

MINOR PLANETS OBSERVATIONS FROM MAY 1986 TO MAY 1987

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RESUMEN

El presente trabajo contiene los resultados de las observaciones fotográficas de asteroides seleccionados realizados en el Observatorio Astronómico de Valencia, durante el período de mayo de 1986 a mayo de 1987. Se emplean ocho estrellas de referencia para las reducciones y se usa el método de las dependencias.

ABSTRACT

This paper contains the results of photographic observations of selected minor planets made in the period May 1986 to May 1987 at the Observatorio Astronómico de Valencia. Eight reference stars are used in the reductions, and the dependences method is employed.

Key words: ASTEROIDS – ASTROMETRY

I. INTRODUCTION

All the photographic observations were made with the Grubb telescope ($f = 230$ cm, $D = 15$ cm) of the Astronomical Observatory of the Universidad de Valencia, from May 1986 to May 1987.

The geographical coordinates of the site are: $\lambda = 0^h 01^m 28^s$ W, $\phi = 39^\circ 28' 41''$ N, $h = 30$ m, above sea level.

II. OBSERVATIONAL METHOD AND REDUCTIONS

Valca plates F22 (6×9 -cm) were used; a number of exposures between one to three, dephased in time and by displacing the plate, were obtained (López *et al.* 1987a). A microdensitometer, designed and built in our Observatory, was used to determine the star positions (López *et al.* 1988c). The star positions were taken from *SAO Catalogue* (1966) for the epoch 1950.0.

The stars registered on the plate were filtered using a least-squares polynomial fit, before the selection of the eight stars included in the reduction. For the reduction, the dependences method with eight stars was used (Smart 1971).

The accuracy of the measurements was checked using the positions of one, or more if possible, catalogued stars near the asteroid and not included in the fit. The mean errors in the star positions were about $0.5''$.

Details on the observational technique, measuring and reduction of the plates have been already described (López *et al.* 1987a, 1988c). Each plate is measured in two opposite positions over the plate-holder, so the minor planet position is obtained as the mean of the two independent measures.

The topocentric object positions referred to the epoch 1950.0 were published in the MPC's (López *et al.* 1988a, 1988b, 1989b). We include here these topocentric positions and the (x,y) values of the asteroid and the reference stars in both M1 and M2 measurements

III. RESULTS

Table 1 gives, for each observation, the epoch (U.T.), the asteroid position (R.A., Dec.) and the results of first and second measures M1(x,y)

TABLE 1
LOG OF OBSERVATIONS

EPOCH (UTC)	RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)		M2(x,y)		SAO No.	M1(x,y)		M2(x,y)
Object. - 1-CERES								
1986-06-02.87006	10h 59m 17.92s	+18° 28'	19.8"	150.151	120.784	123.829	126.210	
99390	170.370	107.717	103.836	139.612	99395	162.280	108.220	111.919
99402	169.587	127.779	104.262	119.545	99409	162.678	131.826	111.100
99411	167.048	136.224	106.656	111.069	99416	151.665	127.540	122.180
99417	140.626	123.633	133.300	123.177	99432	108.037	133.838	165.692
1986-06-03.85552	11h 00m 11.48s	+18° 18'	36.6"	151.713	130.787	121.406	115.782	
99395	163.396	107.313	109.912	139.350	99402	171.156	126.714	102.020
99411	168.781	135.214	104.320	111.495	99416	153.220	126.853	119.937
99426	147.720	145.592	125.281	100.950	99432	109.747	134.075	163.380
99436	108.161	138.103	164.941	108.134	99458	104.390	151.207	168.581
1986-06-03.85899	11h 00m 11.66s	+18° 18'	33.5"	151.196	131.034	121.914	115.534	
99390	171.063	106.912	102.256	139.808	99395	162.975	107.553	110.347
99402	170.645	126.990	102.535	119.732	99411	168.255	135.476	104.869
99426	147.149	145.785	125.854	100.753	99429	115.032	126.849	158.133
99436	107.585	138.151	165.506	108.079	99458	103.809	151.244	169.179
1986-06-03.86255	11h 00m 11.84s	+18° 18'	32.6"	150.173	131.067	122.939	115.490	
99395	161.984	107.570	111.341	139.089	99402	169.636	127.010	103.547
99409	162.792	131.173	110.351	115.486	99411	167.225	135.491	105.896
99416	151.705	127.069	121.458	119.503	99417	140.578	123.353	132.611
99426	146.124	145.782	126.873	100.751	99432	108.175	134.090	164.959
Object. - 2-PALLAS								
1987-05-05.94258	16h 08m 35.19s	+24° 23'	58.9"	140.634	129.563	140.612	129.561	
84200	127.958	98.004	127.938	98.011	84204	109.773	105.848	109.770
84212	111.477	118.742	111.495	118.743	84235	114.443	141.256	114.444
84236	127.363	139.095	127.357	139.096	84237	159.648	132.660	159.646
84238	96.662	145.281	96.657	145.275	84240	172.772	131.670	172.791
1987-05-05.94591	16h 08m 35.01s	+24° 24'	01.4"	140.127	129.525	140.120	129.523	
84200	127.497	97.982	127.491	97.985	84204	109.316	105.822	109.313
84212	111.013	118.713	111.012	118.709	84235	113.983	141.234	113.981
84236	126.882	139.074	126.880	139.072	84237	159.187	132.651	159.183
84238	96.205	145.240	96.205	145.235	84240	172.302	131.663	172.305
1987-05-05.94993	16h 08m 34.80s	+24° 24'	03.4"	139.607	129.477	139.603	129.478	
84200	127.009	97.961	127.014	97.967	84204	108.838	105.794	108.836
84212	110.532	118.690	110.532	118.681	84235	113.498	141.196	113.495
84236	126.386	139.052	126.387	139.048	84237	158.695	132.634	158.694
84238	95.690	145.215	95.695	145.210	84240	171.812	131.657	171.808
1987-05-20.94051	15h 56m 09.60s	+26° 11'	10.1"	137.829	125.662	135.979	125.100	
84076	167.665	138.382	106.291	112.042	84092	117.335	152.135	156.795
84104	129.992	134.605	143.912	116.267	84109	163.571	105.742	109.992
84117	155.566	107.472	118.019	143.081	84123	100.350	142.355	173.650
84128	111.372	130.032	162.485	121.065	84138	103.832	122.089	169.940

MINOR PLANETS OBSERVATIONS

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TABLE 1 (CONTINUED)

EPOCH (UTC)		RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)	M2(x,y)		SAO No.	M1(x,y)	M2(x,y)			
Object. - 2-PALLAS									
1987-05-20.94393	15h 56m 09.41s	+26° 11'	11.0"	138.277	125.654	135.529	125.106		
84076	168.081 138.374	105.874	112.040	84092	117.750 152.095	156.380	98.895		
84104	130.420 134.574	143.487	116.296	84109	164.004 105.732	109.554	144.719		
84117	155.987 107.450	117.593	143.102	84123	100.764 142.328	173.213	108.894		
84128	111.798 129.987	162.058	121.098	84138	104.254 122.043	169.503	129.125		
1987-05-20.94786	15h 56m 09.17s	+26° 11'	12.6"	138.774	125.671	135.025	125.079		
84076	168.550 138.386	105.417	112.028	84092	118.200 152.090	155.915	98.917		
84104	130.874 134.575	143.031	116.284	84109	164.487 105.745	109.079	144.700		
84117	156.463 107.467	117.111	143.078	84123	101.212 142.298	172.771	108.911		
84128	112.259 129.960	161.597	121.116	84138	104.726 122.017	169.046	129.144		
1987-05-28.90706	15h 49m 26.97s	+26° 35'	39.7"	136.880	124.432	136.987	126.404		
84004	172.817 118.005	101.025	132.714	84007	169.019 149.938	104.910	100.825		
84025	151.094 134.315	122.780	116.495	84032	144.031 137.744	129.877	113.073		
84036	140.434 104.168	133.380	146.665	84062	119.124 151.707	154.785	99.210		
84076	103.998 124.471	169.876	126.465	84077	103.453 143.604	170.474	107.343		
1987-05-28.91060	15h 49m 26.78s	+26° 35'	40.0"	136.427	124.420	137.427	126.420		
84004	172.338 118.016	101.504	132.711	84007	168.535 149.943	105.409	100.821		
84025	150.604 134.311	123.261	116.495	84032	143.534 137.741	130.361	113.086		
84036	139.976 104.159	133.838	146.669	84062	118.643 151.685	155.283	99.234		
84076	103.529 124.451	170.345	126.490	84077	102.964 143.578	170.947	107.366		
1987-05-28.91412	15h 49m 26.66s	+26° 35'	40.6"	136.227	124.416	137.622	126.422		
84004	172.121 118.030	101.701	132.688	84007	168.333 149.950	105.615	100.812		
84025	150.390 134.315	123.478	116.496	84032	143.309 137.742	130.577	113.085		
84036	139.767 104.171	134.049	146.659	84062	118.425 151.685	155.511	99.228		
84076	103.310 124.445	170.558	126.499	84077	102.744 143.577	171.169	107.371		
1987-05-28.92159	15h 49m 26.37s	+26° 35'	41.7"	137.685	126.558	136.193	124.250		
84002	99.754 104.549	173.475	147.368	84006	105.365 139.500	168.850	112.235		
84007	106.356 100.204	166.735	151.539	84019	119.989 112.012	153.453	139.329		
84036	133.660 146.695	140.792	104.231	84059	154.280 120.540	119.436	129.786		
84062	156.233 99.774	116.855	150.490	84063	157.420 134.600	116.704	115.636		
1987-05-28.92506	15h 49m 26.14s	+26° 35'	42.0"	137.874	126.568	135.999	124.236		
84002	99.980 104.545	173.236	147.368	84006	105.595 139.490	168.631	112.245		
84007	106.572 100.207	166.511	151.527	84019	120.210 112.013	153.220	139.321		
84036	133.894 146.710	140.579	104.222	84059	154.513 120.560	119.191	129.766		
84062	156.455 99.781	116.642	150.484	84063	157.639 134.608	116.481	115.629		
1987-05-28.92865	15h 49m 25.99s	+26° 35'	42.2"	138.482	126.619	135.401	124.170		
84002	100.629 104.546	172.597	147.338	84006	106.220 139.510	168.020	112.205		
84007	107.231 100.224	165.860	151.489	84019	120.849 112.038	152.575	139.270		
84036	134.497 146.763	139.975	104.160	84059	155.135 120.614	118.574	129.687		
84062	157.112 99.839	115.980	150.407	84063	158.265 134.676	115.864	115.535		

TABLE 1 (CONTINUED)

EPOCH (UTC)		RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.		M1(x,y)	M2(x,y)	SAO No.		M(x,y)		M2(x,y)	
Object.- 3-JUNO									
1986-06-23.94172	16h 18m 45.35s	-03° 19' 28.3"	137.081 120.897	135.733	125.686				
141103	115.337 120.167	157.479 126.730	141106	146.358 97.624	126.127 148.820				
141112	148.626 103.895	123.925 142.530	141114	148.752 108.418	123.881 138.001				
141121	142.289 124.553	130.613 121.956	141126	169.797 110.212	102.897 135.904				
141127	169.154 111.322	103.551 134.804	141146	137.197 151.713	136.047 94.877				
1986-06-23.94508	16h 18m 45.19s	-03° 19' 28.7"	138.114 120.890	134.710	125.678				
141103	116.372 120.169	156.442 126.712	141106	147.416 97.648	125.077 148.779				
141112	149.704 103.918	122.880 142.488	141114	149.823 108.440	122.835 137.962				
141121	143.319 124.570	129.583 121.932	141126	170.839 110.255	101.852 135.848				
141127	170.196 111.363	102.511 134.747	141146	138.229 151.730	135.028 94.847				
Object.- 4-VESTA									
1986-12-23.78885	00h 35m 28.29s	-04° 36' 51.3"	130.262 114.698	143.579	131.921				
128831	121.128 149.727	153.121 96.963	128832	121.283 149.578	152.962 97.121				
128851	101.208 134.741	172.839 112.208	128859	167.581 126.027	106.405 120.180				
128866	121.615 116.495	152.245 130.213	128874	137.031 103.668	136.650 142.871				
128875	144.413 103.567	129.314 142.899	128879	107.589 97.767	166.031 149.108				
1986-12-23.79368	00h 35m 28.50s	-04° 36' 49.3"	130.913 114.694	142.912	131.918				
128831	121.705 149.735	152.535 96.945	128832	121.858 149.585	152.370 97.105				
128851	101.824 134.726	172.234 112.213	128859	168.196 126.111	105.803 120.081				
128866	122.246 116.521	151.600 130.185	128874	137.685 103.708	136.001 142.824				
128875	145.057 103.619	128.668 142.836	128879	108.263 97.760	165.367 149.105				
Object.- 6-HEBE									
1986-06-02.88013	12h 45m 26.17s	+13° 20' 02.5"	130.223 122.996	143.666	123.897				
100230	159.993 139.175	114.261 107.083	100237	157.475 115.837	116.278 130.479				
100262	128.010 143.544	146.317 103.394	100264	135.049 109.243	138.555 137.528				
100267	125.009 139.581	149.238 107.416	100269	132.818 103.271	140.650 143.558				
100273	119.692 135.615	154.463 111.493	100296	100.278 135.544	173.876 111.978				
1986-06-02.88424	12h 45m 26.15s	+13° 20' 00.6"	130.716 122.858	143.174	124.024				
100230	160.419 139.153	113.835 107.088	100231	165.597 120.554	108.260 125.586				
100248	142.113 145.784	132.269 100.853	100262	128.414 143.378	145.908 103.547				
100269	133.392 103.125	140.069 143.690	100273	120.139 135.425	154.021 111.685				
100294	101.031 140.498	173.227 107.008	100296	100.716 135.267	173.429 112.249				
1986-06-11.88601	12h 46m 27.70s	+12° 35' 10.4"	142.157 121.118	130.368	125.692				
100251	116.383 97.927	156.314 148.662	100260	156.589 104.099	116.088 142.834				
100262	132.772 107.596	139.877 139.129	100267	129.710 111.566	142.908 135.140				
100273	127.227 117.754	145.344 128.931	100279	150.845 120.145	121.686 126.740				
100294	137.059 134.763	135.350 111.999	100296	132.095 136.486	140.302 110.238				
Object.- 7-IRIS									
1986-05-12.89606	13h 14m 49.54s	-14° 19' 03.8"	129.194 124.001	144.677	122.518				
157807	106.499 98.382	168.092 147.488	157832	170.128 103.913	104.295 143.726				
157838	165.444 110.235	108.810 137.270	157839	111.802 135.584	161.750 110.461				
157843	109.130 138.993	164.316 106.979	157845	146.665 127.438	127.114 119.579				
157854	172.314 125.747	101.519 121.958	157865	151.317 142.771	122.031 104.375				

MINOR PLANETS OBSERVATIONS

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TABLE 1 (CONTINUED)

EPOCH (UTC)		RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)		M2(x,y)		SAO No.	M1(x,y)		M2(x,y)	
<u>Object. - 7-IRIS</u>									
1986-05-12.89971	13h 14m 49.36s	-14° 19' 02.3"	128.691	124.021	145.186	122.486			
157807	106.073 98.385	168.524 147.476	157832	169.671 104.029	104.747 143.592				
157839	111.290 135.589	162.261 110.442	157843	108.617 138.991	164.824 106.962				
157845	146.175 127.505	127.598 119.488	157854	171.829 125.873	102.011 121.829				
157864	170.154 134.690	103.431 112.965	157874	146.882 149.764	126.268 97.266				
<u>Object. - 11-PARTHENOPE</u>									
1986-06-02.89865	13h 06m 39.09s	-12° 35' 36.9"	135.665	120.124	138.298	126.576			
157702	169.855 98.652	104.544 148.752	157708	166.548 100.709	107.808 146.620				
157732	148.457 104.754	125.823 142.207	157742	150.655 123.867	123.226 123.158				
157749	149.205 139.189	124.369 107.814	157777	100.920 96.474	173.549 149.503				
157781	119.286 135.116	154.356 111.259	157789	103.458 116.555	170.582 129.480				
1986-06-03.89036	13h 06m 31.25s	-12° 32' 07.9"	133.842	117.699	140.060	128.832			
157702	167.824 98.606	106.386 148.463	157708	164.538 100.691	109.649 146.326				
157742	148.825 123.967	124.992 122.812	157749	147.496 139.302	126.082 107.458				
157750	130.565 108.773	143.489 137.706	157771	116.917 123.766	156.898 122.501				
157781	117.535 135.455	156.108 110.824	157783	110.102 123.129	163.735 123.040				
<u>Object. - 11-PARTHENOPE</u>									
1987-02-06.80488	06h 06m 30.33s	+21° 22' 52.3"	136.108	118.312	136.644	128.315			
77983	158.193 97.637	114.108 148.584	77997	110.861 102.670	161.539 144.428				
78022	119.761 108.707	152.767 138.223	78027	174.313 110.051	98.312 135.871				
78049	171.443 119.681	101.290 126.316	78056	141.504 123.946	131.302 122.594				
78068	167.991 132.035	104.979 114.033	78092	116.042 140.227	157.086 106.787				
1987-02-06.80808	06h 06m 30.34s	+21° 22' 54.7"	136.643	118.363	136.037	128.249			
77983	158.809 97.710	113.488 148.499	77997	111.476 102.696	160.913 144.392				
78022	120.367 108.741	152.135 138.180	78027	174.863 110.141	97.721 135.767				
78049	172.046 119.772	100.700 126.212	78056	142.084 124.005	130.725 122.522				
78068	168.561 132.122	104.442 113.936	78092	116.620 140.253	156.469 106.749				
1987-02-06.81580	06h 06m 30.13s	+21° 22' 54.8"	135.611	117.277	138.050	129.405			
77983	157.337 96.203	115.856 150.006	77990	115.279 100.532	157.995 146.594				
78022	119.130 108.016	154.310 139.020	78036	107.980 113.653	165.597 133.619				
78045	102.888 118.372	170.816 129.010	78049	171.046 117.980	102.659 127.931				
78074	128.151 134.202	145.836 112.643	78092	116.028 139.592	158.125 107.505				
1987-02-06.81927	06h 06m 29.91s	+21° 22' 55.2"	136.250	117.260	137.385	129.365			
77983	158.010 96.276	115.155 149.921	77990	115.948 100.543	157.302 146.568				
78022	119.794 108.032	153.655 138.986	78036	108.615 113.654	164.914 133.605				
78045	103.512 118.367	170.143 129.008	78049	171.699 118.071	102.013 127.825				
78074	128.803 134.228	145.222 112.604	78092	116.660 139.601	157.465 107.490				
1987-02-12.80348	06h 05m 06.61s	+21° 35' 17.8"	140.792	117.036	131.840	129.450			
77951	159.591 109.386	112.873 136.692	77967	145.508 99.797	126.718 146.605				
77983	163.020 138.965	110.078 107.026	78006	147.235 126.402	125.598 119.955				
78015	125.977 96.758	146.189 150.078	78045	116.835 103.155	155.467 143.891				
78056	131.943 138.516	141.156 108.195	78074	115.662 133.068	157.319 114.016				

TABLE 1 (CONTINUED)

EPOCH (UTC)	RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y) ²	
SAO No.	M1(x,y)		M2(x,y)		SAO No.	M1(x,y)		M2(x,y)
Object.- 11-PARTHENOPE								
1987-02-12.80718	06h 05m 06.52s	+21° 35' 20.5"	141.003	117.404	131.600	129.100		
77951	159.815	109.792	112.643	136.284	77976	136.868	92.328	135.163 154.274
77983	163.256	139.377	109.884	106.613	78006	147.449	126.794	125.388 119.556
78022	134.097	112.325	138.427	134.339	78045	117.059	103.530	155.214 143.512
78056	132.167	138.899	140.930	107.806	78074	115.869	133.441	157.081 113.649
Object.- 39-LAETITIA								
1986-06-11.93196	16h 02m 28.15s	-04° 50' 19.5"	147.201	122.052	125.737	124.645		
140921	166.043	109.467	106.898	137.252	140924	162.442	133.912	110.502 112.809
140931	152.717	131.700	120.221	115.000	140936	147.971	102.218	124.995 144.488
140948	138.393	141.713	134.518	104.963	140950	137.541	145.119	135.369 101.560
140952	134.540	113.556	138.418	133.130	140967	126.667	95.449	146.329 151.241
1986-06-11.93586	16h 02m 27.99s	-04° 50' 19.0"	146.292	122.165	126.649	124.531		
140921	165.150	109.622	107.804	137.094	140924	161.468	134.062	111.472 112.653
140936	147.088	102.338	125.877	144.367	140937	145.995	129.185	126.931 117.511
140948	137.399	141.812	135.504	104.867	140950	136.545	145.215	136.361 101.467
140952	133.631	113.641	139.332	133.042	140959	130.594	116.134	142.367 130.538
1986-06-12.93414	16h 01m 43.19s	-04° 50' 09.5"	119.657	126.630	153.271	120.029		
140921	108.385	139.080	164.514	107.580	140924	111.773	114.623	161.133 132.067
140937	127.283	119.297	145.624	127.370	140948	135.725	106.543	137.162 140.098
140950	136.542	103.136	136.331	143.507	140952	139.849	134.664	133.075 111.960
140959	142.864	132.138	130.059	114.488	140967	147.931	152.703	125.002 93.919
1986-06-23.92537	15h 54m 30.43s	-04° 58' 11.6"	136.756	121.862	128.447	125.129		
140830	165.919	143.255	98.920	104.194	140834	158.220	113.049	107.097 134.286
140859	134.364	130.326	130.701	116.626	140862	128.929	95.802	136.701 151.060
140871	122.022	97.363	143.575	149.395	140876	116.558	140.792	148.329 105.886
140892	105.632	120.962	159.595	125.530	140895	102.725	143.870	162.106 102.598
1986-06-23.92922	15h 54m 30.41s	-04° 58' 12.4"	136.286	121.885	128.917	125.096		
140825	171.059	96.512	94.537	151.021	140827	168.180	146.288	96.616 101.193
140828	165.918	125.897	99.182	121.536	140832	163.111	105.288	102.328 142.117
140859	133.862	130.351	131.173	116.598	140862	128.454	95.814	137.154 151.038
140871	121.545	97.375	144.029	149.376	140892	105.161	120.965	160.057 125.527
1986-06-30.91080	15h 51m 04.73s	-05° 12' 21.2"	142.152	117.608	130.831	129.068		
140790	175.006	99.348	98.214	147.809	140803	173.409	122.438	99.498 124.693
140804	173.858	124.557	99.003	122.576	140815	158.138	122.092	114.762 124.817
140827	149.747	130.858	123.033	115.929	140828	135.371	116.326	137.625 130.253
140830	145.721	130.208	127.079	116.524	140836	107.580	100.500	165.671 145.682
1986-06-30.91366	15h 51m 04.70s	-05° 12' 21.3"	141.517	117.668	131.461	128.996		
140790	174.381	99.468	98.828	147.675	140803	172.754	122.561	100.142 124.554
140804	173.194	124.685	99.675	122.444	140815	157.500	122.195	115.410 124.707
140827	149.087	130.936	123.698	115.841	140828	134.745	116.368	138.260 130.197
140830	145.061	130.284	127.739	116.445	140836	106.978	100.492	166.266 145.681

TABLE 1 (CONTINUED)

EPOCH (UTC)	RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)		M2(x,y)		SAO No.	M1(x,y)		M2(x,y)
Object.- 40-HARMONIA								
1986-06-03.90433	15h 03m 27.25s	-12° 52' 09.5"	133.921	128.009	138.929	118.614		
158999	108.008 149.220	164.831 97.427	159005	140.966 144.927	131.894	101.695		
159010	160.591 140.038	112.293 106.566	159014	104.014 137.142	168.843	109.507		
159017	116.338 134.668	156.526 111.974	159031	114.421 121.264	158.442	125.391		
159048	128.180 102.596	144.663 144.037	159050	96.349 100.770	176.517	145.885		
1986-06-03.90801 15h 03m 27.08s -12° 52' 09.2" 134.905 127.990 137.948 118.633								
158999	108.944 149.109	163.906 97.535	159005	141.902 144.893	130.950	101.728		
159010	161.547 140.050	111.338 106.555	159014	104.963 137.019	167.886	109.629		
159031	115.419 121.171	157.442 125.475	159045	119.538 106.959	153.305	139.672		
159048	129.214 102.534	143.622 144.098	159050	97.383 100.636	175.469	146.014		
1986-06-12.92173 14h 57m 16.76s -12° 50' 57.0" 139.735 124.563 133.147 122.065								
158921	167.025 119.605	105.836 126.828	158925	163.593 150.720	109.483	95.743		
158975	125.778 109.721	147.013 137.017	158977	124.793 136.087	148.179	110.657		
158979	122.921 95.566	149.746 151.202	158994	109.386 117.245	163.448	129.608		
158999	100.612 151.365	172.447 95.559	159005	96.438 118.474	176.406	128.471		
1986-06-23.91565 14h 52m 54.28s -13° 03' 49.1" 129.477 117.235 137.736 130.217								
158865	152.132 143.474	116.236 103.013	158875	165.437 110.873	101.580	135.053		
158876	156.713 122.151	110.758 124.142	158883	131.684 144.883	136.714	102.489		
158900	129.643 114.505	137.464 132.941	158901	113.569 137.308	154.500	110.840		
158916	97.720 143.604	170.571 105.218	158921	124.036 97.542	142.324	150.141		
1986-06-30.90023 14h 52m 01.93s -13° 19' 57.5" 130.675 131.615 142.373 115.137								
158876	157.290 124.678	115.627 121.461	158883	130.807 145.654	142.601	101.095		
158897	145.119 97.717	127.163 148.702	158900	130.832 115.188	141.832	131.562		
158913	101.416 139.875	171.842 107.560	158916	97.027 142.063	176.287	105.484		
158921	126.414 97.876	145.842 148.989	158936	96.655 120.659	176.161	126.889		
Object.- 532-HERCULINA								
1987-03-30.90933	13h 10m 12.81s	+22° 57' 52.5"	141.796	128.550	134.431	115.920		
82680	176.543 134.847	107.765 92.864	82690	148.099 92.083	110.446	144.303		
82699	162.690 153.720	129.237 83.551	82703	140.447 107.322	124.744	134.996		
82727	136.282 138.208	144.017 110.364	82731	119.613 110.975	144.448	142.379		
82738	116.051 123.786	154.025 133.101	82739	130.174 167.290	164.012	88.280		
1987-03-30.92240 13h 10m 12.09s +22° 57' 59.3" 142.504 123.794 131.198 122.691								
82680	176.108 112.635	97.602 133.740	82690	130.468 89.059	143.143	157.458		
82699	173.045 135.751	100.693 110.633	82703	131.075 106.041	142.567	140.480		
82712	136.586 117.499	137.118 128.993	82731	114.514 119.264	159.184	127.317		
82738	117.578 132.160	156.181 114.407	82739	150.963 163.279	122.851	83.177		
1987-03-30.92624 13h 10m 11.88s +22° 58' 00.3" 142.103 123.480 131.599 123.009								
82680	175.667 112.357	97.984 134.022	82690	130.044 88.774	143.552	157.754		
82699	172.641 135.482	101.102 110.905	82703	130.661 105.763	142.986	140.758		
82712	136.160 117.202	137.511 129.296	82731	114.105 118.968	159.598	127.605		
82738	117.157 131.864	156.600 114.700	82739	150.546 163.007	123.266	83.458		

TABLE 1 (CONTINUED)

EPOCH (UTC)		RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)	M2(x,y)		SAO No.	M1(x,y)	M2(x,y)			
Object. - 532-HERCULINA									
1987-04-09.89317	13h 02m 13.18s	+23° 43'	22.4"	139.673	118.050	133.039	128.489		
82601	175.320 94.020	97.450 152.570	82620	164.400 130.587	108.281 115.982				
82622	165.052 143.492	107.611 103.078	82624	156.935 122.458	115.717 124.110				
82643	124.687 107.096	147.979 139.435	82644	134.937 141.113	137.727 105.427				
82668	110.534 130.380	162.105 116.138	82673	110.679 148.982	161.960 97.530				
1987-04-09.89763	13h 02m 12.93s	+23° 43'	22.4"	139.247	118.140	133.422	128.402		
82601	174.925 94.214	97.766 152.370	82604	171.650 97.951	101.047 148.630				
82622	164.577 143.667	108.101 102.910	82624	156.502 122.610	116.160 123.960				
82627	146.949 99.581	125.762 146.974	82639	130.502 104.973	142.174 141.563				
82668	110.078 130.418	162.603 116.096	82673	110.176 149.020	162.479 97.494				
1987-04-09.90127	13h 02m 12.75s	+23° 43'	22.8"	138.787	118.128	133.884	128.416		
82601	174.443 94.228	98.239 152.361	82604	171.181 97.959	101.517 148.620				
82622	164.042 143.668	108.593 102.907	82624	156.008 122.614	116.652 123.95				
82627	146.486 99.583	126.243 146.972	82639	130.011 104.973	142.665 141.562				
82668	109.607 130.404	163.095 116.104	82673	109.690 149.012	162.977 97.500				
1987-04-09.90598	13h 02m 12.37s	+23° 43'	22.9"	134.292	128.278	138.444	118.293		
82601	98.719 152.287	173.805 94.126	82620	109.608 115.708	163.109 130.751				
82622	108.926 102.808	163.842 143.654	82624	117.048 123.839	155.637 122.659				
82643	149.342 139.159	123.340 107.476	82644	139.073 105.164	133.698 141.417				
82668	163.477 115.870	109.314 130.816	82673	163.360 97.267	109.499 149.422				
1987-04-09.90975	13h 02m 12.32s	+23° 43'	24.3"	135.140	128.284	137.519	118.284		
82601	99.585 152.252	172.944 94.172	82620	110.507 115.685	162.215 130.782				
82622	109.843 102.784	162.938 143.686	82624	117.949 123.817	154.718 122.683				
82643	150.226 139.168	122.452 107.468	82644	139.966 105.158	132.785 141.425				
82668	164.354 115.881	108.389 130.807	82673	164.207 97.281	108.587 149.409				
1987-04-09.91331	13h 02m 12.03s	+23° 43'	24.5"	135.709	128.310	136.972	118.262		
82601	100.170 152.225	172.380 94.195	82620	111.105 115.670	161.619 130.797				
82622	110.443 102.769	162.312 143.706	82624	118.546 123.807	154.137 122.698				
82643	150.797 139.190	121.821 107.448	82644	140.579 105.174	132.198 141.412				
82668	164.963 115.916	107.755 130.777	82673	164.837 97.314	107.966 149.382				
1987-04-09.91742	13h 02m 11.90s	+23° 43'	25.4"	139.972	118.503	134.008	128.144		
82601	175.577 94.761	99.257 153.131	82604	172.304 98.492	102.397 149.286				
82619	159.867 118.188	114.105 129.175	82624	157.079 123.107	116.736 124.163				
82627	147.601 100.053	127.050 146.844	82639	131.147 105.395	143.306 140.924				
82668	110.653 130.768	162.871 114.841	82673	110.671 149.378	162.166 96.249				
1987-04-09.92096	13h 02m 11.74s	+23° 43'	25.8"	139.596	118.491	134.381	128.139		
82601	175.207 94.782	99.613 153.094	82604	171.897 98.509	102.780 149.253				
82619	159.476 118.203	114.506 129.145	82624	156.665 123.119	117.131 124.133				
82627	147.206 100.060	127.438 146.823	82639	130.762 105.402	143.702 140.903				
82668	110.245 130.760	163.285 114.832	82673	110.290 149.350	162.578 96.261				
1987-04-09.92520	13h 02m 11.44s	+23° 43'	26.6"	138.606	118.442	135.386	128.150		
82601	174.173 94.803	100.625 153.033	82604	170.885 98.524	103.793 149.205				
82619	158.423 118.200	115.552 129.109	82624	155.624 123.112	118.179 124.103				
82627	146.206 100.043	128.447 146.806	82639	129.744 105.356	144.712 140.911				
82668	109.191 130.699	164.331 114.857	82673	109.213 149.302	163.653 96.272				

TABLE 1 (CONTINUED)

EPOCH (UTC)		RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)		M2(x,y)		SAO No.	M1(x,y)		M2(x,y)	
Object. - 532-HERCULINA									
1987-05-05.88587	12h 45m 57.57s	+22° 50'	12.5"	127.375	123.272	145.026	123.339		
82486	92.254 119.030	180.175 127.508		82491	124.150 108.910	148.250 137.695			
82497	159.003 102.724	113.421 143.926		82499	119.655 121.347	152.767 125.248			
82510	148.999 116.384	123.454 130.253		82517	112.128 142.244	160.245 104.337			
82520	166.508 119.536	105.909 127.124		82528	116.487 151.034	155.865 95.565			
1987-05-05.88960	12h 45m 57.52s	+22° 50'	12.2"	127.786	123.042	144.601	123.561		
82486	92.685 118.661	179.710 127.876		82491	124.628 108.680	147.770 137.917			
82497	159.497 102.646	112.931 144.004		82499	120.078 121.088	152.345 125.500			
82510	149.441 116.258	122.995 130.372		82517	112.462 141.967	159.905 104.615			
82520	166.935 119.483	105.490 127.178		82528	116.793 150.760	155.547 95.829			
1987-05-05.89310	12h 45m 57.34s	+22° 50'	11.7"	127.996	123.012	144.423	123.590		
82486	92.873 118.646	179.520 127.885		82491	124.836 108.684	147.571 137.921			
82497	159.710 102.645	112.729 144.005		82499	120.286 121.086	152.135 125.502			
82510	149.655 116.256	122.779 130.372		82517	112.655 141.956	159.703 104.622			
82520	167.138 119.489	105.287 127.172		82528	116.983 150.764	155.367 95.839			
1987-05-05.89811	12h 45m 57.40s	+22° 50'	08.1"	144.036	124.261	128.315	122.495		
82486	179.166 128.834	93.157 118.496		82493	150.918 134.419	121.288 112.455			
82497	112.232 144.377	159.803 101.842		82499	151.792 126.216	120.557 120.667			
82512	158.050 111.546	114.530 135.432		82517	159.535 105.406	113.148 141.585			
82520	104.923 127.474	167.390 118.612		82528	155.260 96.555	117.550 150.360			
1987-05-05.90117	12h 45m 57.29s	+22° 50'	07.3"	143.808	124.318	128.560	122.429		
82486	178.938 128.915	93.370 118.412		82493	150.662 134.469	121.524 112.400			
82497	111.958 144.377	160.066 101.832		82499	151.572 126.270	120.799 120.606			
82512	157.816 111.612	114.758 135.365		82517	159.319 105.461	113.355 141.528			
82520	104.690 127.471	167.627 118.608		82528	155.060 96.600	117.785 150.315			
1987-05-05.90421	12h 45m 57.17s	+22° 50'	07.9"	143.366	124.346	129.036	122.397		
82486	178.473 128.936	93.864 118.386		82493	150.189 134.478	121.998 112.384			
82497	111.490 144.365	160.540 101.835		82499	151.081 126.287	121.272 120.586			
82512	157.355 111.615	115.200 135.355		82517	158.825 105.476	113.844 141.505			
82520	104.209 127.472	168.104 118.599		82528	154.640 96.675	118.265 150.275			
1987-05-28.88438	12h 44m 40.21s	+19° 18' 49.3"	127.013	126.745	146.827	124.258			
100234	96.665 144.740	177.461 106.774		100241	117.866 139.384	156.187 111.769			
100254	149.659 129.183	124.233 121.440		100255	142.006 128.963	131.883 121.773			
100268	118.957 118.666	154.745 132.470		100270	138.416 116.005	135.252 134.800			
100285	152.538 108.884	120.996 141.692		100289	99.411 101.671	174.014 149.808			
1987-05-28.88921	12h 44m 40.27s	+19° 18' 46.2"	127.200	126.740	146.643	124.264			
100234	96.881 144.744	177.258 106.764		100241	118.083 139.390	155.947 111.763			
100254	149.880 129.175	124.015 121.420		100255	142.227 128.965	131.662 121.778			
100268	119.179 118.666	154.529 132.467		100270	138.639 116.004	135.027 134.798			
100285	152.762 108.882	120.784 141.690		100289	99.628 101.674	173.798 149.788			

TABLE 1 (CONTINUED)

EPOCH (UTC)		RA(1950.0)		DEC(1950.0)		M1(x,y)		M2(x,y)	
SAO No.	M1(x,y)	M2(x,y)		SAO No.	M1(x,y)	M2(x,y)			
Object. - 704-INTERAMNIA									
1987-03-03.84202	07h 51m 24.08s	+09° 00' 51.3"		141.019	133.279	132.493	113.336		
116049	142.387	157.471	130.589	89.169	116062	105.752	130.100	167.857	115.649
116078	147.458	142.858	125.881	103.905	116101	165.541	138.153	107.915	109.039
116103	109.877	107.252	164.324	138.573	116119	142.078	118.103	131.844	128.521
116126	159.302	124.449	114.467	122.596	116163	139.488	96.688	134.923	149.848
1987-03-03.84670	07h 51m 24.02s	+09° 00' 55.6"		140.567	133.150	132.935	113.448		
116049	141.829	157.321	131.129	89.305	116062	105.289	129.849	168.349	115.888
116078	146.928	142.711	126.366	104.036	116101	165.048	138.061	108.397	109.122
116103	109.473	107.015	164.718	138.803	116120	146.614	120.573	127.233	126.169
116126	158.833	124.345	114.915	122.690	116163	139.130	96.531	135.323	149.999

and M2(x,y). Column headed "SAO No." gives the SAO number of the stars included in each reduction. Column headed "M1(x,y)" gives the plate coordinates (x,y) of the stars for the first measurement, column headed "M2(x,y)" gives (x,y) for the second measurement. All plate coordinates are given in mm. These are included in order to facilitate future recalculations of the asteroid positions.

Data presented in Table 1 as well as the dependences for the stars in each fit are available in magnetic form upon request.

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