

ON C.P.D. MAGNITUDES AND MELBOURNE DIAMETERS
IN -71° TO -81°

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The Melbourne diameters when compared with the C.P.D. magnitudes reveal systematic errors of measurements in magnitude groups 7.1 (-72°), 7.1 (-73°), 7.1, 7.4, 7.7 (-75°), 7.1, 7.4 (-76°), 7.7 for $p = 100$), 7.1, 7.4, 7.7 (-77°), 7.1, 7.7 (-78°), 7.1, 7.4 (-79°), 7.1, 7.7, 8.0 (-80°), 7.1, 7.4, 8.6 (-81°). An empirical relation between magnitudes and diameters has been obtained.

The magnitudes and diameters of stars in some of the astrographic zones have been compared by Christie (1892), Dyson and Hollis (1900), Turner (1905), Goyal (1958, 1960, 1963, 1965), Goyal and Sharma (1959, 1963, 1964), Goyal and Shringi (1965), Goyal and Mithal (1968, *in press*). The present investigation has been undertaken with a view to examine if any systematic error is shown by Melbourne diameters when they are compared with C.P.D. magnitudes. The stars were grouped according to the magnitudes lying between 7.0 and 7.2, 7.3 and 7.5, etc., with mean magnitudes 7.1, 7.4, etc., in each Melbourne Astrographic zone except -71° and -72° .

The table gives the mean diameters \bar{d} , the square root of the variance σ , the probable error (computed from p.e. = $\sigma \times 0.6745$), the value of $\sigma\sqrt{\pi/2n}$, the values of u_x for $p = 100$ and 20. The table is self-explanatory.

Applying Hulme's criterion (1940) we find that the diameters in the magnitude groups—7.1 (-72°), 7.1 (-73°), 7.1, 7.4, 7.7 (-75°), 7.1, 7.4 (-76°), 7.7 for $p = 100$), 7.1, 7.4, 7.7 (-77°), 7.1, 7.7 (-78°), 7.1, 7.4 (-79°), 7.1, 7.7, 8.0 (-80°) and 7.1, 7.4, 8.6 (-81°)—have a real systematic error of measurement.

Further, the least square solution of the following relation

$$D = a + b(m - 9.0) + c(m - 9.0)^2 + d \text{ (C.I.) (1.0),}$$

where D is the mean diameter, m the C.P.D. magnitude and C.I. is the colour index interpolated from Allen (1955), gives the following values of the constants:

$$a = 24.0542 \pm 1.0144, \quad b = -9.7800 \pm 0.6241, \quad c = -2.2614 \pm 0.3635, \quad d = 2.5000 \pm 0.2346.$$

TABLE I

Unit : \bar{d} , $\sigma = 0.01$; p.e., $\sigma\sqrt{\pi/2n}$, $\sigma\sqrt{\pi/2n} \times 0.99$, $\sigma\sqrt{\pi/2n} \times 0.95 = 0.0001$

Mag.	N°	\bar{d}	σ	p.e.	$\sigma\sqrt{\pi/2n}$	$\sigma\sqrt{\pi/2n}$ $\times 0.99$	$\sigma\sqrt{\pi/2n}$ $\times 0.95$
MELBOURNE ASTROGRAPHIC CATALOGUE - 71°							
7.1	23	4678	683	46068	17972	17792	17073
7.4	44	3916	674	45461	12668	12541	12035
7.7	83	3401	767	51734	10572	10466	10043
8.0	117	3048	613	41347	6913	6844	6567
8.3	207	2390	710	47889	6227	6165	5916
8.6	272	2067	999	67383	7510	7435	7134
8.9	633	2061	399	26913	1999	1979	1899
9.15	637	1767	338	22798	1694	1677	1609
9.4	1211	1488	284	19156	1068	1057	1015
9.7	2128	1033	778	52476	1950	1930	1853
10.0	947	1210	214	14434	804	796	764
10.3	364	991	605	40807	3790	3752	3600
10.55	16	1169	73	4924	2287	2264	2173
10.7	48	1060	67	4519	1175	1163	1116
MELBOURNE ASTROGRAPHIC CATALOGUE - 72°							
7.1	20	4175	1503	101377	41432	41018	39360
7.4	47	3975	501	33792	8789	8701	8350
7.7	70	3719	598	40335	14986	14836	14237
8.0	109	3180	707	47687	7973	7893	7574
8.3	234	2783	711	47957	5345	5292	5078
8.6	270	2164	1219	82222	9164	9072	8706
8.9	640	2024	460	31027	2306	2283	2191
9.15	760	1791	770	51937	3859	3820	3666
9.4	1264	1793	540	36423	2030	2010	1928
9.7	2012	1282	128	8634	321	318	305
10.0	955	1192	234	15783	880	871	836
10.3	403	1153	166	11197	1040	1030	988
10.55	24	1162	98	6610	2456	2431	2333
10.7	96	991	594	40065	7443	7369	7071
MELBOURNE ASTROGRAPHIC CATALOGUE - 73°							
7.1	22	4350	1489	100433	37314	36941	35448
7.4	40	3476	786	53016	15758	15600	14970
7.7	70	4018	646	43576	9713	9616	9227
8.0	102	3148	919	61987	11515	11400	10939
8.3	197	2699	458	30892	4017	3977	3816
8.6	264	2352	517	34872	3887	3848	3693
8.9	604	2027	312	21044	1564	1542	1486
9.2	1268	1710	61	4114	229	227	218
9.5	1898	1701	345	23270	1297	1284	1232
9.8	1412	1227	418	28194	2095	2074	1990
10.1	612	1218	178	12006	892	883	847
10.4	192	1114	168	11332	1474	1459	1400
10.6	142	1045	156	10522	1564	1548	1486

TABLE I—*contd.*

Unit: \bar{d} , $\sigma = 0.01$; p.e., $\sigma\sqrt{\pi/2n}$, $\sigma\sqrt{\pi/2n} \times 0.99$, $\sigma\sqrt{\pi/2n} \times 0.95 = 0.0001$

Mag.	N°	\bar{d}	σ	p.e.	$\sigma\sqrt{\pi/2n}$	$\sigma\sqrt{\pi/2n}$ $\times 0.99$	$\sigma\sqrt{\pi/2n}$ $\times 0.95$
MELBOURNE ASTROGRAPHIC CATALOGUE — 74°							
7.1	31	4090	786	53016	17727	17550	16841
7.4	53	3746	784	52881	13753	13615	13065
7.7	78	3384	1011	68192	13935	13796	13238
8.0	91	3045	730	49238	9147	9056	8690
8.3	184	2568	1004	67720	8806	8718	8366
8.6	260	2312	847	57130	6368	6304	6050
8.7	514	2304	649	43775	3253	3220	3090
9.0	947	1639	264	17807	992	982	942
9.5	1882	1338	226	15244	849	841	807
9.8	1172	1257	290	19561	1090	1079	1036
10.1	539	2011	580	39121	2907	2878	2762
10.4	117	1034	680	45866	7668	7591	7285
10.6	264	1193	364	24552	2736	2709	2599
MELBOURNE ASTROGRAPHIC CATALOGUE — 75°							
7.1	20	5070	1155	77905	31839	31521	30247
7.4	26	3681	1077	72644	26990	26423	25356
7.7	50	3896	3937	265550	69063	68372	65610
8.0	77	4031	895	60368	12336	12213	11719
8.3	136	2753	948	63943	9503	9408	9028
8.6	207	2585	562	37907	4929	4880	4683
8.9	297	2077	666	44922	5007	4957	4757
9.2	735	1775	330	22258	1654	1637	1571
9.5	1335	1371	686	46271	2579	2553	2450
9.8	853	1292	346	23338	1301	1288	1236
10.1	421	1362	320	21584	2005	1985	1905
10.4	105	1405	254	17132	3183	3151	3024
10.6	231	1323	320	21584	2406	2382	2286
MELBOURNE ASTROGRAPHIC CATALOGUE — 76°							
7.1	25	4852	1092	73655	27366	27092	25998
7.4	29	3932	1160	78242	26163	25901	24855
7.7	40	3789	1019	68732	20429	20225	19408
8.0	80	3307	998	67315	13755	13617	13067
8.3	139	2987	488	32916	4892	4843	4647
8.6	189	2492	746	50318	6543	6478	6216
8.9	351	2092	322	21719	2017	1997	1916
9.2	711	1664	350	23608	1754	1736	1666
9.5	1210	1392	318	21449	1095	1183	1135
9.8	724	1779	408	27520	2045	2025	1943
10.1	375	1612	388	26171	2431	2407	2309
10.4	113	1450	242	16323	2729	2702	2593
10.6	253	1339	93	6273	699	692	664

TABLE I—*contd.*Unit : \bar{d} , $\sigma = 0.01$; $p.e.$, $\sigma\sqrt{\pi/2n}$, $\sigma\sqrt{\pi/2n} \times 0.99$, $\sigma\sqrt{\pi/2n} \times 0.95 = 0.0001$

Mag.	N°	\bar{d}	σ	p.e.	$\sigma\sqrt{\pi/2n}$	$\sigma\sqrt{\pi/2n}$ $\times 0.99$	$\sigma\sqrt{\pi/2n}$ $\times 0.95$
MELBOURNE ASTROGRAPHIC CATALOGUE — 77°							
7.1	34	4417	1316	88764	28032	27752	26630
7.4	30	3877	1319	88967	29749	29452	28262
7.7	38	2705	1005	75942	58239	57657	55327
8.0	65	3214	1076	72576	16179	16017	15370
8.3	116	3021	510	34400	5751	5693	5463
8.6	158	2667	617	41617	4639	4593	4497
8.9	333	2174	415	27992	2599	2573	2469
9.2	738	1606	883	59558	4426	4382	4205
9.5	1152	1494	422	28464	1586	1570	1507
9.8	839	1335	260	17537	977	967	928
10.1	477	1224	112	7554	702	695	667
10.4	127	1229	412	27789	4130	4089	3924
10.6	168	1340	506	34130	4438	4394	4216
MELBOURNE ASTROGRAPHIC CATALOGUE — 78°							
7.1	23	4409	894	60300	23524	23289	22348
7.4	36	3622	816	55039	16359	16195	15541
7.7	42	3426	1187	80063	22267	22044	21154
8.0	71	2973	650	43842	9773	9675	9284
8.3	117	2482	539	36356	6078	6017	5774
8.6	173	2187	687	46338	6886	6817	6542
8.9	339	1882	349	23540	2186	2164	2077
9.2	642	1589	231	15581	1158	1146	1100
9.5	1185	1289	175	11804	658	651	625
9.8	912	1159	171	11534	643	637	611
10.1	361	1039	161	10859	1009	999	959
10.4	74	973	149	10050	2240	2218	2128
10.6	40	1122	186	12546	3729	3692	3543
MELBOURNE ASTROGRAPHIC CATALOGUE — 79°							
7.1	18	4389	1650	111292	49619	49123	47138
7.4	25	3877	907	61177	22729	22502	21593
7.7	43	3555	1052	70957	19772	19574	18783
8.0	49	3019	772	52071	13542	13407	12865
8.3	88	2567	520	35074	7167	7095	6809
8.6	125	2295	453	30555	5108	5057	4853
8.9	256	1967	363	24484	2729	2702	2593
9.2	458	1153	1217	82087	7625	7549	7244
9.5	874	1382	289	19493	1448	1334	1376
9.8	725	1286	256	17267	1283	1270	1219
10.1	305	1070	206	13895	1549	1534	1472
10.4	58	979	191	12883	3111	3080	2955
10.6	—	—	—	—	—	—	—

TABLE I—*concl'd.*

Unit: \bar{d} , $\sigma = 0.01$; p.e., $\sigma\sqrt{\pi/2n}$, $\sigma\sqrt{\pi/2n} \times 0.99$, $\sigma\sqrt{\pi/2n} \times 0.95 = 0.0001$

Mag.	N°	\bar{d}	σ	p.e.	$\sigma\sqrt{\pi/2n}$	$\sigma\sqrt{\pi/2n}$ $\times 0.99$	$\sigma\sqrt{\pi/2n}$ $\times 0.95$
MELBOURNE ASTROGRAPHIC CATALOGUE — 80°							
7.1	10	4910	944	63673	37851	37472	35958
7.4	24	3938	738	49778	18494	18309	17569
7.7	58	3170	2007	135372	32692	32365	31057
8.0	40	3710	2206	148795	44226	43784	42015
8.3	90	2827	663	44719	8307	8224	7892
8.6	118	2319	470	31702	5300	5247	5035
8.9	241	1937	377	25429	2834	2806	2692
9.2	485	1203	1189	80198	5959	5899	5661
9.5	798	1290	536	36153	2015	1995	1914
9.8	609	1157	201	13557	1511	1496	1435
10.1	300	1067	182	12276	912	903	866
10.4	63	924	287	19358	4675	4628	4441
10.6	—	—	—	—	—	—	—
MELBOURNE ASTROGRAPHIC CATALOGUE — 81°							
7.1	13	4040	1343	90585	45435	44981	43163
7.4	21	3205	2814	189804	74045	73305	70343
7.7	35	3939	892	60165	19000	18810	18050
8.0	37	3243	860	58007	17241	17069	16379
8.3	100	2366	1499	101108	18782	18594	17843
8.6	116	1435	1852	124917	20885	20676	19841
8.7	288	2013	120	8094	902	893	857
9.2	397	1663	332	22393	2080	2059	1976
9.5	892	1309	208	14030	4920	4871	4674
9.8	602	1117	262	17672	1313	1300	1247
10.1	274	1002	187	12613	1406	1392	1336
10.4	34	923	151	10185	3027	2997	2876
10.6	—	—	—	—	—	—	—

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