THE ORBIT OF THE SPECTROSCOPIC BINARY H.D. 9312

By John F. Heard

THE star H.D. 9312, $\alpha(1900)\ 01^h\ 26^m.6$, $\delta(1900) +16°28'$, vis. mag. 6.81, type G5, was announced as a spectroscopic binary from 19 plates taken at this observatory in the course of a recent radial velocity program.[1] Since then 16 additional plates have been obtained. The orbit here presented has been determined from these 35 plates which are dated from September 18, 1935, to February 15, 1940. All the spectrograms have been taken with the 12-inch camera of the one-prism spectrograph, an arrangement giving a dispersion of about 66 A/mm. at Hγ.

The spectrum of H.D. 9312 is of average quality for G5 type. On our spectrograms upwards to 28 lines may be measured in the region 4005 to 4415. Some of these lines, however, notably 4045, 4101, 4143, 4254, 4260, have consistently large velocity residuals when the standard wave-lengths[1] are employed—an effect, no doubt, of blending. Accordingly, corrections were applied to the velocities of 11 lines for which the residuals were well marked. These corrections do not affect the velocities from well-exposed plates on which all the lines involved are measurable; they do appreciably affect the velocities from under-exposed plates.

Table I shows the preliminary elements derived by R. K. Young's graphical method and the final elements derived from a least-squares solution using 23 normal places. Reduction of Σpv^2 was from 787 to 702.

Table II shows the data for the individual plates. Considering the observations numbered serially, the following were grouped: 6, 7, 8; 9, 10; 11, 12; 23, 14; 15, 16; 18, 20; 26, 27, 28; 29, 30, 31; 33, 34. Weights were assigned according to numbers of plates.

TABLE I

		Preliminary	Final	
Period	$P =$	36.64 days	36.588 days	± .024
Eccentricity	$e =$	0.20	.203	± .031
Angle of periastron	$\omega =$	165°	178°.8	+8.3
Date of periastron	$T =$	J.D. 2428085.75	2428088.87	±1.24
Velocity of system	$\gamma =$	−2.9 km.	−3.49	±0.57
Semi-amplitude	$K =$	29.5 km.	29.97	±0.88
$a \sin i$	=		14,780,000 km.	
$\frac{m_1^3 \sin^3 i}{(m_1+m)^2}$	=		.0964⊙	

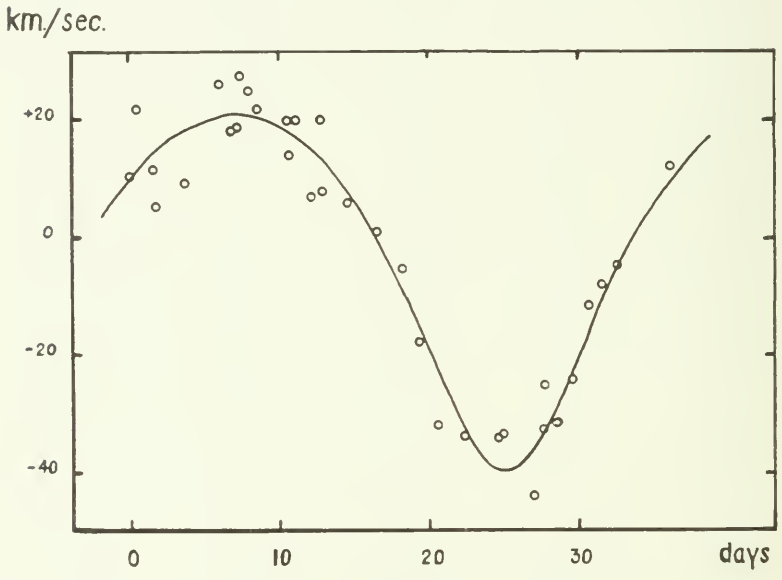
[1]Pub. D.D.O. vol. I, no. 3, 1939.

TABLE II

J.D. 242	Vo Km./sec.	Phase from final T	Vc Km./sec.	Vo−Vc Km./sec.
8063.788	+10.2	0	+10.1	+ .1
8771.828	+19.6	12.862	+13.0	+ 6.6
8786.804	−25.4	27.838	−32.7	+ 7.3
8806.782	+19.5	11.228	+16.6	+ 2.9
9130.902	+25.8	6.053	+20.2	+ 5.6
9197.668	+11.3	36.231	+ 8.7	+ 2.6
9199.673	+11.4	1.648	+14.4	− 3.0
9201.720	+ 9.0	3.695	+17.9	− 8.9
9205.684	+27.1	7.659	+20.4	+ 6.7
9206.701	+21.5	8.676	+20.0	+ 1.5
9208.603	+19.4	10.578	+17.7	+ 1.7
9208.782	+13.9	10.757	+17.6	− 3.7
9212.613	+ 5.6	14.588	+ 7.2	− 1.6
9214.592	+ 0.7	16.567	− 0.3	+ 1.0
9218.604	−32.1	20.579	−22.1	−10.0
9222.683	−34.2	24.658	−39.7	+ 5.5
9226.616	−31.9	28.591	−29.0	− 2.9
9247.519	+ 7.4	12.905	+13.0	− 5.6
9278.526	+18.4	7.324	+20.4	− 2.0
9283.476	+ 6.7	12.274	+14.3	− 7.6
9289.510	− 5.6	18.308	− 9.1	+ 3.5
9498.851	+24.7	8.119	+20.1	+ 4.6
9517.828	−44.2	27.096	−35.8	− 8.4
9527.817	+21.7	0.497	+11.6	+10.1
9570.694	+17.9	6.786	+20.4	− 2.5
9591.665	−32.9	27.757	−33.1	+ 0.2
9592.616	−31.8	28.708	−28.7	− 3.1
9593.601	−24.4	29.693	−23.2	− 1.2
9594.617	−12.0	30.709	−16.3	+ 4.3
9595.592	− 8.4	31.684	−10.4	+ 2.0
9596.558	− 5.3	32.650	− 5.6	+ 0.3
9625.517	−33.5	25.020	−39.5	+ 6.0
9656.510	−18.0	19.425	−15.2	− 2.8
9659.484	−33.9	22.399	−32.7	− 1.2
9675.497	+ 5.2	1.824	+14.9	− 9.7

Since, with our telescope and seeing conditions, it is hardly practicable to study spectroscopic binaries of this magnitude and fainter with higher dispersion than that used here, it is of some interest to notice the degree of accuracy which may, apparently, be expected. From the solution the probable error of a single obser-

vation comes out to be 3.2 km./sec. The larger part of this is to be regarded as arising from the difficulty of measuring the plates, since the average probable error of an observation as computed from inter-agreement of the lines is 1.7 km./sec. The remaining part must represent instrumental errors arising from such effects as focus, temperature, flexure. These, like the errors of measurement, will be expected to be greater with lower dispersion.



Radial Velocity Curve of H.D. 9312