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RADIAL VELOCITIES OF SOME BRIGHT SOUTHERN STARS

The Bright Star Catalogue (Hoffleit 1982) is a widely used publication that is often referenced. Most of the data columns are fairly complete, but there are gaps in the photometric, radial velocity and stellar duplicity columns. The most common radial velocity data omissions are of course for early spectral types, which are typically difficult to measure either because of the very broad lines commonly caused by high stellar rotation or the relatively few lines in the spectra of these stars. However there are quite a number of stars with a spectral type of F or later and it was thought to be useful to obtain their radial velocities. The edition of the catalogue used here contains data compiled through 1979, so it is possible that some of these values have already been obtained elsewhere and are not known to this author.

The data in Table 1 were obtained when a list was drawn up to act as a fill-in program between other program requirements. There is no astrophysical significance in the structure of the list. The criteria for selection from the Bright Star Catalogue were as follows:-

1. mag 6 (V) or brighter,
2. south of the Equator,
3. F5 or later spectral type,
4. no radial velocity entry in the Catalogue,
5. any companion noted that would not be excluded from the spectrograph slit width must be too faint to contaminate the brighter spectrum. (However, any physical companion would still be contributing to the brighter star's radial velocity.)

Two observations were made of each object. Most spectra were obtained centered at Hα (λ6563Å), but some of the earlier observations were made centered at λ5010Å. This means that some pairs of spectra are not directly comparable, but since only radial velocities, and not line profile information, were being determined, the same spectral region was not required.

The observations were made at the Mount John University Observatory, Lake Tekapo, New Zealand. All observations at λ6563Å were made with a 1872 element Reticon detector (MacQueen 1986) operated at -130°C using a Cassegrain échelle spectrograph (Hearnshaw 1977; 1978) mounted on the McLellan 1-m telescope operating at f/8. At λ6563Å the dispersion is 2.28Å mm^{-1}. With 15 micron pixels, this corresponds to 66 pixels mm^{-1} or about 1.5 km s^{-1} per pixel. The free spectral bandwidth between the end masks of the Reticon is just over 60Å at this position. All observations at λ5010Å were made with the spectrograph located in the dataroom adjacent to the dome, where it was thermally and mechanically stable. In these cases the spectrograph utilised a 105 micron single fibre feed (Kershaw & Hearnshaw 1989). A hollow cathode Thorium-Argon calibration lamp was used for all frames. This is built into the spectrograph. The observations at λ5010Å used the same lamp type, but built into the telescope end of the fibre feed module.

All the radial velocities were extracted from the data using a cubic dispersion solution on the Thorium-Argon frame, after the customary flat-field and fixed-pattern manipulations were applied.

All pre-existing data in Table 1 were obtained verbatim from the Bright Star Catalogue. The exposure date column is in day-month-year format. The exposures times are in minutes. (The exposure times may seem long for a 1-m telescope, but this is due to the high dispersion of the spectrograph, and also the approximately 50% light loss in the fibre-feed.) All radial velocities (in km s^{-1}) are with respect to the Sun. (The radial velocities obtained are listed to 0.01 km s^{-1}. Obviously it is not being claimed that this is the degree of accuracy. The last digit has been rounded already and has only been included so users can evaluate the rest of the number as they wish.) The 'rms mÅ' column refers to the root mean square uncertainty (in mÅ) in the dispersion solution from the Thorium-Argon calibration lamp, whereas the standard deviation ('Std.dev') is that obtained from the scatter in velocities over the number of lines ('# lines') used in the stellar frame.

Special attention is drawn to stars HR 5617, 6207, 6648 and 6818. These stars show distinct velocity differences at their two epochs.

Table 1. Program Star Data

HR	HD	V	Sp. Type	Date	Exp.	HJD 2440000+	Region	RV	rms mA	# lines	Std.dev	Del.mag	Sep.*
5391	126241	5.85	K3 III	4-4-89	60	7621.072	5010	-18.14	3.25	16	.69		
				6-8-89	45	7685.859	6563	-19.16	2.23	15	.69		
5389	126209	6.07	K0-1III	3-4-89	90	7620.217	5010	- 8.28	3.14	16	.53		
				8-6-89	35	7685.900	6563	- 9.47	2.77	14	.65		
5408	126862	5.83	K1III	4-4-89	90	7621.172	5010	+78.29	3.83	15	1.23	8.2	35.4
				8-6-89	42	7685.933	6563	+78.58	2.93	13	.40		
5547	131425	5.93	G8II	9-4-89	105	7626.030	5010	+0.66	2.85	12	1.36		
				8-6-89	40	7686.014	6563	+0.48	1.20	9	.59		
5585	132604	5.89	K2-3III	9-4-89	120	7626.122	5010	+42.01	1.56	17	1.03		
				8-6-89	40	7686.050	6563	+42.71	2.73	14	.72		
5525	130650	5.65	G8-K0III	11-4-89	90	7627.869	5010	+14.60	3.59	11	.63		
				8-7-89	60	7715.846	6563	+13.92	1.87	16	.55		
5617	133631	5.77	G8III	11-4-89	90	7628.039	5010	-10.42	1.43	16	.82		
				10-7-89	60	7717.879	6563	- 3.39	3.62	13	.74		
5636	134255	5.98	G8III	11-4-89	100	7628.115	5010	-34.30	1.67	18	1.16		
				27-7-89	30	7734.965	6563	-34.86	0.16	10	.21		
5725	137066	5.71	K5-M0III	12-4-89	90	7628.957	5010	- 9.18	3.18	15	1.23		
				27-7-89	20	7735.052	6563	-10.47	2.49	12	.52		
5767	138505	5.82	M2III	12-4-89	120	7629.038	5010	-38.70	2.92	12	1.26		
				27-7-89	40	7734.995	6563	-40.15	2.77	12	.67		
5929	142691	5.80	K0-1III	7-5-89	126	7654.059	5010	- 3.45	2.43	10	.74		
				27-7-89	30	7735.031	6563	- 3.63	2.46	13	.61		
5955	143346	5.70	K1IIICNII	11-4-89	90	7627.951	5010	+49.57	2.19	18	1.00		
				27-7-89	30	7735.142	6563	+49.60	3.92	14	.65		
6044	145833	5.92	K0III	13-5-89	81	7660.219	6563	-22.02	1.41	16	.52		
				25-7-89	30	7733.007	6563	-23.15	1.40	11	.38		
6073	146690	5.77	K0III	15-5-89	60	7733.038	6563	- 1.10	2.52	17	.67		
				25-7-89	40	7661.900	6563	- 0.52	2.85	14	.62		

Table 1 (cont.)

HR	HD	V	Sp. Type	Date	Exp.	HJD 2440000+	Region	RV	rms mA	# lines	Std.dev	Del.mag	Sep."
6085	147225	5.88	G3II	15-5-89	60	7661.994	6563	-11.27	2.04	16	.91	3.8	40.7
				26-7-89	30	7733.870	6563	-11.43	2.69	12	.50		
6122	148247	5.79	K1IIICNII	15-5-89	50	7622.037	6563	-14.16	2.19	17	.84		
				26-7-89	30	7733.895	6563	-14.19	1.79	13	.65		
6207	150576	5.96	G8III	17-5-89	40	7664.045	6563	-13.75	2.79	17	.88	6.0	40
				26-7-89	32	7733.921	6563	-17.17	1.89	10	.42		
								-15.88		4	.26		
6221	151078	5.48	KOIII	17-5-89	35	7664.151	6563	- 9.48	3.24	17	.94		
				26-7-89	30	7733.951	6563	- 9.86	2.42	13	.66		
6266	152293	5.88	F51b-II	17-5-89	30	7664.178	6563	-37.62	1.40	18	2.72		
				26-7-89	30	7733.976	6563	-37.33	0.63	7	.57		
6288	152820	5.48	K5III	27-5-89	40	7674.005	6563	-78.08	2.68	12	.52		
				26-7-89	20	7733.998	6563	-77.62	3.09	15	.79		
6311	153368	5.97	K2IIICNII	27-5-89	30	7674.033	6563	+17.63	3.71	12	1.29		
								+15.52		7	.58		
				26-7-89	30	7734.019	6563	+16.99	3.76	14	.71		
6374	155035	5.84	M1-M2III	15-5-89	50	7662.173	6563	+20.68	1.80	15	.66		
				10-7-89	30	7718.071	6563	+21.96	1.36	15	.50		
6404	155970	5.99	K1III	15-5-89	32	7662.206	6563	- 0.96	3.99	15	1.08	5.1	4.2
				24-7-89	30	7731.974	6563	- 2.96	2.75	12	.82	7.0	20
6408	156091	5.91	K2IIICN	15-5-89	40	7662.235	6563	- 5.19	3.74	17	.88	8.4	20.2
				10-7-89	30	7718.111	6563	- 4.15	2.45	13	.48		
6456	157097	5.93	K1III	30-5-89	40	7676.950	6563	-36.79	2.14	16	.51	3.6	2.0
				24-7-89	45	7732.006	6563	-37.22	3.40	13	.53		
6438	156768	5.88	G8Ib-II	17-5-89	40	7663.915	6563	-10.07	4.30	17	.93		
				10-7-89	30	7718.135	6563	-10.12	2.96	11	.52		
6442	156854	5.80	G8-KOIII	27-5-89	40	7674.250	6563	- 6.84	2.50	14	.67		
				10-7-89	30	7718.163	6563	- 5.29	1.49	10	.52		
6648	162391	5.84	G8III	30-5-89	40	7676.998	6563	-15.44	2.57	15	.62		
				24-7-89	45	7732.043	6563	-25.07	2.54	11	.61		
6643	162189	5.96	K2III	27-5-89	30	7674.221	6563	-85.08	2.09	11	.64	6.5	23.6
				24-7-89	40	7732.079	6563	-84.80	0.88	11	.73	7.2	30
6624	161814	5.78	KOIII	27-5-89	30	7674.279	6563	+16.34	2.43	14	.54		
				8-7-89	45	7716.143	6563	+17.83	3.24	10	.66		
6691	163652	5.74	G8III	27-5-89	30	7674.195	6563	-88.08	1.52	15	.61	2.4	51.7
				24-7-89	40	7732.110	6563	-88.56	2.51	15	.61		
6818	167096	5.46	G8-KOIII	27-5-89	30	7674.170	6563	-27.54	1.94	15	.86		
				8-7-89	30	7716.176	6563	-19.84	1.94	17	.76		
6837	167714	5.95	K2III	8-6-89	45	7686.191	6563	-14.07	2.97	15	.64		
				10-7-89	30	7718.188	6563	-12.97	2.72	16	.84		

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