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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 = 15cm) 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, $\phi = 39°\ 28'\ 41''$ N, h = 30m, 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.* 1987*a*). A microdensitometer, designed and built in our Observatory, was used to determine the star positions (López *et al.* 1988*c*). 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.* 1987*a*, 1988*c*). 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.* 1988*a*, 1988*b*, 1989*b*). 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	138.974
99402	169.587	127.779	104.262	119.545	99409	162.678	131.826	111.100	115.392
99411	167.048	136.224	106.656	111.069	99416	151.665	127.540	122.180	119.476
99417	140.626	123.633	133.300	123.177	99432	108.037	133.838	165.692	112.406
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	120.009
99411	168.781	135.214	104.320	111.495	99416	153.220	126.853	119.937	119.731
99426	147.720	145.592	125.281	100.950	99432	109.747	134.075	163.380	112.180
99436	108.161	138.103	164.941	108.134	99458	104.390	151.207	168.581	95.000
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	139.109
99402	170.645	126.990	102.535	119.732	99411	168.255	135.476	104.869	111.236
99426	147.149	145.785	125.854	100.753	99429	115.032	126.849	158.133	119.439
99436	107.585	138.151	165.506	108.079	99458	103.809	151.244	169.179	94.959
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	119.706
99409	162.792	131.173	110.351	115.486	99411	167.225	135.491	105.896	111.208
99416	151.705	127.069	121.458	119.503	99417	140.578	123.353	132.611	123.146
99426	146.124	145.782	126.873	100.751	99432	108.175	134.090	164.959	112.152

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	105.851
84212	111.477	118.742	111.495	118.743	84235	114.443	141.256	114.444	141.260
84236	127.363	139.095	127.357	139.096	84237	159.648	132.660	159.646	132.663
84238	96.662	145.281	96.657	145.275	84240	172.772	131.670	172.791	131.673
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	105.824
84212	111.013	118.713	111.012	118.709	84235	113.983	141.234	113.981	141.229
84236	126.882	139.074	126.880	139.072	84237	159.187	132.651	159.183	132.655
84238	96.205	145.240	96.205	145.235	84240	172.302	131.663	172.305	131.669
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	105.794
84212	110.532	118.690	110.532	118.681	84235	113.498	141.196	113.495	141.203
84236	126.386	139.052	126.387	139.048	84237	158.695	132.634	158.694	132.638
84238	95.690	145.215	95.695	145.210	84240	171.812	131.657	171.808	131.663
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	98.855
84104	129.992	134.605	143.912	116.267	84109	163.571	105.742	109.992	144.716
84117	155.566	107.472	118.019	143.081	84123	100.350	142.355	173.650	108.840
84128	111.372	130.032	162.485	121.065	84138	103.832	122.089	169.940	129.082

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

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.- 7-IRIS

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
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

Object.- 11-PARTHENOPE

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)
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	147.206 100.000	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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