	1601.676	17.39	0.11	P

TABLE II (continued)

UT Date	JD 2440000+	Mag.	rms error	Color	UT Date	JD 2440000+	Mag.	rms error	Color
PKS 2345-16 continued									
7/31/70	798.822	17.11	0.12	P	10/13/72	1603.647	17.16	0.14	P
8/04/70	802.868	16.82	0.10	P	11/03/72	1624.617	17.19	0.10	P
8/23/70	821.653	17.33	0.06	P	11/11/72	1632.617	17.34	0.08	P
8/29/70	827.835	17.21	0.17	P	11/27/72	1648.565	17.13	0.10	P
8/31/70	829.849	17.24	0.10	P	7/08/73	1871.841	17.29	0.18	P
9/06/70	835.750	17.28	0.13	P	8/10/73	1904.886	17.13	0.12	P
9/07/70	836.776	17.24	0.10	P	8/25/73	1919.819	17.25	0.11	P
9/22/70	851.628	17.19	0.11	P	9/06/73	1931.813	16.61	0.10	P
9/24/70	853.690	17.19	0.10	P	9/07/73	1932.773	16.61	0.09	P
9/30/70	859.599	17.17	0.09	P	9/08/73	1933.810	16.92	0.17	P
10/05/70	864.753	17.14	0.09	P	9/18/73	1943.610	17.18	0.14	P
10/26/70	885.642	17.26	0.08	P	9/19/73	1944.662	17.07	0.11	P
11/01/70	891.655	17.23	0.11	P	9/22/73	1947.719	17.28	0.09	P
11/18/70	908.589	17.33	0.08	P	9/24/73	1949.704	17.19	0.27	P
11/28/70	918.641	17.34	0.14	P	9/30/73	1955.776	17.11	0.13	P
11/29/70	919.572	17.28	0.08	P	10/04/73	1959.749	17.16	0.12	P
12/21/70	941.506	17.22	0.09	P	10/19/73	1974.625	17.22	0.13	P
12/27/70	947.507	17.28	0.06	P	10/28/73	1983.666	16.83	0.11	P
1/16/71	967.516	17.27	0.03	P	10/31/73	1986.696	16.88	0.11	P
1/20/71	971.520	17.38	0.08	P	11/28/73	2014.576	16.62	0.33	P
1/22/71	973.519	17.33	0.12	P	12/15/73	2031.510	17.18	0.12	P
1/29/71	980.517	17.56	0.15	P	8/16/74	2275.801	16.97	0.23	P
6/21/71	1123.864	17.54	0.05	P	9/11/74	2301.677	17.59	0.25	P
6/22/71	1124.857	17.87	0.11	P	9/16/74	2306.805	17.58	0.14	P
6/24/71	1126.864	17.37	0.12	P	10/09/74	2329.619	17.53	0.10	P
6/26/71	1128.853	17.70	0.07	P	10/21/74	2341.698	17.54	0.07	P
6/27/71	1129.847	17.58	0.10	P	12/04/74	2385.551	17.57	0.10	P
6/30/71	1132.869	17.66	0.13	P	12/10/74	2371.575	17.65	0.03	P
7/02/71	1134.860	17.61	0.08	P	1/02/75	2414.509	17.28	0.08	P

Those exposures for which exact times are not available have integral Julian dates.

bottomed out. Two comparison sequences have been used. The first was derived from photoelectric observations with the Rosemary Hill 76-cm reflector. From late 1972 to the present, observations have been reduced with the sequence of Penston and Wing (1973). Infrared magnitudes for the stars in Penston and Wing's sequence were obtained by photographic transfer from M67 (Eggen 1972).

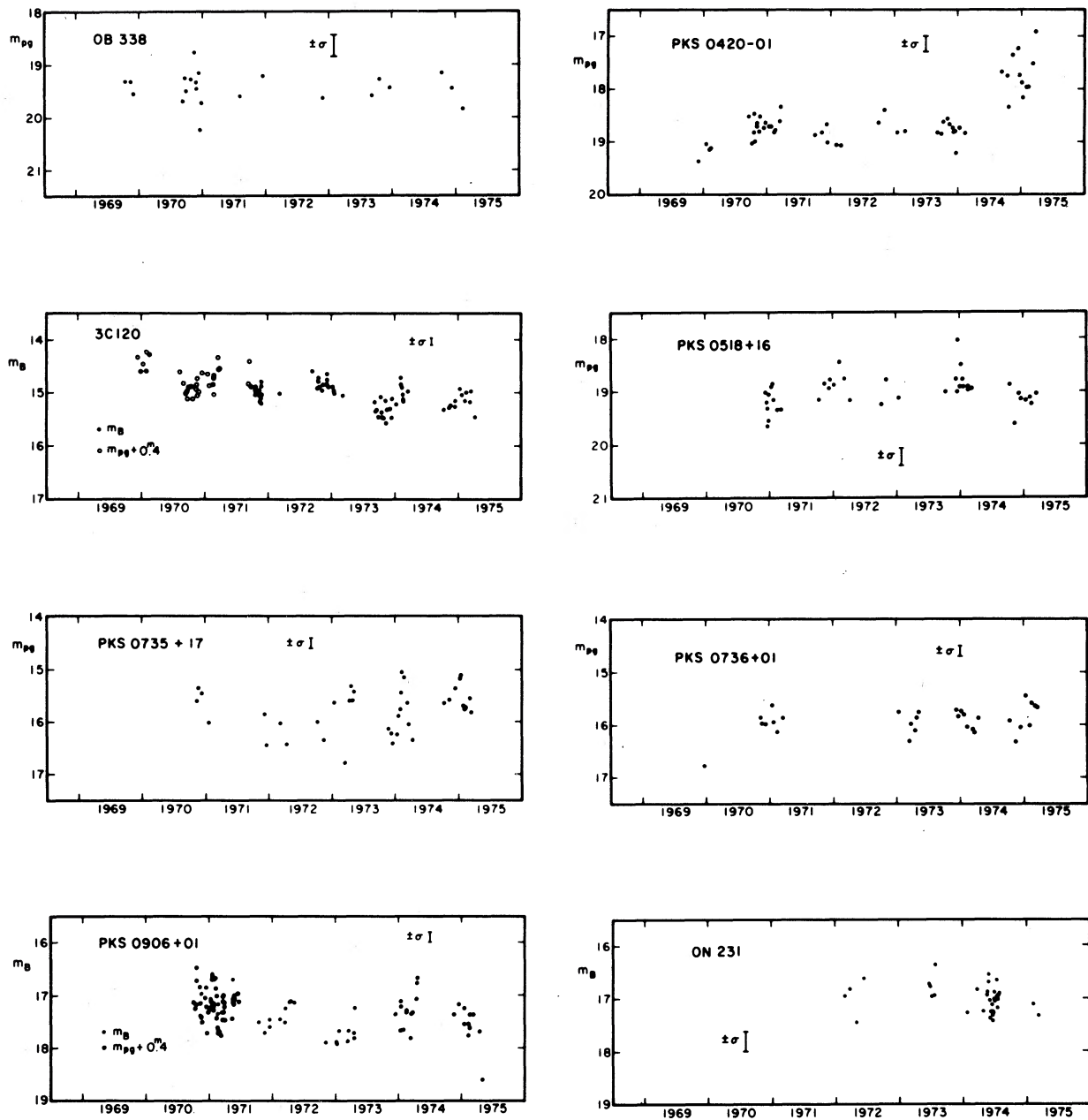
PKS 0906+01: Folsom and Smith (1969) identified this QSO as an OVV that exhibited irregular optical variations of approximately 1^m0 . The long-term Florida light curve shows variations of an interesting nature. Violent short-term fluctuations are apparent in late 1970 and early 1971, after which the level of activity and average intensity declined from 1971 through mid-1973. Early 1974 showed an increase in activity accompanied by a modest rise in average intensity. A comparison sequence was calibrated by photographic transfer from M3 (Sandage 1970).

ON 231: The optical counterpart of ON 231 was identified by Browne (1971) as the variable star W Comae Berenices, a 14^m5 stellar object that appears neutral in color on the Palomar Sky Survey. The Rosemary Hill observations suggest vigorous short-

term activity similar in character to that of the lacertid prototype BL Lac, though of lesser amplitude. Indeed, Hall and Usher (1973) suggest that ON 231 does belong to the lacertid class. The comparison sequence of Wing (1973) was used in reducing the Florida observations.

OQ 208: This object was identified as a Seyfert galaxy by Blake (1970). The long-term rise and fall from 1969 to 1971 that is suggested by the Florida data was also observed by Lü (1972). The radio spectrum is sharply peaked (Kraus *et al.* 1968). A comparison sequence was calibrated by photographic transfer from M3 (Sandage 1953).

PKS 1514-24: The optical counterpart of this radio source has been alternately identified as an elliptical galaxy (Bolton *et al.* 1965), and as an N-type galaxy (Westerlund and Wall 1969). Bond (1971) identified it with the variable object AP Librae. The light curve suggests violent short-term activity similar to that of the lacertid prototype BL Lac. Additionally, there is strong indication of a long-term rise in mean brightness from 1972 through early 1975. The faint spectral features reported by Disney *et al.* (1974) are reminiscent of those reported for BL Lac by Oke and Gunn (1974), and further accentuate the similarity between the two



1(a)

FIG. 1(a). Light curves of the 20 OVV sources.

objects. It should be noted, however, that Baldwin *et al.* (1975) suggest that the features observed by Oke and Gunn were spurious. A comparison sequence was calibrated by photographic transfer from SA 107 (Purgathofer 1969).

NRAO 512: This QSO is one of the most violently variable objects in the Rosemary Hill program. One burst of over 1^m0 was recorded within a three-day period in 1970 (Folsom *et al.* 1970). This violent activity, which is superimposed upon a slowly varying compo-

nent, has continued until the present. This source is also a well-known radio variable (Medd *et al.* 1972; Stull 1972). A comparison sequence was calibrated by photographic transfer from SA 37.

3C 345: This QSO is a well-known OVV. Like those of OJ 287, the three-color light curves of 3C 345 show rapid variations occurring in a few days or weeks superimposed upon a slowly varying component. Since late 1971 the average intensity has declined in all three colors, although there is evidence of bottoming out in

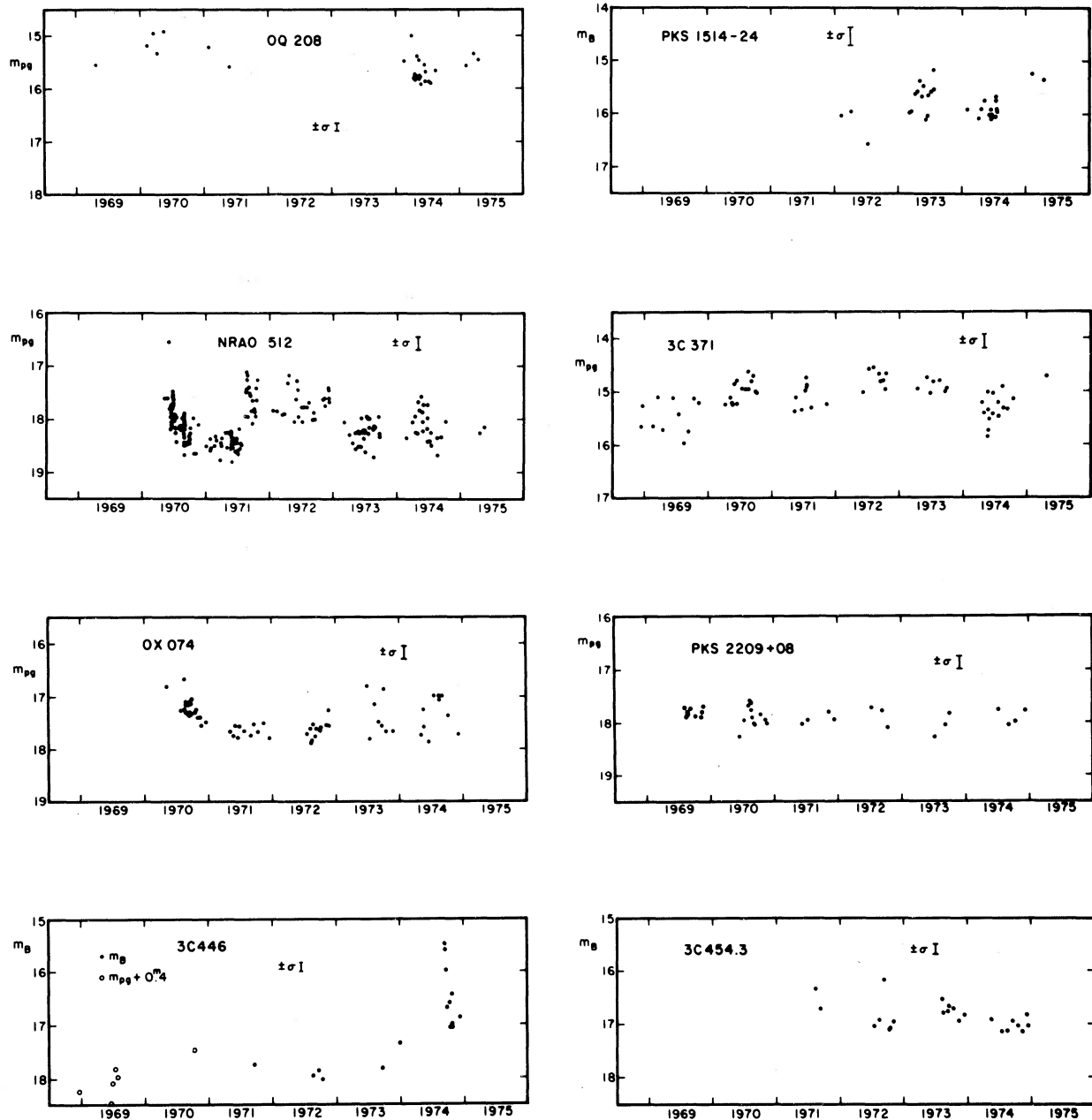


FIG. 1(b). Light curves of the 20 OVV sources.

1974; surprisingly, the long-term decline appears greatest in the ultraviolet and visual, suggesting a possible color effect. The comparison sequence of Angione (1971) was used in reducing the Florida observations.

3C 371: The N-galaxy 3C 371 (Wyndham 1966) was the first source observed in the Rosemary Hill program; it shows a slowly varying component with superimposed outbursts. Dent *et al.* (1974) observed a maximum in the slowly varying component in 1972 at 15.5 GHz, while Medd *et al.* (1972) found a shallow minimum in 1969 at 6.6 and 10.7 GHz; it can be seen from Fig. 1

that these results correlate well with the optical light curve. A comparison sequence was calibrated by photographic transfer from M13 (Savedoff 1956).

OX 074: Kraus *et al.* (1968) reported that this QSO has a peaked radio spectrum. Folsom *et al.* (1971b) observed a rapid flare in mid-1970. This object also shows the typical pattern of short-term bursts superimposed upon a slowly changing background, although minimum light seems to be rather stable near 18^m. The relative quiescence in 1971 and 1972 has been followed by a phase of violent oscillation between maxima and minima. There was no discernable increase

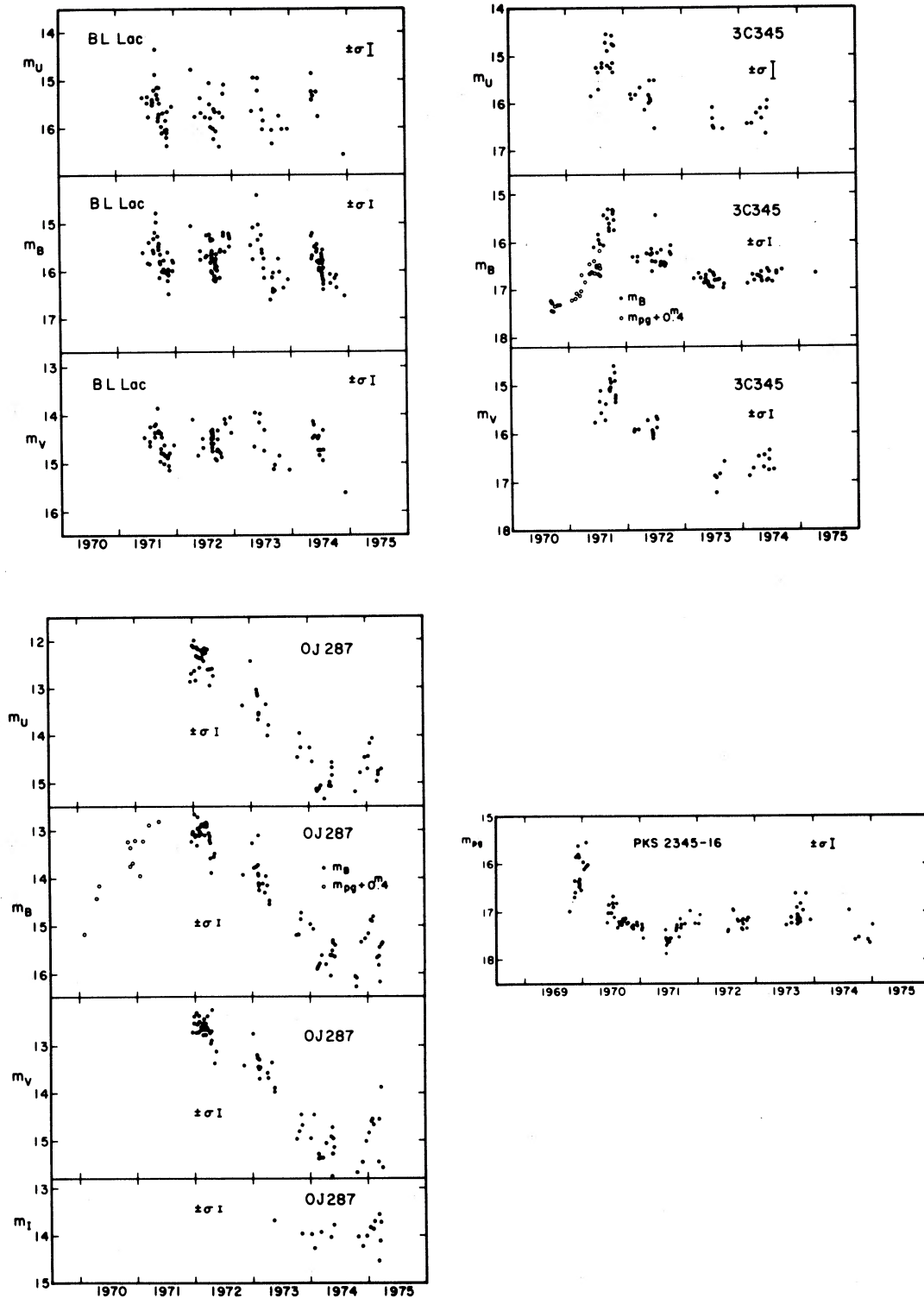


FIG. 1(c). Light curves of the 20 OVV sources.

in the baseline brightness in 1973 and 1974, in contrast to the 1970 outburst. A comparison sequence was calibrated by photographic transfer from SA 89.

BL Lac: The light curves of the lacertid prototype BL Lac show the most violent short-term activity of

any OVV observed at Rosemary Hill. A few infrared exposures (not plotted) appear to show less activity, and in general activity appears to be greater at the shorter wavelengths. While there are significant short-term fluctuations in the color indices, plots of color

index versus time show that these fluctuations occur about a constant value and that long-term color effects are absent. The comparison sequence was chosen from a sequence of eight stars published by Bertaud *et al.* (1969).

PKS 2209+08: This object is a marginal member of the OVV class. One significant outburst of nearly a magnitude was observed in 1970, with an indication of another less well covered in 1973. There appear to be no long-term trends in minimum or mean brightness. A comparison sequence was calibrated by photographic transfer from SA 114.

3C 446: This well-known OVV (Penston and Cannon 1970) was not observed intensively until the large flare of 1974. Because the object was in the declining phase when it was first observed that year, the height of the maximum is unknown, but it is at least $2^m.5$ above the previous minimum. The slow rise and fall of the light curve from 1968 to 1972 is confirmed by several observers at radio wavelengths (Medd *et al.* 1972; Dent and Kojoian 1972; Dent *et al.* 1974). The comparison sequence of Angione (1971) was used to reduce the observations.

3C 454.3: The Florida light curve of the QSO 3C 454.3 does not show the extremely violent short-term activity exhibited by many of the Florida OVVs; the largest burst occurred in September of 1972 and is dependent upon one measurement, which has a large error. However, other observers have seen large intensity changes. For example, Tritton and Selmes (1971) reported a variation of $1^m.5$ over a period of 500 days. The comparison sequence of Angione (1971) was used in reducing the Rosemary Hill observations.

PKS 2345-16: Florida observers recorded an outburst of about $2^m.0$ in 1969 (Folsom *et al.* 1970), with no activity of comparable size seen since that time. This QSO is another that shows a slowly varying component with burst activity superimposed. Medd *et al.* (1972) observed a peak at 6.7 and 10.7 GHz that corresponds to the 1969 optical outburst. Seielstad and Berge (1975) observed a peak at 5 GHz in 1973 which corresponds to a slight increase in the slowly varying optical component as indicated in Fig. 1. The radio spectrum is flat (Kellerman and Pauliny-Toth 1968). A comparison sequence was calibrated by photographic transfer from SA 116.

II. DISCUSSION

A 7-yr study of the optical variability of a large sample of QSOs has shown that there is great variety in the behavior of these objects. Sources exhibiting violent optical activity (OVVs) appear to form one distinctive class, with the Rosemary Hill data suggesting that this class can be roughly subdivided into four subclasses not unlike those described by Dent *et al.* (1974) on the basis of the radio observations. Each of the sources in Table I has been assigned to one of these

subclasses, even though some of the assignments are obviously tentative.

Subclass I includes objects whose light curves are dominated by rapid, short-term "flickering." Long-term trends are inconspicuous and, if present, very gradual. The better examples from the present paper include BL Lac, PKS 0906+01, and PKS 2209+08.

The light curves of subclass II are characterized by prominent, long-term variations in mean level. Flickering appears as minor excursions about this changing average. Good examples from the present work are OJ 287 and 3C 345.

Subclass III is dominated by neither short-term nor long-term effects, but is characterized by a mixture of the two with comparable amplitudes. The light curves of 3C 120, 3C 371, and NRAO 512 are good illustrations of this type of behavior.

Finally, one can describe subclass IV as "episodic." Objects in this group display long periods of relative quiescence, punctuated by shorter intervals of violent activity. PKS 0420-01, 3C 446, and PKS 2345-16 demonstrate this type of light curve.

It should be emphasized that these somewhat arbitrary categories overlap somewhat and do not have rigid boundaries. Placement of an object in a particular subclass may be affected by a selection effect associated with the length and intensity of the observations. If PKS 2345-16 had been observed only from mid-1970 to 1975, it would have been placed in subclass I rather than IV. It further seems likely that the fraction of sources placed in the OVV category itself would increase with the length of the observing run, due to the presence of significant numbers of subclass IV.

In none of the sources described in this study is there significant evidence of periodicity. Because observations of most objects are necessarily limited to a fraction of each year, a source that displays quasi-continuous, short-term activity will generate some kind of a "peak" during nearly every observing season (for examples, see the light curves of 3C 120, PKS 0906+01, 3C 371, NRAO 512, BL Lac). Thus, the greatest suspicion must attach to any apparent periodicity approximating one year.

The Florida data strongly suggest that QSOs do not form a single species, but rather a genus of objects which, although bound together by certain identifying characteristics, exhibit many divergent properties. This in turn implies that there may be no general model of a QSO, or perhaps that optical variability is an evolutionary and possibly transient phenomenon.

ACKNOWLEDGMENTS

The authors are grateful for support from the National Science Foundation that made this extensive program possible. Major portions of the data on ON 231 and PKS 1514-24 were obtained by R. L. Hackney and K. R. Hackney during two summers spent at

Rosemary Hill on special grants from the National Science Foundation and the Western Kentucky University Faculty Research program. Dr. G. H. Folsom, now at Agnes Scott College, contributed substantially to the earlier observations. Technical support was provided by W. W. Richardson, H. W. Schrader, and E. E. Graves.

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