STUDIES OF FAINT B-TYPE STARS. II*

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ABSTRACT

Radial velocities and spectral types are listed for 150 B-type stars between magnitudes 8 and 12. The combined observations of this paper and of *McDonald Observatory Contribution* No. 35 are shown graphically.

The observations of B-type stars published in *McDonald Observatory Contribution* No. 35[2] have been extended by obtaining spectrograms of 150 additional stars, making a total of 268 stars. An attempt has been made to distribute the observations uniformly along the available portion of the Milky Way (see Figs. 1–3). The improvement in distribution over that of the first paper alone is due in a large measure to lists of B stars from unpublished sections of the *Henry Draper Extension*, made available through the courtesy of Dr. Shapley, Dr. Bok, and Mrs. Mayall, of the Harvard College Observatory. These lists include stars in three regions of galactic longitude: 180°–190°, 320°–340°, and 20°–40°. A few stars were chosen from the Cape catalogue of faint stars.[3] A second spectrogram was obtained for each of 13 stars observed by O'Keefe.[4] The remaining sources of material are listed in paper I.

Two spectrograms, having a dispersion 76 A/mm at $H\gamma$, were obtained for each star, with the exception of 24 stars with poor lines and of 2 stars for which insufficient observing time was available. The average exposure time for a star of given magnitude was decreased by hypersensitization of the emulsion.

MAGNITUDES

Although material has been obtained for the determination of magnitudes and colors of the stars, as well as additional material for some of the stars in paper I, I have not had the opportunity of reducing it. This material consists of photographic and photovisual plates taken with the 6-inch UV camera and of the spectrograms themselves, from which colors are to be determined (see paper I for a discussion). For 63 of the stars of this paper, however, photographic magnitudes and colors had been obtained by Seyfert in the program for the earlier paper. In this sense he is a collaborator, and I wish to express my indebtedness to him. His colors are not published here, since it is desirable to combine them with the colors from the spectrograms. Reliable photographic magnitudes are also available for 25 of the remaining stars. Of these, 10 are stars from the *Bergedorfer Spektral-Durchmusterung*, while 15 magnitudes were obtained from the colors and visual magnitudes of Stebbins, Huffer, and Whitford.[5]

The magnitudes of the 43 remaining stars for which photographic magnitudes are listed in Table 2 were taken from the catalogues listing the stars as B stars or from the CPD (*Durchmusterung* stars between $-20°$ and $-36°$). For these latter, corrections to

* *Contributions from the McDonald Observatory, University of Texas*, No. 92.

[1] On leave of absence for war research.

[2] Seyfert and Popper, *Ap. J.*, **93**, 461, 1941. Referred to as "I."

[3] *Catalogue of 20,554 Faint Stars*, Observatory of the Cape of Good Hope, 1939.

[4] *Ap. J.*, **94**, 353, 1941.

[5] *Ap. J.*, **91**, 20, 1940.

the magnitudes were applied as given in *Harvard Ann.*, **80**, 256, 1917. For 19 of the BD stars, only approximate visual magnitudes are available. These were obtained from the BD and are corrected according to published tables.[6]

SPECTRAL TYPES

Classification of the spectra is discussed in the earlier paper. As a check on the consistency of the spectral types, a random selection of 45 of the spectrograms of that paper was reclassified along with the spectrograms of this paper. The systematic difference averages 0.1 spectral subdivision, while the differences taken without regard to sign average 0.5 subdivision. The star HD 123884 of paper I should be classified cB9 instead of cB6.

The use of the intensity ratio of the helium lines λ 3964 and λ 4026 continues to be a useful criterion for luminosity classification on our spectrograms of stars from types B1 to B4. The explanation suggested in paper I for the relative strengthening of λ 3964 in c stars is incorrect. The true reason is probably that this line is lost in the wing of $H\epsilon$ in the spectra of main-sequence stars.

TABLE I

LUMINOSITY CLASSIFICATION ACCORDING TO MORGAN, KEENAN, AND KELLMAN

TYPE	McDONALD		
	c	c⁻	Normal
O9.5	.....	.....	I–III
B0	.....	.....	I–III
B0.5	I	II	III–IV
B1	I–II	III	V
B2	I	III	V
B3–A0	I	.....	V

An attempt is made in Table 1 to correlate the luminosity classes used here with those of Morgan, Keenan, and Kellman.[7] Blank spaces occur in the table where luminosity classes are not used in the McDonald classification. A few B0 stars were observed which belong in class V. For these the remark is entered, following Table 2, that the spectrum is similar to that of τ Sco. In these spectra the *Si* IV lines are much stronger than those of *Si* III, but the ratio of *Si* IV to *H* is considerably smaller than for normal B0 stars.

RADIAL VELOCITIES

As in paper I, a correction of −2.1 km/sec has been applied to all measured velocities in order to reduce them to the system of Moore's catalogue.[8] When the difference in velocity from two spectrograms exceeds five times the larger probable error of measurement, the comment "Velocity variable?" has been appended to Table 2. It is not implied that all the other stars have constant velocities. A few stars are common to our list and to that of Neubauer.[9] These are indicated in the remarks at the end of Table 2. They are too few in number for a statistical comparison.

[6] Pannekoek, *Pub. Astr. Inst. Univ. Amsterdam*, No. 1, 1924.

[7] *An Atlas of Stellar Spectra*, Chicago: University of Chicago Press, 1943.

[8] *Lick Obs. Pub.*, Vol. **18**, 1932.

[9] *Ap. J.*, **97**, 300, 1943.

TABLE 2

OBSERVATIONS OF B STARS

STAR	α 1900	δ 1900	l	b	m_{pg}	SPECTRUM	STAR VEL. (KM/SEC)	K-LINE VEL. (KM/SEC)	REMARKS
	Part I								
8-1454	0^h50^m1	+61° 13′	91	− 1	11.10	O7	−24eF	−54eF	
8-1105	1 1.2	+60 6	93	− 2	11.50	c⁻B2	−33dB	−12bB	
8-640	1 4.8	+59 7	93	− 3	11.50	B2.5	−12cA	−25bC	
8-1675	1 5.4	+61 23	93	0	11.80	B1	−52cA	−41cA	
8-1779	1 12.6	+61 18	94	− 1	11.90	B3	−46dD	− 8bA	R
236800	1 30.1	+59 26	96	− 2	9.58	B3	−25cC	−15dB	
236961	2 17.7	+57 1	103	− 3	9.41	B1	−34eA	+15d	
237015	2 45.0	+59 57	105	+ 2	9.05	B4	−15dA	+ 5eB	
9-274	2 52.2	+59 6	106	+ 1	11.00	B4n	−44eC	+ 4bA	
9-53	3 0.2	+58 55	107	+ 2	11.04	A2p	+28cB	Stellar	R
9-106	3 5.2	+58 34	108	+ 2	10.51	B1n	− 9eE	−30cC	
232999	4 37.0	+50 21	123	+ 4	9.77	cB2	+ 1bA	−15bB	
242926	5 16.1	+33 13	141	0	9.28	O7.5	− 8eC	− 9cC	
243780	5 21.4	+21 25	152	− 6	9.94	B3+F8	+21cB	−12bB	R
243827	5 21.7	+33 15	142	+ 1	10.89	c⁻B2	+66dC	−34e	
245770	5 32.7	+26 16	149	− 1	9.73	B1neα	+ 6dE	+ 1aC	R
246901	5 38.3	+33 29	144	+ 3	8.68	cB1+K	− 1bA	+ 2cA	R
247331	5 40.2	+25 30	151	0	8.73	B3neγ	−14dB	+19e	R
248893	5 48.0	+22 6	155	0	10.0	B0	+23cB	+12bA	
250980	5 58.1	+ 9 40	166	− 5	9.18	B2neβ	− 1cA	+ 2aB	R
251204	5 59.0	+23 24	155	+ 2	10.4	B0	+ 7dD	.....	
253021	6 5.7	+21 40	157	+ 3	10.2	B2	....f	+33d	R
254428	6 11.2	+13 32	165	0	9.13	B0.5	+18aA	+15bB	
254577	6 11.8	+22 26	157	+ 5	9.5	B0	+18eC	− 6aB	
255191	6 14.0	+24 17	156	+ 6	10.7	cB1	+24cD	+20e	
256577	6 18.6	+ 8 21	170	− 1	9.72	B2eγ	+11eD	+26aB	R
256725	6 19.1	+19 54	160	+ 5	9.70	O5.5	+38dA	+36bA	
258982	6 26.2	+ 6 14	173	0	9.6	B2	+62cF	+16cC	R
259597	6 28.1	+ 8 24	171	+ 1	8.60	B3neγ	+37fF	+19aA	
259828	6 28.8	+ 8 11	172	+ 1	11.06	B5	+11dB	+46d	
+0°1576	6 39.7	+ 0 42	179	0	9.33	O9	+41cC	+30bB	
236775	6 41.5	+ 5 42	175	+ 3	10.56	B3	+38eB	+29bA	
+0°1627	6 44.2	+ 0 50	180	+ 1	9.42	B2	+12dE	+29bD	R
+0°1638	6 45.1	+ 0 33	180	+ 1	10.03	O8n	+46eD	+49bA	
+1°1560	6 46.8	+ 1 29	180	+ 2	9.63	B2n	+24eD	+27b	
−1°1471	6 52.0	− 1 38	183	+ 2	10.13	B1	+75dA	.....	
−3°1668	6 52.9	− 3 38	185	+ 1	9.76	B3	+45cA	+23cB	
−2°1892a	6 57.4	− 2 51	185	+ 3	10.43	B3	+42cC	+27e	R
−4°1806a	7 0.1	− 4 5	186	+ 3	10.55	B3	+68dC	.....	R
−3°1746	7 2.6	− 3 56	186	+ 3	10.61	B5eγ	+65cA	.....	R
55885	7 9.8	−15 13	197	− 1	8.90	B(5)neβ	+57eA	+58cA	R
123-602	7 12.1	−14 54	197	0	10.5	B5	+33dC	+45bD	
123-1955	7 23.4	−15 11	198	+ 2	9.69	O7	+54dB	+32aB	
62413	7 38.7	−27 11	210	− 1	10.29	B4eα	+39cA	+25aA	R
63290	7 43.0	−27 41	212	0	9.46	cB1	+43aA	+25dB	

TABLE 2—*Continued*

Star	α 1900	δ 1900	l	b	m_{pg}	Spectrum	Star Vel. (Km/Sec)	K-Line Vel. (Km/Sec)	Remarks
	Part I—*Continued*								
148-732	7h56m4	−30° 27′	215	+ 1	11.3	B7	+ 6eC	.....	
148-1118	7 59.4	−31 26	217	+ 1	11.4	B4	+ 8fC	.....	
148-1662	8 3.3	−30 1	216	+ 2	11.1	B8	+20eA	Stellar	
148-2127	8 7.1	−31 49	218	+ 2	11.1	B9	+ 2cA	Stellar	
−44°4543	8 31.1	−44 41	231	− 2	10.4	B0	+44dF	.....	
172-1522	8 43.7	−45 57	233	− 1	9.45	B1	+57dF	+31e	R
172-1753	8 46.5	−44 12	232	0	9.9	B0	+27dA	.....	
−46°4786	8 53.5	−46 40	235	0	9.9	B1	+22eB	.....	
−47°4551	8 54.5	−47 21	236	0	9.0	O7	−13fB	.....	
78959	9 5.9	−43 29	234	+ 3	9.6	B0.5	+44bA	+28dD	
124448	14 8.6	−45 49	286	+13	9.7	Bp	−65aA	−46b	R
144695	16 2.0	−49 41	300	0	9.6	O9	0eF	.....	
−46°10590	16 3.4	−46 43	302	+ 2	10.2	O9	−19eE	.....	
150197	16 34.3	−47 22	305	− 2	9.32	O8	− 2cD	−33cA	
150475	16 36.1	−37 39	313	+ 4	8.60	O8.5	−22cB	− 8cC	R
151018	16 39.6	−45 42	307	− 2	9.2	B0	−48cC	.....	
151300	16 41.4	−47 0	306	− 3	9.53	O6	−47dA	.....	
180-1052	16 50.1	−43 34	310	− 2	9.21	B0	−27dB	−27bA	
155959	17 9.6	−40 46	314	− 3	9.0	B0.5	−13eC	−24bA	
156134	17 10.7	−35 27	319	0	8.50	c−B0.5	−22dD	+56cF	R
157-521	17 25.1	−31 16	324	0	11.0	B4	− 2eB	.....	
−33°12155	17 25.7	−33 16	323	− 1	10.0	O8	−22cC	−11d	
−34°11820	17 29.2	−34 34	322	− 3	10.8	B1	−32cB	0cB	R
−33°12242	17 29.6	−33 49	322	− 2	10.3	cB0.5	−31bA	−21cB	
−35°11760	17 31.2	−35 20	321	− 3	9.9	cB5	+ 7cB	0c	R
160730	17 36.4	−24 15	331	+ 2	10.24	O8	−72eC	.....	
−35°11892	17 38.7	−35 22	322	− 5	9.8	B3	−53eD	−24bC	
−24°13687	17 52.0	−24 49	333	− 2	10.3	B2	−22aB	− 9bC	
165049	17 59.0	−15 22	342	+ 2	8.20	c−B1.5	−24bB	−17aA	R
165319	18 0.3	−14 12	342	+ 2	8.40	B0	+30aC	− 9aC	R
165517	18 1.2	−25 7	333	− 4	8.70	B0	−48dF	+10cB	R
−22°12627	18 3.6	−22 21	336	− 3	10.2	B2	−10cB	.....	
166188	18 4.4	−18 13	340	− 1	9.10	B2neβ	+25cE	−16cB	R
166418	18 5.4	−16 44	341	0	8.30	B0	+36cD	−24bB	R
166611	18 6.3	−26 45	332	− 5	9.68	B1	−23dA	+17aA	
134-464	18 6.4	−14 32	343	0	9.93	B0.5	−14eB	+20e	
−20°5043	18 8.1	−20 20	338	− 3	9.7	O7	+28dA	+49e	
−20°5061	18 9.7	−20 44	338	− 3	9.6	B5n	..... f	+15cA	
167451	18 10.2	−13 36	344	0	9.00	cB1	−13bF	− 2aA	R
134-1269	18 10.5	−14 39	344	0	9.83	B1	−28cA	+ 2c	
168352	18 14.1	−17 7	342	− 2	8.90	B2	−16bA	−29aA	R
134-2076	18 14.6	−15 6	344	− 1	9.76	B0	+21dA	−12bF	
168607	18 15.5	−16 25	343	− 2	9.73	cB8eγ	−30bF	+ 2cF	R
168625	18 15.5	−16 25	343	− 2	9.55	cB2	− 4bA	−13dA	
−20°5108	18 16.4	−20 7	340	− 4	9.4	B0.5	+17cA	+13aA	

TABLE 2—*Continued*

Star	α 1900	δ 1900	l	b	m_{pg}	Spectrum	Star Vel. (Km/Sec)	K-Line Vel. (Km/Sec)	Remarks
	Part I—*Continued*								
134-2608	18h18m2	−14°12′	345	− 2	10.37	B0.5	+23cA	− 6bA	
169754	18 21.1	−11 25	348	− 1	9.50	B0.5	+11dF	+17d	R
230373	18 55.9	+12 59	14	+ 2	10.65	B7n	+ 1dD	− 4cA	
+22°3559	18 57.5	+22 26	22	+ 6	(10.4)	B3	−19aA	+ 6bB	
177812	19 1.1	+ 3 6	5	− 3	9.10	cB1.5	+40bC	+14aB	R
+24°3632	19 1.8	+24 39	24	+ 7	(10.4)	cB8	0eE	Stellar	
230705	19 2.5	+18 29	19	+ 4	11.26	B3	+ 5cA	−11bA	
230780	19 4.7	+14 58	16	+ 2	10.8	B5	−26dD	−60e	R
231564	19 24.8	+12 22	16	− 4	10.8	c−B1	+25dE	+28aA	
+23°3730	19 36.0	+23 47	27	0	(9.2)	cB8	+17bA	Stellar	
+22°3781	19 38.8	+23 2	27	− 1	(10.0)	O9	+ 4cA	− 8e	
+22°3782	19 38.9	+23 3	27	− 1	(9.0)	O9	+20cA	.....	
+23°3759	19 41.0	+23 48	28	− 1	(9.1)	B0	−21eB	+26cB	
+25°3952	19 41.5	+25 7	29	− 1	(10.0)	O8	+ 7dC	.....	
+29°3732	19 41.9	+30 1	33	+ 2	(9.7)	B2	+ 5eA	+ 4c	
+22°3836	19 46.8	+22 35	28	− 3	(9.3)	cB1	+ 4bB	+ 9aA	
+29°3842	19 56.6	+30 6	35	− 1	(10.4)	B1	+14bC	−12aC	R
+21°4017	19 57.1	+21 59	28	− 5	(10.4)	B0	+30dA	−15aB	
+28°3598	19 59.1	+28 25	34	− 2	(10.0)	B0	−13bD	+ 1bC	R
227415	20 0.1	+35 16	40	+ 1	10.00	B0	−25dE	−22bA	R
+31°3921	20 0.3	+31 52	37	− 1	(8.7)	B0.5	+34cC	− 7dA	
227607	20 2.0	+36 14	41	+ 2	10.00	B3	+ 5dC	− 8bB	R
227704	20 2.9	+34 38	39	+ 1	8.43	B0	−24bB	−28bA	
+19°4293	20 3.7	+19 12	27	− 8	(10.5)	B8	−20eD	Stellar?	
227836	20 4.3	+35 50	41	+ 1	9.60	Bve	−25aA	−37cC	R
+23°3915	20 6.9	+23 27	31	− 7	(9.7)	B5n	+26eD	− 6c	
+29°3944	20 9.8	+29 24	36	− 3	(10.0)	B5	−10dA	.....	
228461	20 10.4	+37 56	43	+ 1	9.46	B1	+ 6cB	−26bB	
229049	20 17.4	+38 42	44	0	10.36	B0	−17bA	− 3bB	R
40-1659	20 44.3	+45 14	53	+ 1	11.10	B4	−13dC	− 6aA	
18-390	21 17.1	+59 34	67	+ 7	10.80	B2	−49dC	−39e	
235618	21 43.5	+54 53	66	+ 1	10.05	B1	− 5dA	.....	
240171	22 58.5	+56 36	76	− 3	9.1	B2.5	−19cB	−12cA	
240311	23 24.9	+59 3	80	− 2	10.70	B6	−12dA	−42e	R
	Part II								
8-1680	1 5.8	+61 47	93	0	11.10	B(5)neα	− 6e	−37d	R
8-1720	1 8.4	+61 25	93	0	11.20	B(4)neα	−69f	.....	R
237056	2 55.0	+57 7	108	0	9.17	B1neα	−21e	−26c	
232774	3 12.9	+51 42	113	− 4	9.17	B(5)n	....f	+ 8c	
246579	5 36.7	+33 23	149	− 3	9.95	B5n	....f	.....	

TABLE 2—*Continued*

STAR	α 1900	δ 1900	l	b	m_{pg}	SPECTRUM	STAR VEL. (KM/SEC)	K-LINE VEL. (KM/SEC)	REMARKS
	Part II—*Continued*								
247795	5^h42^m6	+31° 48′	145	+ 3	9.38	B(4)neβ	....f	+28d	R
248434	5 45.7	+21 31	155	− 1	10.5	B(5)neγ	−63f	−18c	R
250163	5 54.4	+19 11	158	− 1	10.2	Bneβ	....f	.....	R
251696	6 0.9	+23 12	155	+ 3	10.1	B5n	+58f	+36c	
253339	6 6.9	+24 4	155	+ 4	10.6	B3neβ	....f	+49e	R
264600	6 44.2	+ 6 19	175	+ 4	10.90	Bn	....f	+35c	R
−5°1971	7 2.4	− 5 4	187	+ 3	10.18	B(5)neβ	+69f	+23c	R
+1°1699	7 2.7	+ 1 53	181	+ 6	(9.3)	B4n	+99e	+13c	
62780	7 40.5	−26 43	210	− 1	8.96	Bneβ	+73e	+44c	R
63150	7 42.3	−36 16	219	− 5	8.7	Bneβ	....f	.....	
64639	7 49.7	−24 33	210	+ 3	9.59	Bneγ	....f	.....	R
172-880	8 37.5	−45 44	233	− 2	9.63	Bneβ	+78f	.....	R
80834	9 16.9	−41 45	234	+ 6	10.0	Bneγ	....f	+20d	R
−40°10757	16 42.3	−40 38	311	+ 1	9.8	B(3)n	....f	.....	
−25°12556	17 54.2	−25 14	333	− 2	11	B1	+19e	+ 8d	R
−25°12786	18 2.5	−25 22	333	− 4	10.8	B5n	−42f	.....	
167722	18 11.4	−19 46	339	− 3	9.20	B3n	− 3f	− 3c	R
134-1627	18 12.2	−13 53	344	0	10.91	cB4	− 8d	.....	R
+19°4266	19 59.1	+19 42	27	− 7	(10.5)	Bn	....f	− 9b	
228041	20 6.2	+35 12	40	0	9.20	Bneβ	....f	−22b	R
+32°3749	20 9.8	+32 15	39	− 2	(10.4)	O(8)neγ	....f	.....	R

NOTES TO TABLE 2

8-1779	Velocity variable?
9-53	Type cA2 from *H* and *Ca* II; but *Si* II, *Fe* II, and *Mg* II not visible.
243780	Composite spectrum. The continuous spectra of the two stars appear to be approximately equal at λ 4250. Color index approximately +1.2 mag. Velocity mainly from F-type lines.
245770	MWC 507.
246901	Composite spectrum. The continuous spectra appear to be approximately equal at λ 4600. Color index about +0.9 mag. Velocity from both B- and K-type lines.
247331	MWC 513.
250980	MWC 518.
253021	Double lines.
256577	MWC 525.
258982	Velocity variable?
+0°1627	Velocity variable?
−2°1892a	4′ north of −2°1892.
−4°1806a	3′ sf −4°1806.
−3°1746	MWC 544.
55885	MWC 550.
62413	MWC 568.
172-1522	Velocity variable?
124448	See *Pub. A.S.P.*, **54**, 160, 1942, for a brief description of the spectrum of this star. $H\delta$ and $H\gamma$, if present, must be weaker than 0.2 equivalent angstroms. This upper limit was set by comparing spectrograms of HD 124448 and of ρ Leonis with a dispersion of 26 A/mm at $H\gamma$. E. G. Williams has published intensities of numerous lines in the spectrum of ρ Leonis (*Ap. J.*, **83**, 83, 1936). The radial velocity is based on 5 spectrograms.
150475	Magnitude from Stebbins, Huffer, and Whitford.

156134	Magnitude from Stebbins, Huffer, and Whitford.
−34°11820	Velocity variable?
−35°11760	Probable *Hα* emission.
165049	Magnitude from Stebbins, Huffer, and Whitford. Velocities by Neubauer: stellar, -17 ± 1; K line, −10.
165319	Velocity variable? Magnitude from Stebbins, Huffer, and Whitford.
165517	Velocity variable? Magnitude from Stebbins, Huffer, and Whitford.
166188	Velocity variable? MWC 282. Magnitude from Stebbins, Huffer, and Whitford. Velocity by Neubauer: -23 ± 2.
166418	Magnitude from Stebbins, Huffer, and Whitford. Velocities by Neubauer: stellar, $+6\pm2$; K line, −20.
167451	Velocity variable? Magnitude from Stebbins, Huffer, and Whitford. Velocity by Neubauer: -5 ± 4 (var).
168352	Magnitude from Stebbins, Huffer, and Whitford. Velocities by Neubauer: stellar, -28 ± 2; K line, −30.
168607	MWC 291. This star and HD 168625 are the very red stars near M 17 (*Pub. A.S.P.*, **52**, 401, 1940).
169754	Magnitude from Stebbins, Huffer, and Whitford. Velocity by Neubauer: $+35\pm16$ (var).
177812	Magnitude from Stebbins, Huffer, and Whitford.
230780	Velocity variable? This star was erroneously announced to have *Hα* in emission (MWC 613). It should be removed from the list in *Ap. J.*, **98**, 153, 1943.
+29°3842	Velocity variable?
+28°2398	Velocity variable?
227415	Spectrum similar to that of *τ* Sco. Magnitude from Stebbins, Huffer, and Whitford.
227607	Velocity variable?
227836	MWC 628. Spectrum peculiar and variable. See note in *Ap. J.*, **98**, 153, 1943. Magnitude from Stebbins, Huffer, and Whitford.
229049	Spectrum similar to that of *τ* Sco.
240311	*Si* II lines strong.
8-1680	*He* lines sharp. MWC 421.
8-1720	MWC 422.
247795	MWC 514.
248434	MWC 515.
250163	MWC 517.
253339	MWC 522.
264600	Probable *Hα* emission. The region of *Hα* is not included on our spectrogram.
−5°1971	MWC 543.
62780	MWC 573.
64639	MWC 576.
172-880	MWC 578.
80834	MWC 580.
−25°12556	Insufficient time to obtain a second spectrogram.
167722	Magnitude from Stebbins, Huffer, and Whitford.
134-1627	Insufficient time to obtain a second spectrogram.
228041	MWC 330. Magnitude from Stebbins, Huffer, and Whitford.
+32°3749	MWC 631. The only lines visible are *He* II 4686 and *C* III + *O* II 4650.

THE TABLE OF OBSERVATIONS

The table of observations (Table 2) is divided into two parts. In Part I are listed data for the 124 stars for which two (in a few cases more) spectrograms have been obtained. Part II contains data for 26 additional stars with only one spectrogram per star. Nearly all the stars of Part II have poor lines.

The first column of the table gives the designation of the star. For most of the stars this is the HD, BD, or CoD number. HD numbers larger than 225300 are to be found in the *Henry Draper Extension* (*Harvard Ann.*, Vol. **100**). The CoD stars south of −40° are listed as B stars in the Cape catalogue of faint stars.[3] The rest of the BD and CoD stars are from unpublished portions of the *Henry Draper Extension*. Hyphenated designations refer to Selected Area and star numbers as found in the *Bergedorfer Spektral-Durchmusterung* (northern declinations) or in the *Potsdamer Spektral-Durchmusterung* (southern declinations). The 1900 positions of the BD and CoD stars are the BD and CoD positions corrected for precession. The positions for the other stars were taken from

the catalogues listing them as B stars. Galactic co-ordinates (fourth and fifth columns) were interpolated from the Lund Observatory table.

The reliable photographic magnitudes, probably good to 0.1 mag. for the most part, are listed to two decimals. These include Seyfert's observations, the Bergedorf stars, and

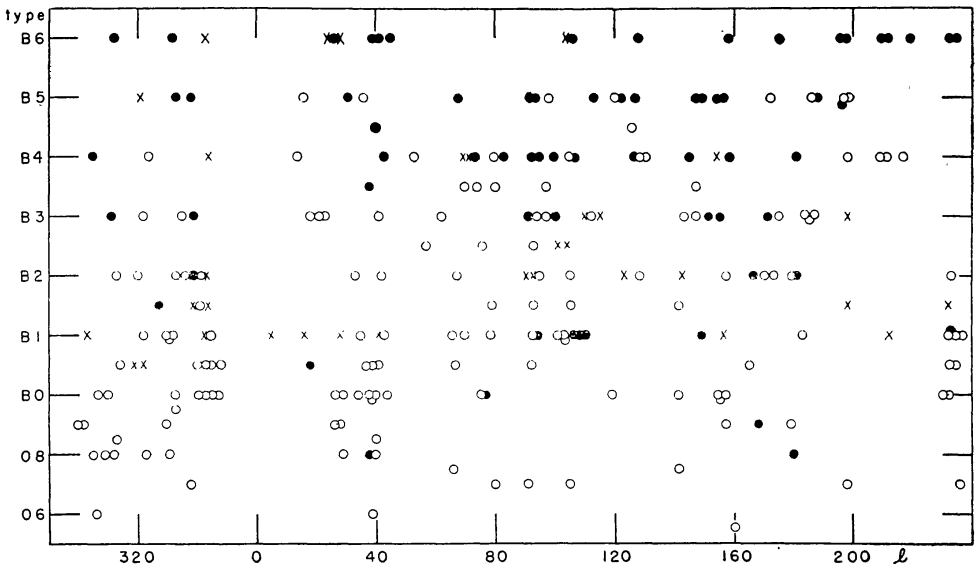

FIG. 1.—Distribution of spectral types of B stars. ○=main-sequence stars; ●=n stars; ×=c stars. Unclassified Bn stars and c stars later than B5 are shown at B6.

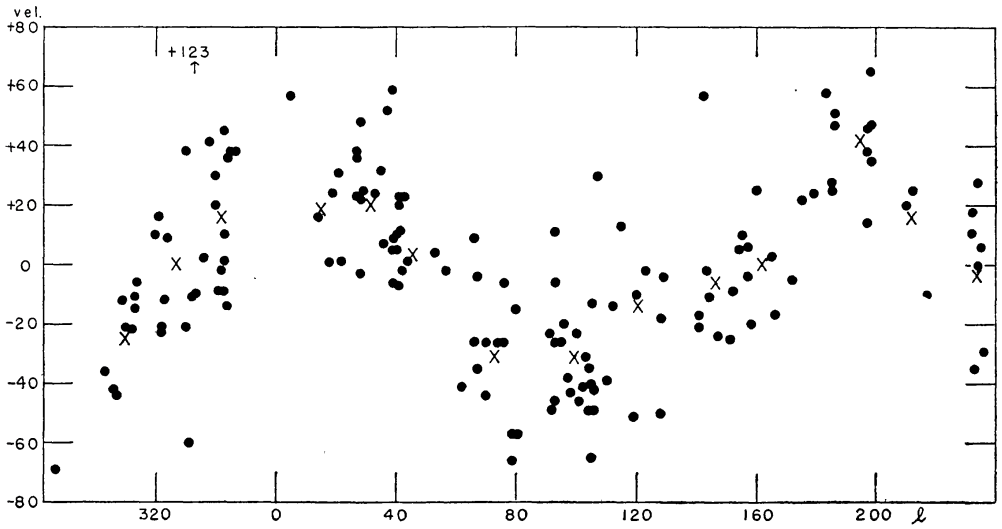

FIG. 2.—Stellar radial velocities corrected for the sun's motion and for $\cos^2 b$. ×=normal points

stars observed by Stebbins, Huffer, and Whitford. A zero has been arbitrarily added in the second decimal place for stars of the last two groups (see the discussion of magnitudes above). Magnitudes in parentheses are adjusted visual magnitudes from the BD. The remaining magnitudes, given to 0.1 mag., are photographic magnitudes from the *Henry Draper Catalogue* and the *Extension* or from the *Potsdamer Spektral-Durchmusterung* or are corrected values from the CPD.

The spectral types are listed in the seventh column. The Greek letter appended to the type of a Be star indicates the highest member of the Balmer series visible in emission. The radial velocities given in the eighth (stellar) and ninth (K-line) columns are the weighted means of the measures decreased by 2.1 km/sec. The small letters following the velocities are indications of the "quality" of the spectrograms and of the K line. The quality of a spectrogram is proportional to the sum of the weights of the lines and inversely proportional to the probable error of measurement. For the K lines the quality depends only on the weight of the line. The letter "a" denotes highest quality. Estimates of K-line intensities, listed in paper I, have not been continued. The capital

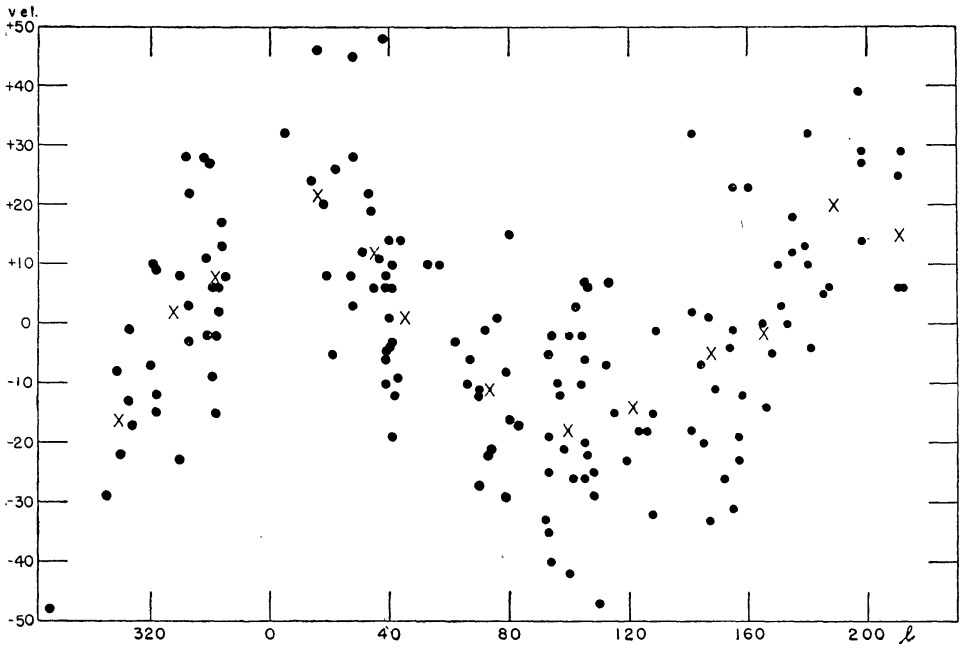

FIG. 3.—K-line velocities corrected for the sun's motion and for $\cos^2 b$. $\times$ = normal points

letters following the velocities show the agreement between the measured velocities of the two spectrograms, as follows:

Letter.....	A	B	C	D	E	F
P.e. (km/sec)..	0–±4.0	±4.1–±8.0	±8.1–±12.0	±12.1–±16.0	±16.1–±20.0	>20.0

The probable error is taken as one-third the difference of the two measures, as in paper I. Where no capital letter is listed, the published velocity depends on only one spectrogram. Where no K-line velocity is given, the spectrograms are too weak to show it. An "R" in the last column refers to a remark in the notes following the table.

DISCUSSION

Since the material is incomplete as regards magnitudes and colors, an analysis of the data has not been attempted. Some of the observations are shown graphically. These plots include the observations from both papers, I and II. Main-sequence stars later than B5 are omitted. The inhomogeneity of the observational material may introduce systematic effects.

Figure 1 shows the distribution of spectral types along the galactic plane. There is an apparent concentration of earlier types toward the galactic center and a minimum of Bn stars in that direction. In Figure 2 are plotted the stellar velocities corrected for the sun's motion among the near-by stars and for the $\cos^2 b$ term of galactic rotation. The

TABLE 3

NORMAL VELOCITIES*

STELLAR			K LINE		
l	Stars	Vel. (Km/Sec)	l	Stars	Vel. (Km/Sec)
310	9	−23	310	6	−16
327	12	0	328	11	+ 2
342	14	+16	342	13	+ 7
15	6	+19	17	7	+21
33	17	+22	36	18	+11
46	10	+ 4	46	10	+ 1
73	13	−29	74	14	−11
100	23	−31	100	25	−18
121	8	−13	122	9	−14
147	10	− 6	148	12	− 5
164	8	+ 2	166	12	− 1
195	12	+42	189	10	+20
212	3	+16	211	4	+15
234	7	− 1			

* The individual velocities are corrected for the sun's motion and for $\cos^2 b$.

153 velocities with probable errors less than 12 km/sec are shown. In forming the normal points, velocities with probable errors in classes A, B, and C are given weights 4, 3, and 2, respectively. Figure 3 is a similar plot for 153 K-line velocities from the two papers. A few stars with strong K lines are included for which only one spectrogram was obtained. The normal velocities are listed in Table 3.