Photographic observations of the eclipsing variable Castor C = YY Geminorum from 1926 Oct. 2 to 1928 Jan. 13

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COMMUNICATION FROM THE OBSERVATORY AT LEIDEN.

Photographic observations of the eclipsing variable Castor C = YY Geminorum from 1926 Oct. 2 to 1928 Jan. 13, by *H. van Gent*.

1. Between the publication of the note on Castor C in *B. A. N.* 97 and my departure from Leiden to Johannesburg, I took a number of additional plates of this variable, mainly during the minima. These plates have been measured by C. KOOREMAN in the Schilt-photometer. Two later epochs of minimum were determined by P. TH. OOSTERHOFF.

The 14 epochs of minimum used for a least square solution of the period are given in Table 1. The first of these epochs has been taken from *B. A. N.* 97. The apparent period (half the period of revolution) is found to be ^{d}·4071411 ± ^{d}·0000005 (m. e.). The mean error of a single epoch is ± ^{d}·0015. No evidence of the orbit being excentric can be found in Table 1 from the O—C's of the odd and even minima.

TABLE 1.

J. D.	epoch	O—C
d		
2424595·4105	0	—·0010
4791·6548	482	+ 13
4848·6537	622	+ 5
4875·5268	688	+ 23
4916·6466	789	+ 9
4920·3112	798	+ 12
4921·5306	801	— 8
4922·3441	803	— 17
4961·4304	899	— 9
5230·5519	1560	+ 4
5234·6211	1570	— 18
5242.3568	1589	— 18
5687·3656	2682	+ 18
5698·3561	2709	— 4

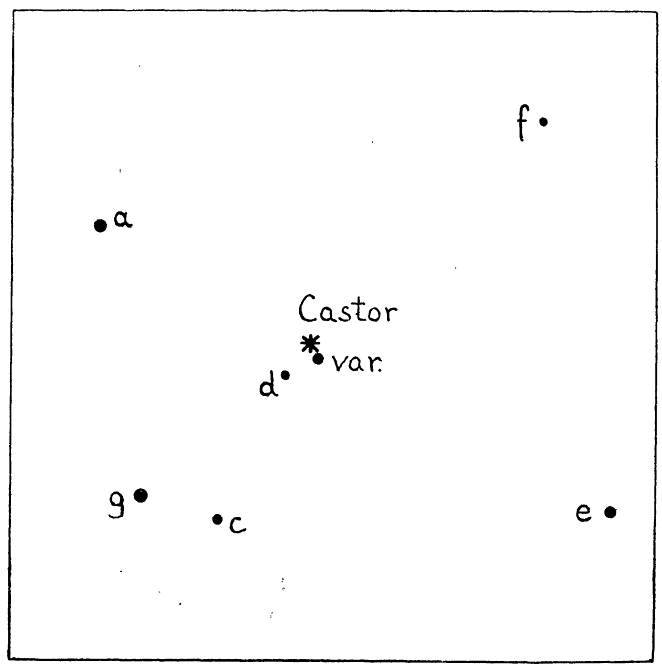
The phases were then computed from the formula:

phase = 2^{d-1}·456151 (J. D. hel. M. astr. T. Grw. — 2424595·4105).

Altogether 1165 exposures on 34 plates from 21 nights have been used. These are given in Table 2 together with an additional plate containing 11 exposures (near maximum of the variable) taken with a grating placed in front of the objective for the determination of the magnitude scale. The adopted difference in magnitude between the central image and the spectra of the first order is ^{m}·923, according to former measures made by SCHILT and HERTZSPRUNG (*B. A. N.* 35, 56 and 68).

Six comparison stars, the positions of which are indicated on Figure 1, were used. The galvanometer

FIGURE 1.



Size of square 5′ × 5′

readings of the Schilt photometer were converted into provisional magnitudes by the aid of a table, which had been prepared from other material to represent an average plate. These provisional magnitudes, counted

TABLE 2.

plate no.	date	epoch	number of exposures	middle of first and last exposure	reduction factor for gradation	observed differential magnitude of comparison stars *g*	*a*	*e*	*c*	*d*	*f*	reduction to max = m.00
				h m s h m s		m	m	m	m	m	m	m
1200	1926 Oct. 2	482	78	2 13 46 5 31 16	·908	— ·730	— ·655	— ·361	·336	·590	·817	— ·01
1202	— Nov. 28	622	61	6 36 9 9 21 9	·947	— ·660	— ·682	— ·405	·304	·672	·773	— ·20
1203	1) — Dec. 1		(11)	7 37 24 9 36 10	1·024	— ·738	— ·631	— ·374	·323	·627	·794	·00
1209	— — 25	688	73	5 56 13 8 56 13	1·242	— ·686	— ·634	— ·437	·319	·714	·726	— ·32
1217	1927 Febr. 2	784	20	10 6 40 10 56 40	1·018	— ·715	— ·616	— ·432	·349	·638	·774	— ·07
1221	— — 4	789	54	11 26 40 13 46 40	·974	— ·702	— ·630	— ·428	·343	·615	·802	— ·06
1223	— — 7	796	38	7 16 41 8 51 41	1·030	— ·694	— ·661	— ·398	·336	·650	·769	— ·19
1224	— — 8	798	68	4 16 48 7 11 41	1·080	— ·694	— ·608	— ·457	·315	·676	·767	— ·19
1228	— — 9	801	84	8 41 41 12 11 41	1·048	— ·730	— ·648	— ·372	·337	·708	·706	2)
1229	— — 10	803	62	5 11 42 7 46 42	1·001	— ·712	— ·639	— ·404	·334	·710	·713	— ·29
1230	— — 12	808	21	5 41 43 6 31 43	1·346	— ·660	— ·592	— ·556	·409	·773	·626	— ·27
1231	— — —	808	21	6 41 43 7 31 43	1·098	— ·713	— ·684	— ·339	·299	·714	·721	— ·24
1232	— — —	808	21	7 41 43 8 36 43	1·208	— ·681	— ·681	— ·397	·348	·715	·698	— ·28
1234	— March 3	854	1	10 1 42	·656	— ·663	— ·637	— ·453	·295	·656	·801	— ·20
1238	— — 16	887	11	11 36 40 12 1 40	1·130	— ·700	— ·622	— ·424	·285	·733	·727	— ·26
1239	— — —	887	11	12 9 10 12 34 10	1·134	— ·704	— ·609	— ·438	·302	·696	·754	— ·22
1240	— — —	887	11	12 39 28 13 4 10	·964	— ·675	— ·623	— ·479	·357	·704	·715	— ·22
1241	— — —	887	11	13 11 40 13 36 40	1·028	— ·658	— ·665	— ·433	·312	·702	·742	— ·22
1242	— — 17	889	11	7 11 41 7 36 40	1·100	— ·729	— ·595	— ·439	·343	·699	·722	— ·18
1243	— — —	889	11	7 46 40 8 11 40	1·050	— ·663	— ·598	— ·520	·343	·717	·718	— ·20
1244	— — —	889	11	8 21 40 8 49 10	1·059	— ·686	— ·627	— ·448	·328	·690	·744	— ·20
1245	— — —	889	11	8 56 40 9 21 40	1·062	— ·697	— ·599	— ·462	·310	·717	·733	— ·20
1246	— — —	889	16	9 31 40 10 9 10	1·078	— ·688	— ·647	— ·428	·331	·689	·738	— ·26
1248	— — 21	899	76	8 56 42 12 4 12	·957	— ·669	— ·619	— ·480	·324	·697	·745	— ·15
1254	— May 6	1012	11	12 16 44 12 41 44	1·114	— ·690	— ·661	— ·389	·281	·697	·759	— ·23
1255	— — —	1012	11	12 49 14 13 16 44	1·086	— ·712	— ·629	— ·417	·331	·693	·732	— ·20
1256	— — —	1012	21	13 31 44 14 21 44	·839	— ·691	— ·626	— ·476	·424	·671	·699	— ·20
1304	— Dec. 15	1560	71	5 51 8 8 48 38	·972	— ·670	— ·665	— ·417	·302	·710	·737	— ·18
1311	— — 19	1570	72	7 56 7 10 56 7	·975	— ·675	— ·600	— ·499	·336	·746	·693	— ·17
1321	— — 27	1589	52	2 31 6 4 38 36	·910	— ·705	— ·689	— ·349	·325	·663	·755	— ·22
1345	— — 29	1594	74	3 1 31 6 6 31	·903	— ·689	— ·739	— ·311	·322	·707	·707	— ·28
1348	1928 Jan. 11	1626	21	4 6 0 4 56 0	·846	— ·711	— ·683	— ·332	·282	·656	·789	— ·15
1349	— — —	1626	21	4 58 30 5 48 30	·837	— ·729	— ·694	— ·320	·337	·723	·683	— ·20
1350	— — —	1626	11	5 53 30 6 18 30	·949	— ·693	— ·653	— ·418	·344	·769	·652	— ·20
1353	— — 13	1631	19	5 15 59 6 3 29	·977	— ·704	— ·660	— ·383	·318	·682	·746	— ·29

1) taken with a grating in front of the objective. 2) — ·10 at the beginning, gradually changing to — ·28 at the end.

from the mean magnitude of the comparison stars as zeropoint, were then multiplied by a factor for gradation, different for each plate, in order to reduce them to the correct scale of magnitude. These factors, given in the 7th column of Table 2 are thus to be considered as the reciprocal relative gradation of the plate in question. [3]) The resulting differential magnitudes of the comparison stars for each plate are given in the columns 8 to 13 of Table 2. The mean values are for the star *g*: $-{}^{m}.695$, *a*: $-{}^{m}.643$, *e*: $-{}^{m}.419$, *c*: $+{}^{m}.328$, *d*: $+{}^{m}.692$, *f*: $+{}^{m}.736$. There still remained systematic differences between the plates in the maximum brightness of the variable. Accordingly, for each plate a constant was added to the derived magnitudes of the variable, in order to reduce the maximum brightness in every case to zero magnitude. The reduction constants adopted for this purpose are given in the last column of Table 2. Their mean value is $-{}^{m}.205$. Accordingly the variable is at maximum brightness found ${}^{m}.205$ darker than the mean of the six comparison stars.

It should be remembered that the variable is so near to Castor that its surroundings are subject to variable fogging according to the haziness of the atmosphere and that the yellow colour of Castor C is probably considerably different from that of the average comparison star. The greatest hour angle at which an exposure was made that has been used is $6^h51^m51^s$ past the meridian. The corresponding height of Castor above the horizon at Leiden is $17^\circ.6$. Systematic errors of the kind described above are therefore not surprising.

The results thus obtained for each of the 1166 exposures are given in Table 3. The normal exposure time was 140 sec., with 10 sec. between two consecutive exposures. Small deviations, merely of an accidental character, occur now and then from this rule.

3) The mean deviation of a plate from the mean gradation is about ± 11 per cent.

-9551-

TABLE 3.

J. D.	phase	Δm
plate no. **1200**		
2424791		
d	P	m
·5490	·746	+ ·05
·5507	·750	− 3
·5524	·754	+ 1
·5541	·758	− 2
·5559	·763	− 3
·5576	·767	+ 2
·5593	·771	− 4
·5611	·775	+ 1
·5628	·780	− 2
·5645	·784	− 6
·5663	·788	− 6
·5680	·792	+ 2
·5697	·797	− 4
·5715	·801	− 3
·5732	·805	+ 5
·5749	·809	+ 4
·5767	·814	− 4
·5784	·818	− 6
·5801	·822	+ 0
·5819	·827	+ 4
·5836	·831	+ 5
·5853	·835	− 1
·5870	·839	+ 1
·5888	·844	+ 3
·5905	·848	+ 2
·5922	·852	+ 3
·5940	·856	+ 3
·5957	·860	+ 3
·5974	·865	− 3
·5992	·869	+ 1
·6009	·873	+ 4
·6026	·877	+ 1
·6044	·882	+ 1
·6061	·886	− 8
·6078	·890	+ 2
·6096	·895	0
·6113	·899	− 1
·6130	·903	− 5
·6147	·907	− 4
·6165	·912	− 6
·6182	·916	+ 6
·6199	·920	+ 10
·6217	·924	+ 4
·6234	·929	+ 11
·6251	·933	+ 12
·6269	·937	+ 8
·6286	·941	+ 17
·6303	·945	+ 14
·6321	·950	+ 15
·6338	·954	+ 21
·6355	·958	+ 22
·6373	·963	+ 39
·6390	·967	+ 34
·6407	·971	+ 42
·6424	·975	+ 23
·6442	·980	+ 36
·6459	·984	+ 44
·6476	·988	+ 45
·6494	·992	+ 56
·6511	·997	+ 63
·6563	·009	+ 60
·6580	·013	+ 55
·6598	·018	+ 48
·6615	·022	+ 44

J. D.	phase	Δm
d	P	m
·6632	·026	+ ·45
·6650	·031	+ 43
·6667	·035	+ 43
·6684	·039	+ 34
·6702	·043	+ 34
·6719	·048	+ 30
·6736	·052	+ 27
·6753	·056	+ 22
·6771	·060	+ 21
·6788	·065	+ 19
·6805	·069	+ 19
·6823	·073	+ 22
·6840	·077	+ 13
·6857	·082	+ 15
plate no. **1202**		
2424848		
d	P	m
·5801	·823	− ·01
·5818	·827	+ 5
·5836	·831	+ 7
·5853	·836	+ 4
·5870	·840	+ 4
·5888	·844	− 3
·5905	·848	− 7
·5922	·852	− 4
·5940	·857	− 3
·5957	·861	− 3
·5974	·865	+ 1
·5991	·869	− 1
·6009	·874	− 3
·6026	·878	− 1
·6043	·882	+ 3
·6061	·887	+ 4
·6078	·891	+ 1
·6095	·895	− 2
·6113	·899	0
·6130	·904	+ 7
·6217	·925	+ 13
·6234	·929	+ 8
·6251	·933	+ 8
·6269	·938	+ 16
·6286	·942	+ 15
·6303	·946	+ 21
·6320	·950	+ 22
·6338	·955	+ 27
·6355	·959	+ 28
·6372	·963	+ 33
·6390	·967	+ 33
·6407	·972	+ 31
·6424	·976	+ 43
·6442	·980	+ 48
·6459	·984	+ 59
·6476	·989	+ 52
·6494	·993	+ 57
·6511	·997	+ 51
·6528	·001	+ 55
·6546	·006	+ 61
·6563	·010	+ 60
·6597	·018	+ 54
·6615	·023	+ 43
·6632	·027	+ 42
·6649	·031	+ 37
·6667	·035	+ 42
·6684	·040	+ 40
·6701	·044	+ 30
·6719	·048	+ 30

J. D.	phase	Δm
d	P	m
·6736	·052	+ ·24
·6753	·057	+ 25
·6771	·061	+ 25
·6788	·065	+ 7
·6823	·074	+ 14
·6840	·078	+ 8
·6857	·082	+ 11
·6874	·086	+ 12
·6892	·091	+ 8
·6909	·095	+ 12
·6926	·099	+ 9
·6944	·104	+ 7
plate no. **1209**		
2424875		
d	P	m
·4800	·893	+ ·03
·4817	·897	+ 3
·4835	·902	− 2
·4852	·906	− 3
·4869	·910	+ 7
·4887	·914	+ 5
·4904	·919	+ 3
·4921	·923	+ 4
·4939	·927	+ 9
·4956	·931	+ 9
·4973	·935	+ 11
·4992	·940	+ 8
·5008	·944	+ 14
·5025	·948	+ 16
·5042	·952	+ 13
·5060	·957	+ 18
·5077	·961	+ 16
·5094	·965	+ 21
·5112	·970	+ 24
·5129	·974	+ 29
·5146	·978	+ 23
·5164	·982	+ 35
·5181	·987	+ 44
·5198	·991	+ 48
·5216	·995	+ 44
·5233	·999	+ 51
·5250	·004	+ 54
·5267	·008	+ 52
·5285	·012	+ 52
·5302	·016	+ 49
·5319	·020	+ 44
·5337	·025	+ 38
·5354	·029	+ 36
·5371	·033	+ 31
·5389	·038	+ 33
·5406	·042	+ 34
·5423	·046	+ 25
·5441	·050	+ 25
·5458	·055	+ 25
·5475	·059	+ 15
·5493	·063	+ 23
·5510	·067	+ 15
·5527	·072	+ 10
·5545	·076	+ 15
·5562	·080	+ 10
·5579	·084	+ 9
·5596	·088	+ 14
·5614	·093	+ 10
·5631	·097	+ 5
·5648	·101	+ 8
·5666	·106	− 2

J. D.	phase	Δm
d	P	m
·5683	·110	+ ·03
·5700	·114	0
·5718	·118	+ 8
·5735	·123	+ 3
·5752	·127	+ 3
·5770	·131	− 2
·5787	·135	+ 7
·5804	·140	− 2
·5822	·144	− 3
·5839	·148	0
·5856	·152	+ 4
·5873	·157	+ 4
·5891	·161	− 1
·5908	·165	− 3
·5925	·169	− 5
·5943	·174	− 2
·5960	·178	− 1
·5977	·182	− 8
·5995	·186	− 2
·6012	·191	− 3
·6029	·195	− 2
·6047	·199	− 1
plate no. **1217**		
2424914		
d	P	m
·5467	·847	− ·03
·5484	·851	− 3
·5501	·855	+ 5
·5519	·859	+ 1
·5536	·864	− 1
·5553	·868	+ 2
·5571	·872	− 2
·5588	·876	− 3
·5605	·881	− 6
·5623	·885	+ 1
·5640	·889	0
·5657	·893	+ 4
·5674	·898	+ 2
·5692	·902	0
·5709	·906	+ 4
·5726	·910	+ 10
·5761	·919	+ 11
·5778	·923	+ 11
·5796	·928	+ 12
·5813	·932	+ 25
plate no. **1221**		
2424916		
d	P	m
·5965	·881	− ·06
·5983	·886	− 7
·6000	·890	− 1
·6017	·894	− 5
·6035	·899	− 1
·6052	·903	− 1
·6121	·920	− 1
·6138	·924	+ 2
·6156	·928	+ 4
·6173	·932	+ 5
·6190	·937	+ 9
·6208	·941	+ 9
·6225	·945	+ 16
·6242	·949	+ 18
·6260	·954	+ 26
·6277	·958	+ 28

TABLE 3 (*continued*).

J. D.	phase	Δm
d	P	m
·6294	·962	+ ·35
·6312	·967	+ 37
·6329	·971	+ 38
·6346	·975	+ 42
·6363	·979	+ 47
·6381	·983	+ 45
·6398	·988	+ 54
·6415	·992	+ 56
·6433	·996	+ 60
·6450	·000	+ 56
·6467	·005	+ 52
·6485	·009	+ 52
·6502	·013	+ 52
·6519	·017	+ 43
·6537	·022	+ 51
·6554	·026	+ 52
·6571	·030	+ 50
·6589	·035	+ 46
·6606	·039	+ 35
·6623	·043	+ 32
·6641	·047	+ 29
·6658	·052	+ 29
·6675	·056	+ 37
·6689	·059	+ 19
·6710	·064	+ 15
·6727	·068	+ 9
·6744	·073	+ 13
·6762	·077	+ 13
·6779	·081	+ 10
·6796	·085	+ 12
·6814	·090	+ 14
·6831	·094	+ 10
·6848	·098	+ 5
·6866	·103	+ 3
·6883	·107	+ 4
·6900	·111	— 3
·6918	·115	+ 7
·6935	·120	+ 9
plate no. **1223**		
2424919		
d	P	m
·4151	·804	— ·05
·4168	·808	— 1
·4185	·813	+ 3
·4203	·817	— 3
·4220	·821	+ 2
·4237	·825	+ 2
·4255	·830	0
·4272	·834	+ 1
·4289	·838	+ 2
·4307	·843	— 1
·4324	·847	— 3
·4341	·851	— 4
·4359	·855	+ 1
·4376	·859	0
·4393	·864	— 3
·4411	·868	— 1
·4428	·872	— 3
·4445	·876	— 4
·4462	·881	— 3
·4480	·885	+ 2
·4497	·889	+ 8
·4532	·898	+ 2
·4549	·902	— 3
·4566	·906	— 14
·4584	·911	— 3
·4601	·915	— ·08
·4618	·919	+ 2
·4636	·923	— 3
·4653	·928	— 3
·4670	·932	+ 4
·4688	·936	+ 9
·4705	·940	+ 9
·4722	·944	+ 11
·4740	·949	+ 19
·4757	·953	+ 23
·4774	·957	+ 26
·4791	·961	+ 30
·4809	·966	+ 41
plate no. **1224**		
2424920		
d	P	m
·2877	·947	+ ·12
·2894	·952	+ 12
·2911	·956	+ 13
·2928	·960	+ 18
·2946	·964	+ 23
·2963	·969	+ 26
·2980	·973	+ 27
·2998	·977	+ 36
·3015	·981	+ 40
·3032	·986	+ 36
·3049	·990	+ 46
·3067	·994	+ 49
·3084	·998	+ 37
·3101	·002	+ 43
·3119	·007	+ 52
·3136	·011	+ 47
·3153	·015	+ 43
·3171	·020	+ 41
·3188	·024	+ 40
·3205	·028	+ 35
·3223	·032	+ 33
·3240	·037	+ 34
·3257	·041	+ 29
·3275	·045	+ 13
·3292	·049	+ 26
·3309	·054	+ 22
·3327	·058	+ 14
·3344	·062	+ 14
·3361	·066	+ 6
·3378	·071	+ 12
·3396	·075	+ 5
·3413	·079	+ 9
·3430	·083	+ 7
·3448	·088	— 2
·3482	·096	— 1
·3500	·100	— 3
·3517	·105	— 2
·3534	·109	0
·3552	·113	+ 7
·3569	·117	— 1
·3586	·122	+ 4
·3638	·134	+ 8
·3655	·139	0
·3673	·143	— 7
·3690	.147	+ 3
·3707	·151	+ 3
·3725	·156	0
·3742	·160	+ 3
·3759	·164	— 3
·3777	·169	+ 5
·3794	·173	+ ·04
·3811	·177	— 1
·3829	·181	+ 6
·3846	·185	— 1
·3863	·190	+ 2
·3881	·194	+ 8
·3898	·198	+ 3
·3915	·202	+ 2
·3932	·207	— 2
·3950	·211	— 3
·3967	·215	— 11
·3984	·219	+ 3
·4002	·224	— 8
·4019	·228	— 2
·4036	·232	— 10
·4054	·237	+ 2
·4071	·241	— 5
·4088	·245	+ 2
plate no. **1228**		
2424921		
d	P	m
·4684	·847	+ ·05
·4701	·852	+ 7
·4718	·856	+ 5
·4736	·860	— 2
·4753	·864	+ 6
·4770	·869	— 1
·4788	·873	— 2
·4805	·877	— 2
·4822	·881	+ 1
·4840	·886	— 3
·4857	·890	— 2
·4874	·894	— 11
·4892	·899	0
·4909	·903	0
·4926	·907	— 8
·4943	·911	+ 7
·4961	·915	+ 1
·4978	·920	+ 7
·4995	·924	+ 7
·5013	·928	+ 6
·5030	·932	+ 9
·5047	·937	+ 16
·5065	·941	+ 17
·5082	·945	+ 16
·5117	·954	+ 34
·5134	·958	+ 42
·5151	·962	+ 49
·5169	·967	+ 43
·5186	·971	+ 36
·5203	·975	+ 32
·5220	·979	+ 36
·5238	·984	+ 48
·5255	·988	+ 48
·5272	·992	+ 55
·5290	·996	+ 62
·5307	·000	+ 63
·5324	·005	+ 54
·5342	·009	+ 60
·5359	·013	+ 51
·5376	·017	+ 45
·5394	·022	+ 53
·5411	·026	+ 40
·5428	·030	+ 33
·5446	·035	+ 30
·5463	·039	+ 27
·5480	·043	+ 19
·5498	·047	+ ·19
·5515	·052	+ 21
·5532	·056	+ 17
·5549	·060	+ 13
·5567	·064	+ 14
·5584	·068	+ 13
·5601	·073	+ 2
·5619	·077	+ 2
·5636	·081	+ 10
·5653	·085	+ 3
·5671	·090	— 5
·5688	·094	+ 1
·5705	·098	— 2
·5723	·103	— 3
·5740	·107	0
·5757	·111	— 3
·5775	·115	— 6
·5792	·120	— 9
·5809	·124	— 1
·5826	·128	— 1
·5844	·132	— 6
·5861	·137	+ 1
·5878	·141	+ 1
·5896	·145	+ 4
·5913	·149	+ 3
·5930	·153	+ 4
·5948	·158	+ 3
·5965	·162	+ 5
·5982	·166	+ 12
·6000	·171	0
·6017	·175	— 2
·6034	·179	+ 4
·6052	·183	+ 5
·6069	·188	— 6
·6086	·192	— 1
·6103	·196	— 4
·6121	·200	— 1
·6138	·205	+ 1
plate no. **1229**		
2424922		
d	P	m
·3202	·940	+ ·01
·3219	·944	+ 5
·3236	·948	+ 4
·3254	·952	+ 11
·3271	·957	+ 21
·3288	·961	+ 19
·3306	·965	+ 20
·3323	·969	+ 22
·3340	·973	+ 28
·3358	·978	+ 38
·3392	·986	+ 39
·3410	·991	+ 47
·3427	·995	+ 41
·3444	·999	+ 37
·3461	·003	+ 36
·3479	·008	+ 41
·3496	.012	+ 39
·3513	·016	+ 24
·3531	·020	+ 22
·3548	·025	+ 25
·3565	·029	+ 26
·3583	·033	+ 22
·3600	·037	+ 14
·3617	·042	+ 24
·3635	·046	+ 24
·3652	·050	+ 17

TABLE 3 (*continued*).

J. D.	phase	Δ*m*
d	P	m
·3669	·054	+ ·11
·3687	·059	+ 11
·3704	·063	+ 11
·3721	·067	+ 11
·3738	·071	+ 9
·3756	·076	+ 2
·3773	·080	+ 8
·3790	·084	− 1
·3808	·088	+ 3
·3825	·093	+ 5
·3842	·097	+ 5
·3860	·101	+ 1
·3877	·105	+ 1
·3894	·110	− 8
·3912	·114	+ 8
·3928	·118	− 12
·3946	·122	− 1
·3964	·127	+ 5
·3981	·131	+ 3
·3998	·135	+ 1
·4016	·140	+ 8
·4033	·144	+ 11
·4050	·148	+ 10
·4067	·152	+ 1
·4085	·156	0
·4102	·161	− 1
·4119	·165	− 13
·4137	·169	− 7
·4154	·173	− 10
·4171	·178	− 4
·4189	·182	− 2
·4206	·186	− 8
·4223	·190	− 1
·4241	·195	+ 3
·4258	·199	+ 7
·4275	·203	+ 3
plate no. **1230**		
2424924		
d	P	m
·3354	·889	− ·06
·3371	·893	+ 3
·3389	·898	+ 3
·3406	·902	+ 4
·3423	·906	+ 16
·3441	·911	+ 19
·3458	·915	+ 20
·3475	·919	+ 11
·3493	·923	+ 11
·3510	·928	+ 13
·3527	·932	+ 15
·3545	·936	+ 9
·3562	·940	+ 12
·3579	·944	0
·3596	·949	− 4
·3614	·953	+ 5
·3631	·957	+ 11
·3648	·961	+ 8
·3666	·966	+ 42
·3683	·970	+ 42
·3700	·974	+ 28
plate no. **1231**		
d	P	m
·3770	·991	+ ·59
·3787	·996	+ 42
·3804	·000	+ 43

J. D.	phase	Δ*m*
d	P	m
·3822	·004	+ ·35
·3839	·008	+ 40
·3856	·013	+ 25
·3873	·017	+ 33
·3891	·021	+ 46
·3908	·025	+ 39
·3925	·029	+ 24
·3943	·034	+ 44
·3960	·038	+ 20
·3977	·042	+ 25
·3995	·047	+ 30
·4012	·051	+ 24
·4029	·055	+ 20
·4047	·059	+ 10
·4064	·064	+ 10
·4081	·068	+ 17
·4099	·072	+ 16
·4116	·076	+ 1
plate no. **1232**		
d	P	m
·4185	·093	+ ·18
·4202	·098	+ 24
·4220	·102	+ 9
·4237	·106	+ 12
·4254	·110	+ 7
·4272	·115	− 14
·4289	·119	+ 3
·4306	·123	+ 1
·4324	·127	+ 7
·4341	·132	+ 8
·4358	·136	− 6
·4376	·140	− 14
·4393	·144	− 6
·4445	·157	− 12
·4462	·161	− 11
·4479	·166	+ 5
·4497	·170	− 4
·4514	·174	+ 3
·4531	·178	+ 2
·4549	·183	+ 13
·4566	·187	+ 5
plate no. **1234**		
2424943		
d	P	m
·4623	·868	− ·12
plate no. **1238**		
2424956		
d	P	m
·4915	·869	− ·06
·4932	·874	+ 3
·4949	·878	+ 0
·4967	·882	− 1
·4984	·886	− 1
·5001	·891	+ 1
·5019	·895	+ 3
·5036	·899	+ 3
·5053	·903	+ 1
·5070	·908	+ 3
·5088	·912	+ 4
plate no. **1239**		
d	P	m
·5140	·925	+ ·06

J. D.	phase	Δ*m*
d	P	m
·5157	·929	+ ·05
·5174	·933	+ 12
·5192	·937	+ 12
·5209	·942	+ 10
·5226	·946	+ 14
·5244	·950	+ 11
·5261	·954	+ 24
·5278	·959	+ 15
·5296	·963	+ 23
·5313	·967	+ 24
plate no. **1240**		
d	P	m
·5350	·976	+ ·28
·5365	·980	+ 40
·5382	·984	+ 41
·5399	·988	+ 45
·5417	·993	+ 47
·5434	·997	+ 47
·5451	·001	+ 54
·5469	·006	+ 42
·5486	·010	+ 58
·5503	·014	+ 59
·5521	·018	+ 48
plate no. **1241**		
d	P	m
·5573	·031	+ ·63
·5590	·035	+ 32
·5607	·039	+ 36
·5625	·044	+ 17
·5642	·048	+ 25
·5659	·052	+ 23
·5676	·056	+ 19
·5694	·061	+ 10
·5711	·065	+ 17
·5728	·069	− 5
·5746	·074	− 9
plate no. **1242**		
2424957		
d	P	m
·3051	·868	·05
·3069	·872	− 5
·3086	·876	0
·3103	·881	+ 2
·3121	·885	0
·3138	·889	0
·3155	·893	0
·3173	·898	− 3
·3190	·902	− 1
·3207	·906	− 3
·3225	·911	0
plate no. **1243**		
d	P	m
·3294	·927	− ·02
·3311	·932	+ 1
·3328	·936	+ 10
·3346	·940	+ 11
·3363	·944	+ 18
·3380	·949	+ 21
·3398	·953	+ 21
·3415	·957	+ 30
·3432	·961	+ 37
·3450	·966	+ 38
·3467	·970	+ 37

J. D.	phase	Δ*m*
plate no. **1244**		
d	P	m
·3536	·987	+ ·46
·3553	·991	+ 53
·3571	·996	+ 53
·3588	·000	+ 51
·3605	·004	+ 53
·3640	·012	+ 53
·3657	·017	+ 48
·3675	·021	+ 29
·3692	·025	+ 40
·3709	·029	+ 38
·3727	·034	+ 31
plate no. **1245**		
d	P	m
·3779	·047	+ ·27
·3796	·051	+ 20
·3813	·055	+ 26
·3830	·059	+ 20
·3848	·064	+ 14
·3865	·068	+ 12
·3882	·072	+ 13
·3900	·076	+ 13
·3917	·080	+ 9
·3934	·085	+ 4
·3952	·089	+ 5
plate no. **1246**		
d	P	m
·4021	·106	+ ·01
·4038	·110	− 2
·4056	·115	+ 1
·4073	·119	− 3
·4090	·123	− 1
·4108	·127	− 7
·4125	·132	+ 2
·4142	·136	− 2
·4159	·140	+ 2
·4177	·144	+ 2
·4194	·149	+ 2
·4211	·153	+ 3
·4229	·157	+ 6
·4246	·161	+ 1
·4263	·165	+ 1
·4281	·170	+ 1
plate no. **1248**		
2424961		
d	P	m
·3666	·843	− ·04
·3683	·848	− 2
·3700	·852	+ 6
·3718	·856	− 1
·3735	·860	+ 1
·3752	·865	− 4
·3770	·869	− 4
·3787	·873	− 2
·3804	·877	− 4
·3822	·882	− 3
·3839	·886	− 4
·3856	·890	+ 2
·3874	·895	− 2
·3891	·899	− 3
·3908	·903	− 4
·3925	·907	+ 4
·3943	·911	+ 6

TABLE 3 (*continued*).

J. D.	phase	Δ*m*
d	P	m
·3960	·916	+ ·03
·3977	·920	+ 6
·3995	·924	+ 8
·4012	·928	+ 10
·4029	·933	+ 9
·4047	·937	+ 9
·4064	·941	+ 15
·4081	·945	+ 17
·4099	·950	+ 16
·4116	·954	+ 19
·4133	·958	+ 18
·4151	·963	+ 32
·4168	·967	+ 41
·4185	·971	+ 39
·4203	·975	+ 42
·4220	·980	+ 34
·4237	·984	+ 41
·4254	·988	+ 50
·4272	·992	+ 48
·4289	·996	+ 54
·4306	·001	+ 57
·4324	·005	+ 55
·4341	·009	+ 44
·4358	·013	+ 43
·4376	·018	+ 46
·4393	·022	+ 41
·4410	·026	+ 34
·4428	·031	+ 33
·4445	·035	+ 34
·4462	·039	+ 27
·4480	·043	+ 20
·4497	·048	+ 22
·4514	·052	+ 22
·4531	·056	+ 14
·4549	·060	+ 21
·4566	·064	+ 20
·4583	·069	+ 15
·4601	·073	+ 14
·4618	·077	+ 16
·4635	·081	+ 11
·4653	·086	+ 4
·4670	·090	+ 5
·4687	·094	+ 4
·4705	·099	+ 3
·4722	·103	+ 1
·4739	·107	+ 10
·4757	·111	— 3
·4774	·116	— 7
·4791	·120	+ 1
·4808	·124	+ 3
·4826	·128	+ 8
·4843	·133	+ 8
·4860	·137	— 1
·4878	·141	— 1
·4895	·145	+ 1
·4912	·149	— 1
·4930	·154	+ 7
·4947	·158	+ 1
·4964	·162	0
plate no. **1254**		
2425007		
d	P	m
·3752	·848	— ·01
·3769	·852	— 3
·3786	·856	— 6
·3804	·860	0

J. D.	phase	Δ*m*
d	P	m
·3821	·864	+ ·07
·3838	·869	0
·3856	·873	+ 2
·3873	·877	— 3
·3890	·881	+ 2
·3907	·886	— 2
·3925	·890	+ 4
plate no. **1255**		
d	P	m
·3977	·903	+ ·11
·3994	·907	+ 8
·4011	·911	+ 9
·4029	·916	+ 7
·4046	·920	+ 10
·4063	·924	+ 11
·4081	·928	+ 18
·4098	·932	+ 18
·4124	·939	+ 17
·4150	·945	+ 22
·4167	·949	+ 26
plate no. **1256**		
d	P	m
·4271	·975	+ ·47
·4288	·979	+ 47
·4306	·984	+ 49
·4323	·988	+ 59
·4340	·992	+ 56
·4358	·996	+ 49
·4375	·001	+ 59
·4392	·005	+ 45
·4410	·009	+ 51
·4427	·013	+ 50
·4444	·017	+ 45
·4461	·022	+ 44
·4479	·026	+ 43
·4496	·030	+ 42
·4513	·034	+ 30
·4531	·039	+ 23
·4548	·043	+ 25
·4565	·047	+ 13
·4583	·052	+ 29
·4600	·056	+ 17
·4617	·060	+ 14
plate no. **1304**		
2425230		
d	P	m
·5041	·886	— ·06
·5058	·890	— 5
·5076	·894	— 5
·5093	·899	— 2
·5110	·903	— 1
·5127	·907	— 3
·5145	·911	— 4
·5162	·916	— 6
·5179	·920	— 4
·5197	·924	— 1
·5214	·928	+ 1
·5231	·932	+ 6
·5249	·937	+ 5
·5266	·941	+ 6
·5283	·945	+ 12
·5301	·950	+ 14
·5318	·954	+ 20
·5335	·958	+ 26

J. D.	phase	Δ*m*
d	P	m
·5353	·962	+ ·20
·5370	·967	+ 27
·5387	·971	+ 40
·5405	·975	+ 39
·5422	·979	+ 45
·5439	·984	+ 43
·5456	·988	+ 44
·5491	·996	+ 49
·5508	·000	+ 54
·5526	·005	+ 48
·5543	·009	+ 46
·5560	·013	+ 38
·5578	·018	+ 46
·5595	·022	+ 48
·5612	·026	+ 38
·5630	·030	+ 42
·5647	·035	+ 36
·5664	·039	+ 33
·5682	·043	+ 27
·5699	·047	+ 22
·5716	·052	+ 17
·5733	·056	+ 18
·5751	·060	+ 11
·5768	·064	+ 10
·5785	·069	+ 7
·5803	·073	+ 7
·5820	·077	+ 5
·5837	·081	+ 6
·5855	·086	— 1
·5872	·090	— 1
·5889	·094	— 4
·5907	·098	+ 8
·5924	·103	0
·5941	·107	— 2
·5959	·111	+ 2
·5976	·115	+ 3
·5993	·120	+ 8
·6010	·124	+ 3
·6028	·128	+ 5
·6045	·132	+ 2
·6062	·137	+ 1
·6080	·141	+ 2
·6097	·145	+ 7
·6114	·149	+ 4
·6132	·154	— 5
·6149	·158	— 3
·6166	·162	— 7
·6184	·167	— 1
·6201	·171	— 5
·6218	·175	— 3
·6236	·179	— 1
·6253	·183	— 1
·6270	·188	+ 11
plate no. **1311**		
2425234		
d	P	m
·5799	·897	+ ·03
·5816	·901	— 4
·5834	·905	+ 8
·5851	·909	+ 12
·5868	·914	+ 13
·5885	·918	+ 12
·5903	·922	+ 12
·5920	·926	+ 12
·5937	·930	+ 10
·5955	·935	+ 11

J. D.	phase	Δ*m*
d	P	m
·5972	·939	+ ·19
·5989	·943	+ 16
·6007	·948	+ 18
·6024	·952	+ 25
·6041	·956	+ 22
·6059	·960	+ 24
·6076	·965	+ 32
·6093	·969	+ 37
·6111	·973	+ 42
·6128	·977	+ 41
·6145	·982	+ 45
·6162	·986	+ 43
·6180	·990	+ 47
·6197	·994	+ 51
·6214	·998	+ 57
·6232	·003	+ 50
·6249	·007	+ 47
·6266	·011	+ 44
·6284	·016	+ 50
·6301	·020	+ 45
·6318	·024	+ 43
·6336	·028	+ 39
·6353	·033	+ 29
·6370	·037	+ 24
·6388	·041	+ 27
·6405	·045	+ 25
·6422	·050	+ 8
·6439	·054	+ 11
·6457	·058	+ 12
·6474	·062	+ 13
·6491	·067	+ 14
·6509	·071	+ 15
·6526	·075	+ 15
·6543	·079	+ 14
·6561	·084	+ 6
·6578	·088	+ 8
·6595	·092	+ 6
·6613	·096	+ 5
·6630	·101	+ 9
·6647	·105	+ 6
·6682	·113	+ 8
·6699	·118	+ 1
·6717	·122	+ 2
·6734	·126	+ 3
·6751	·130	+ 5
·6768	·135	+ 3
·6786	·139	0
·6803	·143	+ 1
·6820	·147	+ 4
·6838	·152	— 1
·6855	·156	— 3
·6872	·160	— 8
·6890	·165	— 7
·6907	·169	— 7
·6924	·173	— 6
·6942	·177	+ 3
·6959	·181	— 1
·6976	·186	— 1
·6994	·190	— 2
·7011	·194	— 7
·7028	·198	— 3
·7045	·203	— 8
plate no. **1321**		
2425242		
d	P	m
·3332	·940	+ ·03
·3349	·944	+ 13

TABLE 3 (*continued*).

J. D.	phase	Δm	J. D.	phase	Δm	J. D.	phase	Δm	J. D.	phase	Δm
d	P	m	d	P	m	d	P	m	d	P	m
·3366	·948	+·14	·3506	·895	+·07	·4475	·133	+·03	·4083	·967	+·34
·3384	·953	+13	·3523	·899	+5	·4493	·137	+9	·4100	·971	+39
·3401	·957	+31	·3540	·903	+6	·4510	·141	−5	·4118	·975	+39
·3418	·961	+31	·3558	·908	−6	·4527	·146	+5	·4135	·979	+55
·3436	·965	+39	·3575	·912	+5	·4545	·150	+2	·4152	·984	+49
·3453	·970	+43	·3592	·916	+3	·4562	·154	−3	·4170	·988	+47
·3470	·974	+48	·3610	·920	+17	·4596	·163	−2	·4187	·992	+49
·3488	·978	+37	·3627	·925	+24	·4614	·167	−5	·4204	·996	+54
·3505	·982	+54	·3644	·929	+14	·4631	·171	−6	·4222	·001	+52
·3522	·987	+53	·3662	·933	+12	·4648	·175	−8	·4239	·005	+52
·3540	·991	+54	·3679	·937	+19	·4666	·180	+5	·4256	·009	+50
·3557	·995	+55	·3696	·942	+20	·4683	·184	+8	·4274	·013	+42
·3574	·999	+64	·3713	·946	+23	·4700	·188	−16	·4291	·018	+49
·3592	·004	+50	·3731	·950	+19	·4718	·193	−5			
·3609	·008	+58	·3748	·954	+24	·4735	·197	−5			
·3626	·012	+48	·3765	·958	+24	·4752	·201	−5	plate no. **1350**		
·3643	·016	+45	·3783	·963	+31	·4770	·205	+3			
·3661	·021	+40	·3800	·967	+30				d	P	m
·3678	·025	+42	·3817	·971	+33				·4326	·026	+·45
·3695	·029	+39	·3835	·976	+31	plate no. **1348**			·4346	·030	+39
·3713	·033	+26	·3852	·980	+27				·4360	·035	+37
·3730	·038	+28	·3869	·984	+39	2425257			·4378	·039	+38
·3747	·042	+23	·3887	·988	+35	d	P	m	·4395	·043	+33
·3765	·046	+26	·3904	·993	+50	·3581	·843	−·01	·4412	·047	+28
·3782	·050	+20	·3921	·997	+46	·3598	·847	−1	·4429	·052	+31
·3799	·055	+12	·3941	·002	+49	·3616	·852	−5	·4447	·056	+18
·3817	·059	+8	·3956	·005	+33	·3633	·856	−6	·4464	·060	+15
·3834	·063	+11	·3973	·010	+29	·3650	·860	−1	·4481	·064	+14
·3851	·067	+7	·3990	·014	+51	·3668	·865	−1	·4499	·069	+14
·3869	·072	+6	·4008	·018	+42	·3685	·869	0			
·3886	·076	+5	·4025	·022	+33	·3702	·873	+4			
·3903	·080	+5	·4042	·027	+34	·3720	·877	0			
·3920	·084	+6	·4060	·031	+32	·3737	·882	+3	plate no. **1353**		
·3938	·089	+5	·4077	·035	+35	·3754	·886	+8			
·3955	·093	−3	·4094	·039	+28	·3772	·890	+5	2425259		
·3972	·097	0	·4112	·044	+31	·3789	·894	−4			
·3990	·101	−6	·4129	·048	+14	·3806	·899	0	d	P	m
·4007	·106	+1	·4146	·052	+16	3824	·903	+4	·4011	·861	−·07
·4024	·110	−1	·4164	·056	+10	·3841	·907	+3	·4028	·865	+4
·4042	·114	0	·4181	·061	+17	·3858	·911	−1	·4046	·870	−5
·4059	·118	−6	·4198	·065	+8	·3875	·915	+5	·4063	·874	+6
·4076	·123	+2	·4216	·069	+14	·3893	·920	+8	·4080	·878	+2
·4094	·127	+2	·4233	·073	+10	·3910	·924	+5	·4098	·883	+0
·4111	·131	−4	·4250	·078	+8	·3927	·928	+1	·4115	·887	−5
·4128	·135	−6	·4267	·082	+8				·4132	·891	+1
·4146	·140	+10	·4285	·086	+11				·4150	·895	−3
·4163	·144	+2	·4302	·091	−5	plate no. **1349**			·4167	·899	+6
·4180	·148	+9	·4319	·095	−3	d	P	m	·4184	·904	−8
·4197	·152	−3	·4337	·099	+5	·3945	·933	+·08	·4201	·908	−8
·4215	·157	+3	·4354	·103	+13	·3962	·937	+12	·4236	·916	−14
			·4371	·107	+10	·3979	·941	+20	·4253	·921	−8
plate no. **1345**			·4389	·112	−5	·3997	·945	+19	·4271	·925	−9
			·4406	·116	−2	·4014	·950	+22	·4288	·929	−4
2425244			·4423	·120	−10	·4031	·954	+27	·4305	·933	−2
d	P	m	·4441	·125	−3	·4049	·958	+33	·4323	·938	−1
·3488	·890	+·06	·4458	·129	−1	·4066	·962	+36	·4340	·942	+3

The mean error for a single exposure during minimum is found to be ± m·068 from the differences between two observations following each other in phase.

The observations were now arranged according to phase and divided into groups as indicated in Table 4. Of the 23 larger groups of 50 observations each, 21 are shown graphically in Figure 2. By the aid of a curve drawn through the points of Figure 2 the phase of minimum was, in the way described in *B. A. N.* 147, p. 179, found to be P·0024, while the mean of the phases of the 11 minima between J. D. 2424791 and 5242 of Table 1 is P·0023. The mean epoch of the observations of the present paper is:

J. D. hel. M. astr. T. Grw. 2424989d·1169 ± d·0004 (m.e.),

TABLE 4.

number of exposures	phase	Δ*m*	phase	Δ*m*	number of exposures	phase	Δ*m*	phase	Δ*m*	number of exposures	phase	Δ*m*	phase	Δ*m*
	P	m	P	m		P	m	P	m		P	m	P	m
6	·7563	·000			10	·9545	·233			10	·0568	·197		
10	·7897	—·022	·8009	·000	10	·9574	·229			10	·0595	·137		
10	·8170	—·004			10	·9595	·247	·9596	·269	10	·0620	·155		
10	·8328	·028			10	·9620	·313			10	·0644	·138	·0647	·132
10	·8445	—·004			10	·9648	·321			10	·0675	·118		
10	·8502	—·024			10	·9672	·325			10	·0702	·112		
10	·8551	·011	·8551	—·004	10	·9702	·365			10	·0730	·092		
10	·8604	—·011			10	·9726	·344	·9727	·361	10	·0761	·076		
10	·8653	·010			10	·9753	·366			10	·0788	·100	·0791	·085
10	·8689	—·025			10	·9783	·405			10	·0821	·083		
10	·8729	—·004			10	·9810	·404			10	·0855	·074		
10	·8765	—·010	·8766	—·010	10	·9842	·456			10	·0893	·040		
10	·8806	—·008			10	·9873	·448	·9868	·467	10	·0931	·042		
10	·8842	—·001			10	·9894	·503			10	·0967	·050	·0966	·043
10	·8871	—·015			10	·9920	·524			10	·1001	·043		
10	·8900	·012			10	·9950	·507			10	·1040	·038		
10	·8930	—·013	·8930	+ ·000	10	·9968	·507			10	·1072	·029		
10	·8960	·009			10	·9999	·525	·9999	·504	10	·1109	—·013		
10	·8988	·008			10	·0025	·487			10	·1146	·005	·1146	·003
10	·9015	—·003			10	·0051	·496			10	·1183	—·025		
10	·9034	·018			10	·0082	·481			10	·1218	·017		
10	·9065	—·003	·9065	+ ·017	10	·0103	·501			10	·1258	·015		
10	·9093	·033			10	·0128	·457	·0130	·466	10	·1300	·009		
10	·9119	·042			10	·0158	·447			10	·1340	·032	·1340	·012
10	·9156	·017			10	·0180	·443			10	·1382	·014		
10	·9194	·065			10	·0211	·407			10	·1418	—·011		
10	·9219	·061	·9218	·051	10	·0237	·420			10	·1455	·026		
10	·9244	·063			10	·0261	·415	·0263	·396	10	·1497	·033		
10	·9276	·050			10	·0291	·351			10	·1540	·003	·1540	·006
10	·9294	·088			10	·0313	·388			10	·1583	—·004		
10	·9323	·111			10	·0343	·344			10	·1626	—·028		
10	·9347	·085	·9348	·100	10	·0365	·302			10	·1672	—·015		
10	·9374	·114			10	·0391	·321	·0393	·297	10	·1720	—·025		
10	·9402	·104			10	·0422	·288			10	·1771	—·011	·1773	—·009
10	·9422	·125			10	·0443	·230			10	·1824	·024		
10	·9446	·142			10	·0471	·237			10	·1879	—·018		
10	·9471	·157	·9472	·150	10	·0495	·217			10	·1945	—·019		
10	·9496	·167			10	·0520	·239	·0521	·213	10	·2015	·004	·2040	—·016
10	·9524	·161			10	·0550	·173			10	·2259	—·034		

with the epoch 967 in the counting of Table 1.

The 117 smaller groups of Table 4 were then arranged anew according to the phase counted from minimum. Mean results thus obtained are given for 24 groups of about 50 observations each in Table 5. The results for 21 of these groups nearest to minimum are shown graphically in Figure 3.

FIGURE 2.

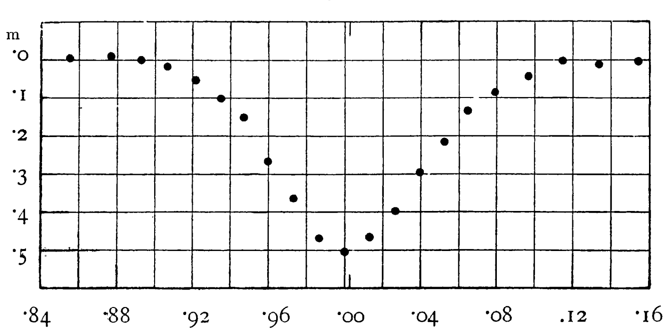
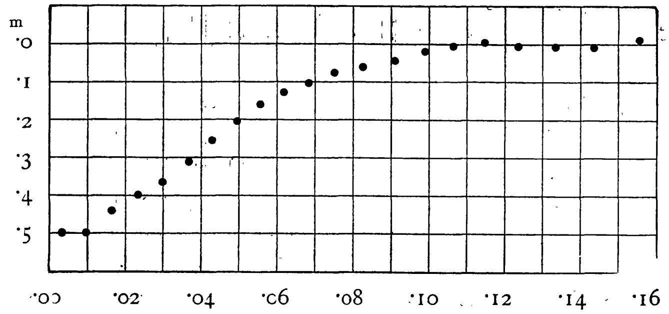


TABLE 5.

number of exposures	phase counted from minimum	mean Δ*m*	number of exposures	phase counted from minimum	mean Δ*m*
	P	m		P	m
50	± ·0033	·499	50	± ·0826	·060
50	± ·0098	·498	50	± ·0911	·041
50	± ·0162	·440	50	± ·0990	·019
50	± ·0234	·399	50	± ·1065	·004
50	± ·0300	·361	50	± ·1148	— ·005
50	± ·0367	·311	50	± ·1236	·005
50	± ·0430	·251	50	± ·1335	·005
50	± ·0494	·205	50	± ·1438	·010
50	± ·0555	·160	50	± ·1556	— ·011
50	± ·0618	·127	50	± ·1717	·000
50	± ·0683	·104	50	± ·1950	— ·012
50	± ·0752	·075	16	± ·2320	— ·021

FIGURE 3.



2. A new computation of the geometrical elements of the system was now made. No sensible difference in the depth of even and odd minima was noted. The system is assumed to consist of two identical spherical components of uniform surface brightness, revolving in a circular orbit. The unknown quantities which can now be found from the lightcurve are the inclination of the orbit i, and the ratio r/a between the semidiameters of each component and of the orbit. The relation between the two unknowns is:

$$\left(\frac{\delta}{r}\right)^2 \cdot \left(\frac{r}{a}\right)^2 = 1 - \sin^2 i \cos^2 \vartheta \qquad (1)$$

in which δ denotes the projected distance of the centres, and ϑ the phase angle, counted from the middle of the eclipse as zeropoint. If we take $(r/a)^2$ and $\sin^2 i$ as the unknowns, this relation is linear in both, and a least square solution to determine $(r/a)^2$ and $\sin^2 i$ was now made. For this purpose the first 16 data from Table 5 (representing 16×50 observations) were collected in the first two columns of Table 6. The third column contains $\sin^2 \vartheta = \sin^2 (\pi \times \text{phase})$. The fourth column contains the quantity α = the fraction of one disc obscured by the other one, computed from the second column; and the fifth column contains the corresponding projected distance of the centres δ/r, in terms of the radius of each component. In the equation (1) the coefficient $\cos^2 \vartheta$ is exact, and the uncertainty is wholly in the coefficient $(\delta/r)^2$. Now for each of the points of the lightcurve it was computed how big the change in δ/r was, corresponding to a change of ${}^m{\cdot}01$ in Δm, in both directions. Columns 6, 7, 8 and 9 give the results of these computations. Accordingly, weights were given to the equations in the least square solution. These weights are given in column 11. The result of the least square solution for the equation (1) was:

TABLE 6.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
					m — ·01		m + ·01				calc.	calc.	
		$\sin^2 \pi P$	α	$\left(\frac{\delta}{r}\right)^2$	α	$\left(\frac{\delta}{r}\right)^2$	α	$\left(\frac{\delta}{r}\right)^2$	(7)—(9)	$\frac{4}{(10)^2}$	$\left(\frac{\delta}{r}\right)^2$	α	O—C
P	m									p			
·0033	·499	·0001075	·7370	·1731	·7252	·1893	·7486	·1581	·0312	4100	·1672	·7415	— ·004
·0098	·498	·000947	·7358	·1748	·7240	·1911	·7474	·1596	·0315	4030	·1999	·7178	+ 15
·0162	·440	·002588	·6664	·2812	·6540	·3031	·6786	·2606	·0425	2220	·2637	.6767	— 8
·0234	·399	·005395	·6150	·3777	·6022	·4041	·6278	·3522	·0519	1490	·3728	·6174	— 2
·0300	·361	·008857	·5658	·4850	·5524	·5168	·5788	·4551	·0617	1050	·5074	·5563	+ 7
·0367	·311	·013234	·4982	·6577	·4842	·6974	·5120	·6200	·0774	667	·6775	·4912	+ 5
·0430	·251	·018139	·4128	·9229	·3982	·9742	·4274	·8737	·1005	395	·8682	·4290	— 11
·0494	·205	·023830	·3440	1·1805	·3288	1·2437	·3592	1·1200	·1237	261	1·0894	·3671	— 15
·0555	·160	·030095	·2740	1·4916	·2580	1·5705	·2898	1·4163	·1542	168	1·3330	·3082	— 22
·0618	·127	·037222	·2208	1·7681	·2044	1·8621	·2370	1·6799	·1822	120	1·6100	·2503	— 18
·0683	·104	·045339	·1826	1·9943	·1658	2·1025	·1994	1·8917	·2108	90	1·9256	·1938	— 7
·0752	·075	·054779	·1334	2·3293	·1162	2·4614	·1506	2·2055	·2559	61	2·2925	·1384	— 3
·0826	·060	·065844	·1076	2·5313	·0900	2·6821	·1248	2·3944	·2877	48	2·7226	·0856	+ 12
·0911	·041	·079699	·0742	2·8305	·0564	3·0147	·0918	2·6660	·3487	33	3·2612	·0359	+ 21
·0990	·019	·093654	·0348	3·2721	·0164	3·5581	·0528	3·0548	·5033	16	3·8037	·0047	+ 16
·1065	·004		·0074	3·7311			·0256	3·4066					+ 4

$$\cdot 025617 \left(\frac{\delta}{r}\right)^2 = 1 - \cdot 995823 \cos^2 \vartheta,$$

from which follows: $\frac{r}{a} = \cdot 160053 \qquad (\cdot 157)$

and: $i = 86^\circ{\cdot}3 \qquad (86^\circ{\cdot}2)$

Between brackets have been added the values found for these quantities in *B. A. N.* 97. It is remarkable how well they agree with the values derived in this paper, although they were derived from observations during one minimum only.

The columns 12 and 13 were now computed with the new values for r/a and i, and the corresponding difference between observed and computed lightcurve in column 14. The mean error of the O—C's is $\pm$ $^{m}\cdot014$.

3. The absolute dimensions may again be computed with the aid of the spectrographic data given by JOY and SANFORD in *Ap. J.* **64**, p. 250. Taking the maximum separation of the spectral lines of the two components as 240·7 km/sec, the following quantities result:

radius of each component:	$r =$	432000 km
radius of orbit :	$a =$	2701000 km
mass of each component: $\frac{1}{2}(M_1 + M_2) =$		·593 ⊙
density :	$\rho =$	2·468 $\rho_{\odot}$.

The absolute visual magnitude of each component is $9^{m}\cdot15$ (parallax = ″·1) (*B. A. N.* 97). Computing the mass from EDDINGTON's mass-luminosity relation (EDDINGTON, *The internal constitition of the stars*, p. 137), the value ·593 ⊙ is found, exactly the mass as derived directly from the observations.

4. Comparing the absolute visual magnitude of each component of Castor C with the sun's absolute visual magnitude $+ 4^{m}\cdot67$ (parallax = ″·1), and taking into account the difference in size, it is found that the surface brightness of Castor C is $3^{m}\cdot45$ darker than that of the sun. Adopting for the sun an effective temperature of 5741°, and using the table on p. 139 of EDDINGTON, *The intern. const. of the stars* (HERTZSPRUNG's formula), this gives an effective temperature of Castor C of 3400°, in good agreement with its spectrum M. According to the effective wavelengths given by FRANK S. HOGG in *H. B.* 848 the colour index of Castor C in the mean system of DOORN (*B. A. N.* 140) is $+ 1^{m}\cdot52$.