

KG

11966  
u.246

*Calculations.*  
*Schaefer + others.*





























Comet 1905 b (Schaefer) = 1905 V.

Hademeyers' Elements in A. N. 170. 97.

$$\begin{array}{rcl}
 \checkmark & T = 1905, \text{ Oct. } 25.20124 & \text{Ber. in. J.} \\
 \checkmark & \omega = 132^\circ & 42' & 41.9'' \\
 \checkmark & \Omega = 222 & 56 & 3.1 \\
 \checkmark & i = 140 & 34 & 51.6 \\
 \checkmark & \log q = 0.022111 & & 
 \end{array}
 \left. \vphantom{\begin{array}{l} \omega \\ \Omega \\ i \end{array}} \right\} 1905.0$$

1905, Oct. 25.20124 = J. J. 2417144.20124



Comet 1905 b (Schaefer) = 1905 V.  
Computation of Log R and Log Δ.

5

(t - T)

Log do

" m

" Ab

Ab

V

$\frac{1}{2} V$

Log cos do

" sec "

" sec<sup>2</sup> "

" g

" R

" g

" g <sup>$\frac{3}{2}$</sup>

" C<sub>0</sub>

" m

Per. Apr. 7<sup>h</sup>

1905. Nov. 5. 57

2417155.57

1905. Oct. 21<sup>h</sup>

2417140.5

1905. Dec. 5<sup>h</sup>

2417125.5

+10.76276

+1.03217

+9.92696

+0.95913

+9.10120

+13° 46' 21"

+6 53 10.

+9.99626

+0.00314

+0.00622

+0.02211

+0.02239

-4.30124

+0.63359

+9.92696

+0.56055

-3.63542

-5° 32' 45"

-2 46 22.

+9.99949

+0.00051

+0.00102

+0.02211

+0.02313

+40.69276

+1.60950

+9.92696

+1.53654

+46 42 37.

+46 42 37.

+23 21 12.

+9.96227

+0.03713

+0.07426

+0.02211

+0.09637

+0.02211

+0.03317

+9.96013

+9.92696



6

Comet 6 1905 (Schaar) = 1905 V.

Computation of Log  $r$  and Log  $\Delta$  con.

	Per. M. J.	Per. M. J.	Per. M. J.	Per. M. J.
	1905. Nov. 20.5	1905. Nov. 25.5	1905. Oct. 21.5	1905. Dec. 5.5
	2417170.5	2417155.5	2417140.5	2417125.5
$v$	= +31° 30' 35"	+13° 46' 21"	-5° 32' 45"	+46° 42' 37"
$u = v + w$	= 164 13 17	146 29 3	127 9 57	179 25 19
Log $\tan u$	$\log 9.45112$	$\log 9.82105$	$\log 0.12027$	$\log 2.00326$
" $\cos i$	$\log 9.82792$	$\log 9.82792$	$\log 9.82792$	$\log 9.82792$
Sum logs	+9.33904	+9.70297	+0.00219	+7.29172
$l - R$	192 12 51	207 5 46	225 32 24	120 26 42
Log $\sin (l - R)$	$\log 9.32293$	$\log 9.65247$	$\log 9.25354$	$\log 7.29126$
" $\tan i$	$\log 9.91425$	$\log 9.91425$	$\log 9.91425$	$\log 9.91425$
Sum logs	+9.24372	+9.57332	+9.76239	+7.20671
$b$	+9 56 34	+20 31 31	+30 23 56	+0 22 2
$l$	55 14 54	70 1 49	22 22 27	43 22 51
Log $r$	+0.05539	+0.02239	+0.02313	+0.09637
" $\cos b$	+9.99343	+9.97151	+9.93572	+9.99999
" $\cos (l - 0)$	$\log 9.99951$	$\log 9.94956$	$\log 9.69107$	$\log 9.93443$
Sum logs	$\log 0.04233$	$\log 9.94946$	$\log 9.64992$	$\log 0.03479$
$2y$	-1.11772	-0.29014	-0.44666	-1.02340
$R$	+0.92762	+0.99100	+0.99492	+0.92512
$\Delta \cos \beta \cos (x - 0)$	-0.13004	+0.10026	+0.54232	-0.09222
Log $\Delta$	$\log 9.11402$	+9.00372	+9.73904	$\log 2.99220$
" $r$	+0.05539	+0.02239	+0.02313	+0.09637
" $\cos b$	+9.99343	+9.97151	+9.93572	+9.99999
" $\sin (l - 0)$	+2.67742	$\log 9.65230$	$\log 9.94010$	+9.69623
$\Delta \cos \beta \sin (x - 0)$	+2.72630	$\log 9.65220$	$\log 9.29901$	+9.79259
$\tan (x - 0)$	$\log 9.61222$	$\log 0.65442$	$\log 0.15997$	$\log 0.20039$
$l - 0$	177° 16' 21"	207° 5' 4"	240° 35' 41"	150° 12' 27"
$\Delta$	237° 52' 33"	222° 56' 45"	207° 52' 46"	253° 10' 24"
Log $R$	+9.99462	+9.99607	+9.99721	+9.99351
$R$	+0.92762	+0.99100	+0.99492	+0.92512



Const to 1905 (Schaefer) = 1905.V.  
 Computation of  $\log R$  and  $\log A$  con.

	Per. M. S. 1905. Nov. 20.5	Per. M. S. 1905. Nov. 5.5	Per. M. S. 1905. Oct. 21.5	Per. M. S. 1905. Dec. 5.5
	241 7170.5	241 7155.5	241 7140.5	241 7125.5
$\log \sin(A-0)$	+9.61222	+9.65442	+9.15997	+9.20039
$A-0$	157 43 57	202° 29' 36"	235 19' 12"	92 59 53
$\log \sin(A-0)$	+9.57256	+9.92959	+9.91506	+9.99462
$\log \Delta \cos \beta$	+9.14774	+9.66261	+9.92395	+9.79797
$\log R$	+0.05539	+0.02239	+0.02313	+0.09637
$\log \sin \delta$	+9.23720	+9.54424	+9.70416	+7.20620
$\log \Delta \sin \beta$	+9.29259	+9.57323	+9.72729	+7.90317
$\log \sin \beta$	+0.14425	+9.90462	+9.74334	+2.10520
$\beta$	+54 22 52	+32° 45' 30"	+20 52 37	+0 43 42
$\log \sin \beta$	+9.91005	+9.79660	+9.62526	+2.10519
$\log \Delta$	+9.32254	+9.77663	+0.04203	+9.79792
$\Delta$	0.2413	0.5979	1.1016	+0.6220





# Comet 6190r (Schaer) = 190r V. Computation of Log r and Log A con.

	190r. Dec. 20r	190r. Nov. 17r	190r. Nov. 23r	190r. Nov. 12r
	2417200r	2417167r	2417173r	2417162r
$(t - T)$	+55.69276	+22.69276	+22.69276	+17.69276
Log do	+1.74520	+1.35601	+1.45726	+1.24794
" m	+9.92696	+9.92696	+9.92696	+9.92696
" No	+1.67221	+1.22297	+1.32422	+1.17490
" v	+59° 6' 2"	+22° 7' 59"	+34° 46' 43"	+22° 16' 44"
" ± v	+29 33 4	+14 3 59	+17 23 22	+11 4 22
Log cos do.	+9.93942	+9.92674	+9.97969	+9.99174
" sec do.	+0.06052	+0.01322	+0.02031	+0.00226
" sec <sup>2</sup> ..	+0.12104	+0.02644	+0.04062	+0.01652
" q	+0.02211	+0.02211	+0.02211	+0.02211
" r	+0.14315	+0.04255	+0.06273	+0.03263



Comet 1905 (Schaer) = 1905 V.  
 Computation of Log  $r$  and Log  $\Delta$  con.

	1905, Dec. 20.	1905, Nov. 17.	1905, Nov. 23.	1905, Nov. 12.
$v$	2417200.	2417167.	2417173.	2417162.
$u = v + w$	+59° 6' 2."	+22 7 59.	+34 46 43.	+22 16 44.
Log $\tan u$	191 42 50.	160 50 41.	167 29 25.	154 59 26.
" $\cos i$	+9.32042	+9.54072	+9.34610	+9.66226
Sum logs	+9.22792	+9.22792	+9.22792	+9.22792
$L - A$	170 49 17.	195 1 17.	129 43 32.	199 49 2.
Log $\sin(L - A)$	+9.20220	+9.41360	+9.22770	+9.53026
" $\tan i$	+9.91425	+9.91425	+9.91425	+9.91425
Sum logs	+9.11765	+9.32245	+9.14255	+9.44511
$b$	-7 22 11.	+12 1 34.	+7 54 10.	+15 34 20.
$L$	33 45 20.	57 57 20.	52 39 35.	62 45 11.
Log $r$	+0.14315	+0.04255	+0.06273	+0.03263
" $\cos b$	+9.99630	+9.99036	+9.99525	+9.92376
" $\cos(L - 0)$	+9.76214	+9.99940	+9.99537	+9.92299
Sum logs	+9.90159	+0.03231	+0.05395	+0.01132
$2y$	-0.79724	-1.09222	-1.13226	-1.02655
$R$	+0.92362	+0.92222	+0.92714	+0.92935
$\Delta \cos \beta \cos(A - 0)$	+0.12644	-0.10394	-0.14512	-0.03720
Log $\Delta$	+9.27054	+9.01672	+9.16173	+2.57054
" $r$	+0.14315	+0.04255	+0.06273	+0.03263
" $\cos b$	+9.99630	+9.99036	+9.99525	+9.92376
" $\sin(L - 0)$	+9.91160	+2.72000	+9.16199	+9.34693
$\Delta \cos \beta \sin(A - 0)$	+0.05105	+2.75291	+9.22057	+9.36932
Log $\tan(A - 0)$	+0.72051	+9.74213	+0.05224	+0.79272
$0$	262 25 35.	234 56 50.	241 0 32.	229 54 33.
$L - 0$	125 19 45.	123 0 30.	171 39 3.	192 50 32.
Log $R$	+9.99225	+9.99422	+9.99432	+9.99535
$R$	+0.92362	+0.92222	+0.92714	+0.92935



Comet 1905 (Schae) = 1905-VI.  
 Computation of Log  $\mu$  and Log  $\Delta$  con.

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	1905. Dec. 20.5 2417200.5	1905. Nov. 17.5 2417167.5	1905. Nov. 23.5 2417173.5	1905. Nov. 12.5 2417162.5
Log tan ( $\lambda - \odot$ )	+0.72051	+9.74213	+0.05224	+0.79272
$\lambda - \odot$	20 35 17	202 54 34	131 7 50	260 52 9
Log sin ( $\lambda - \odot$ )	+9.99412	+9.62433	+9.27692	+9.99452
$\Delta \cos \beta$	+0.05693	+9.07452	+9.34365	+9.37474
" $\mu$	+0.14315	+0.04255	+0.06273	+0.03263
" sin $b$	+9.11395	+9.31221	+9.13240	+9.42227
$\Delta \sin \beta$	+9.25710	+9.36736	+9.20113	+9.46750
" tan $\beta$	+9.20017	+0.29272	+9.25742	+0.09276
$\beta$	-9 0 34	+62 59 50	+35 45 47	+51 4 23
" sin $\beta$	+9.19472	+9.94947	+9.76673	+9.29095
" $\Delta$	+0.06232	+9.41749	+9.43440	+9.57655
$\Delta$	1.1543	0.2615	+0.2719	+0.3772





Comet b. 1905 (Schaer) = 1905.V.  
Computation of Log  $\kappa$  and Log  $\Delta$ .

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1905. Nov. 24<sup>r</sup>  
 2417174<sup>r</sup>

$t - T$	+33.69476 <sup>r</sup>
Log do.	+1.52761 <sup>r</sup>
" $m$	+9.92696 <sup>r</sup>
" $M$	+1.45457 <sup>r</sup>
$M$	
$v$	+39 50 29 <sup>r</sup>
$\frac{1}{2} v$	+19 59 14 <sup>r</sup>
Log cos do.	+9.97302 <sup>r</sup>
" sec do.	+0.02692 <sup>r</sup>
" sec <sup>2</sup> do.	+0.05396 <sup>r</sup>
" $q$	+0.02211 <sup>r</sup>
" $\kappa$	+0.07607 <sup>r</sup>

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Comet b 1905 (Schaer) = 1905 V.  
 Computation of Log  $r$  and Log.  $\Delta$  con.

	1905. Nov. 20.5	.....		
	241717.5			
$v$	+39 52 29.			
$u = v + w$	172 41 11.			
" $\tan u$	" 9.10232			
" $\cos i$	" 9.22792			
Sum logs	+2.99630			
$l - R$	125 39 45.			
Log sin ( $l - R$ )	" 2.99412			
" $\tan i$	" 9.91425			
Sum logs	+2.90903			
$b$	+4 32 12			
$l$	42 35 42.			
Log $r$	+0.07607			
" $\cos b$	+9.99252			
" $\cos (l - 0)$	" 9.97942			
Sum logs.	" 0.05413			
Log.	-1.13274			
$R$ .	+0.92626			
$\Delta \cos \beta \cos (r - 0)$	-0.14642			
Log do.	" 9.16572			
Log $r$	+0.07607			
" $\cos b$	+9.99252			
" $\sin (l - 0)$	+9.47756			
Log $\Delta \cos \beta \sin (r - 0)$	+9.55221			
" $\tan (r - 0)$	" 0.32643			
$0$	246 4 21.			
$l - 0$	162 31 27.			
Log $R$	+9.99399			
$R$	+0.92626			



Comet b 1905 (Schaar) = 1905.VI.  
 Computation of Log  $r$  and Log  $\Delta$  con.

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	1905. Nov. 22 <sup>h</sup>
	2417172.5
Log $\tan(\lambda - 0)$	+0.32643
$\lambda - 0$	112 19 42.
Log $\sin(\lambda - 0)$	+9.96615
" $\Delta \cos \beta$	+9.52606
" $r$	+0.07607
" $\sin b$	+2.90761
" $\Delta \sin \beta$	+2.92362
" $\tan \beta$	+9.39762
$\beta$	+14 1 34.
" $\sin \beta$	+9.32447
" $\Delta$	+9.59921
$\Delta$	+0.3974













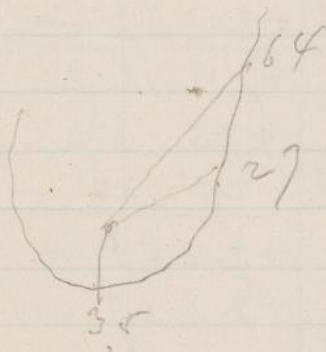
Comet a 1910.  
 Calculations from Kobold's Orbit given  
 in H. C. O. Circular <sup>Bulletin</sup> 323.

Kobold's Elements.

$$\begin{aligned}
 T &= 1910. \text{ Jan. } 17.32^{\text{d}} & v &= 2629.32^{\text{d}} \\
 \omega &= 263^{\circ} 06' & v & \\
 \Omega &= 2^{\circ} 56' & v & \\
 i &= 62^{\circ} 16' & v & \\
 q &= 0.041 & v & \\
 \log q &= 2.61272 & v &
 \end{aligned}$$

$t - T$	<u>5.12</u>	<u>17.12</u>
$\log C_0 = +9.96013^{\text{v}}$		
" $q^{\frac{3}{2}} = +7.91917^{\text{v}}$		
" $m = 2.04096^{\text{v}}$		$+2.04096^{\text{v}}$
" $(t - T) = 0.70927^{\text{v}}$		$+1.23350^{\text{v}}$
" $M_0 = 2.75023^{\text{v}}$		$+3.27446^{\text{v}}$
$v = 135^{\circ} 56'$		$151^{\circ} 50'$
$\frac{1}{2} v = 67^{\circ} 52'$		$75^{\circ} 55'$
$\log \sec \frac{1}{2} v = +0.42520^{\text{v}}$		$+0.61320^{\text{v}}$
" $\sec^2 \frac{1}{2} v = +0.25160^{\text{v}}$		$+1.22760^{\text{v}}$
" $q = 2.61272^{\text{v}}$		$+2.61272^{\text{v}}$
" $r = +9.46432^{\text{v}}$		$+9.24032^{\text{v}}$
" $q^2.9 = +1.96202^{\text{v}}$		$+1.96202^{\text{v}}$
27.1 mil. = $1.43240^{\text{v}}$		$+1.20240^{\text{v}}$
27.1 mil.		64.3 mil.





Comet  $\alpha$  1910.

Calculations from Kobold's Orbit given in  
 H. C. O. Circular <sup>Bulletin</sup> 343.

	1910. Jan. 17.32	1910. Jan. 22.5	1910. Feb. 3.5
$v$	$0^{\circ} 0'$	$135^{\circ} 56'$	$151^{\circ} 50'$
$u = v + w$	$263^{\circ} 6'$	$39^{\circ} 2'$	$54^{\circ} 56'$
$\log \tan u$	$+0.91717$	$+9.90229$	$+0.15370$
" $\cos i$	$+9.66779$	$+9.66779$	$+9.66779$
Sum logs	$+0.58496$	$+9.57668$	$+9.82149$
$l - A$	$255^{\circ} 25'$	$20^{\circ} 40'$	$33^{\circ} 33'$
$\log \sin(l - A)$	$+9.92572$	$+9.54769$	$+9.74246$
" $\tan i$	$+0.27922$	$+0.27922$	$+0.27922$
Sum logs	$+0.26500$	$+9.82691$	$+0.02168$
$b$	$-61^{\circ} 29'$	$+33^{\circ} 52'$	$+46^{\circ} 26'$
$l$	$264^{\circ} 21'$	$29^{\circ} 36'$	$42^{\circ} 29'$
$\log R$	$+2.61272$	$+9.46432$	$+9.24032$
" $\cos b$	$+9.67290$	$+9.91925$	$+9.23234$
" $\cos(l - 0)$	$+9.92530$	$+2.63672$	$+2.49304$
Sum logs	$+2.21692$	$+2.02041$	$+2.17176$
$2\log R$	$+0.01642$	$+0.01042$	$+0.01425$
$R$	$+0.92322$	$+0.92422$	$+0.92590$
$\Delta \cos \beta \cos(l - 0)$	$+1.00036$	$+0.99476$	$+1.00075$
$\log \Delta \cos \beta$	$+0.00015$	$+9.99772$	$+0.$
$\log R$	$+2.61272$	$+9.46432$	$+9.24032$
" $\cos b$	$+9.67290$	$+9.91925$	$+9.23234$
" $\sin(l - 0)$	$+9.73200$	$+9.99959$	$+9.99979$
" $\Delta \cos \beta \sin(l - 0)$	$+2.02362$	$+9.32322$	$+9.67251$
" $\tan(l - 0)$	$+2.02353$	$+9.32550$	
$0$			
$l - 0$	$+327^{\circ} 21'$	$+27^{\circ} 31'$	$+22^{\circ} 13'$
$\log R$			
$R$			
$(l - 0)$	$+327^{\circ} 21'$	$+27^{\circ} 31'$	$+22^{\circ} 13'$



1910. Feb. 3. v

St. Louis

Con. on p. 34,

Comet a 1910.  
Calculations from Kobold's Orbit given in  
H. C. O. Circular <sup>Bulletin</sup> No. 3 A3.

-48.88 Nov. 29<sup>v</sup> -38.88 Dec. 9<sup>v</sup> -28.88 Dec. 19<sup>v</sup>

$t - T$	-48.88	-38.88	-28.88
$\log m$	+2.04096 <sup>v</sup>	+2.04096 <sup>v</sup>	+2.04096 <sup>v</sup>
" $(t - T)$	$\approx 1.62913$ <sup>v</sup>	$\approx 1.52973$ <sup>v</sup>	$\approx 1.46060$ <sup>v</sup>
" $Ab$	$\approx 3.73009$ <sup>v</sup>	$\approx 3.63069$ <sup>v</sup>	$\approx 3.50156$ <sup>v</sup>
" $r$	-160° 31' <sup>v</sup>	-152° 54' <sup>v</sup>	-156° 35' <sup>v</sup>
" $\frac{1}{2}r$	-80 16 <sup>v</sup>	-79 27 <sup>v</sup>	-78 12 <sup>v</sup>
$\log \sec \frac{1}{2}r$	+0.77195 <sup>v</sup>	+0.73733 <sup>v</sup>	+0.69296 <sup>v</sup>
" $\sec^2 \frac{1}{2}r$	+1.54390 <sup>v</sup>	+1.47466 <sup>v</sup>	+1.32592 <sup>v</sup>
" $q$	+2.61272 <sup>v</sup>	+2.61272 <sup>v</sup>	+2.61272 <sup>v</sup>
" $r$	+0.15662 <sup>v</sup>	+0.02744 <sup>v</sup>	+9.99270 <sup>v</sup>



-12.22 Dec. 29<sup>v</sup> -12.22 Jan 2<sup>v</sup>

-12.22	-12.22
+2.04096 <sup>v</sup>	+2.04096 <sup>v</sup>
w1.27600 <sup>v</sup>	w0.94241 <sup>v</sup>
w3.31696 <sup>v</sup>	w2.92937 <sup>v</sup>
-152° 47' <sup>v</sup>	-144° 13' <sup>v</sup>
-76 24 <sup>v</sup>	-72 6 <sup>v</sup>
+0.62267 <sup>v</sup>	+0.51236 <sup>v</sup>
+1.25734 <sup>v</sup>	+1.02472 <sup>v</sup>
+2.61272 <sup>v</sup>	+2.61272 <sup>v</sup>
+9.27012 <sup>v</sup>	+9.63750 <sup>v</sup>

Comet a 1910.

Calculations from Kobold's Orbit given  
in H.C.O. Circular <sup>Bulletin</sup> No. 323.

	-48.22 Jan. 29.5	-32.22 Dec. 9.5	-22.22 Dec. 19.5
$v$	$-160^{\circ} 31'$	$-152^{\circ} 54'$	$-156^{\circ} 35'$
$u = v + w$	$+102 35$	$+104 12$	$+106 31$
$\log \tan u$	$\sim 0.65126$	$\sim 0.59621$	$\sim 0.52793$
$\log \cos i$	$+9.66779$	$+9.66779$	$+9.66779$
Sum logs	$\sim 0.31905$	$\sim 0.26460$	$\sim 0.19572$
$l - R$	$115^{\circ} 32'$	$112^{\circ} 32'$	$122^{\circ} 30'$
$\log \sin (l - R)$	$+9.95500$	$+9.94376$	$+9.92603$
$\log \tan i$	$+0.27922$	$+0.27922$	$+0.27922$
Sum logs	$+0.23422$	$+0.22292$	$+0.20525$
$b$	$+59^{\circ} 45'$	$+59^{\circ} 6'$	$+52^{\circ} 4'$
$l$	$124 34$	$127 22$	$131 26$
$\log R$	$+0.15662$	$+0.02744$	$+9.99270$
$\log \cos b$	$+9.70224$	$+9.71052$	$+9.72340$
$\log \cos (l - O)$	$\sim 9.73061$	$\sim 9.20625$	$\sim 9.25706$
Sum logs	$\sim 9.52953$	$\sim 9.60427$	$\sim 9.57916$
$2y$	$-0.32263$	$-0.40204$	$-0.37945$
$R$	$+0.92605$	$+0.92470$	$+0.92374$
$\Delta \cos (\beta \cos (i - O))$	$+0.59742$	$+0.52266$	$+0.60429$
$\log \Delta \cos$	$+9.77622$	$+9.76542$	$+9.72124$
$\log R$	$+0.15662$	$+0.02744$	$+9.99270$
$\log \cos b$	$+9.70224$	$+9.71052$	$+9.72340$
$\log \sin (l - O)$	$\sim 9.92527$	$\sim 9.22552$	$\sim 9.24164$
$\Delta \cos \beta \sin (i - O)$	$\sim 9.72479$	$\sim 9.62354$	$\sim 9.56374$
$\log \tan (i - O)$	$\sim 0.00251$	$\sim 9.91212$	$\sim 9.72250$
$O$	$247 6$	$257 16$	$267 27$
$l - O$	$237 22$	$230 12$	$223 59$
$\log R$	$+9.99390$	$+9.99330$	$+9.99222$
$R$	$+0.92605$	$+0.92470$	$+0.92374$



<sup>d</sup> -12.22 Dec. 29 <sup>✓</sup>	<sup>d</sup> -12.22 Jan. 8 <sup>✓</sup> <sup>1910</sup>
-152° 47' ✓	-144° 13' ✓
+110 19 ✓	+112 53 ✓
w 0.43151 ✓	w 0.25234 ✓
+9.66779 ✓	+9.66779 ✓
w 0.09930 ✓	w 9.92613 ✓
122° 31' ✓	139 51 ✓
+9.29344 ✓	+9.20942 ✓
+0.27922 ✓	+0.27922 ✓
+0.17266 ✓	+0.02264 ✓
+56° 6' ✓	+50° 42' ✓
137 27 ✓	142 47 ✓
+9.27012 ✓	+9.63750 ✓
+9.74644 ✓	+9.20074 ✓
w 9.22542 ✓	w 9.27211 ✓
w 9.50192 ✓	w 9.31635 ✓
-0.31767 ✓	-0.20712 ✓
+0.92322 ✓	+0.92340 ✓
+0.66561 ✓	+0.77622 ✓
+9.22322 ✓	+9.22992 ✓
+9.27012 ✓	+9.63750 ✓
+9.74644 ✓	+9.20074 ✓
w 9.20641 ✓	w 9.21651 ✓
w 9.42297 ✓	w 9.25475 ✓
w 9.59975 ✓	w 9.36477 ✓
277 32 ✓	227° 50' ✓
219 49 ✓	220 57 ✓
9.99262 ✓	+9.99273 ✓
+0.92322 ✓	+0.92340 ✓

Comet a 1910.

Calculations from Kobold's Orbit given  
in H. C. O. Circular, No. 3 A3.

	(1909) Nov. 29.5	Dec. 9.5	Dec. 19.5
$\log \tan (\lambda - \phi)$	$\sim 0.00251$	$\sim 9.91412$	$\sim 9.74250$
$(\lambda - \phi)$	314 26	320 22	322 47
$\log \sin (\lambda - \phi)$	$\sim 9.25374$	$\sim 9.20473$	$\sim 9.71456$
" $\Delta \cos \beta$	$+9.93105$	$+9.87221$	$+9.84912$
" $\Delta$	$+0.15662$	$+0.02744$	$+9.99270$
" $\sin \delta$	$+9.93643$	$+9.93352$	$+9.92274$
" $\Delta \sin \beta$	$+0.09311$	$+0.02096$	$+9.92744$
" $\tan \beta$	$+0.16206$	$+0.14215$	$+0.07426$
$\beta$	$+55 27$	$+54 13$	$+50 2$
" $\sin \beta$	$+9.91573$	$+9.90915$	$+9.82510$
" $\Delta$	$+0.17732$	$+0.11121$	$+0.04234$
" $92.9$	$+1.96202$	$+1.96202$	$+1.96202$
" $\Delta$ (miles)	$+2.14540$	$+2.07923$	$+2.01036$
$\Delta$ (miles)	$+139.2 \text{ mil.}$	$+120.2$	$+102.4$
$\phi$	247 6	257 16	267 27
$\lambda - \phi$	314 26	320 22	322 47
$\lambda$	201 32	217 32	236 14



Dec. 29.5

Jan. 2.5 (1912)

$$\begin{array}{r} \sim 9.5997 \checkmark \\ 332 \quad 12 \checkmark \end{array}$$

$$\begin{array}{r} \sim 9.36477 \checkmark \\ 346 \quad 52 \checkmark \end{array}$$

$$\begin{array}{r} \sim 9.56790 \checkmark \\ +9.25507 \checkmark \end{array}$$

$$\begin{array}{r} \sim 9.35312 \checkmark \\ +9.90157 \checkmark \end{array}$$

$$\begin{array}{r} +9.27012 \checkmark \\ +9.91902 \checkmark \end{array}$$

$$\begin{array}{r} +9.63750 \checkmark \\ +9.22927 \checkmark \end{array}$$

$$\begin{array}{r} +9.72920 \checkmark \\ +9.93413 \checkmark \end{array}$$

$$\begin{array}{r} +9.52677 \checkmark \\ +9.62520 \checkmark \end{array}$$

$$\begin{array}{r} +40 \quad 40 \checkmark \\ +9.21402 \checkmark \end{array}$$

$$\begin{array}{r} +22 \quad 52 \checkmark \\ +9.52949 \checkmark \end{array}$$

$$\begin{array}{r} +9.97512 \checkmark \\ +1.96202 \checkmark \end{array}$$

$$\begin{array}{r} +9.93722 \checkmark \\ +1.96202 \checkmark \end{array}$$

$$\begin{array}{r} +1.94320 \checkmark \\ +27.7 \checkmark \end{array}$$

$$\begin{array}{r} +1.90530 \checkmark \\ +20.4 \checkmark \end{array}$$

$$\begin{array}{r} 277 \quad 32 \checkmark \\ 332 \quad 12 \checkmark \end{array}$$

$$\begin{array}{r} 227 \quad 50 \checkmark \\ 346 \quad 52 \checkmark \end{array}$$

$$\begin{array}{r} 255 \quad 56 \checkmark \end{array}$$

$$\begin{array}{r} 274 \quad 42 \checkmark \end{array}$$

Comet. = 1910.

Calculations from Kobold's Orbit given  
in H. C. O. Circular 343.

	Nov. 29 <sup>th</sup>	Dec. 9 <sup>th</sup>	Dec. 19 <sup>th</sup>
$\beta$	+55 27	+54 13	+50 12
$\lambda$	201 32	217 34	236 14
$\log \tan \beta$	+0.16205	+0.14220	+0.07224
" $\sin \lambda$	$\sim 9.56472$	$\sim 9.72576$	$\sim 9.91976$
" $\tan \lambda$	$\sim 0.59733$	$\sim 0.35644$	$\sim 0.15242$
$\lambda$	-75 49	-66 15	-55 14
$\epsilon$	+23 27	+23 27	+23 27
$\lambda + \epsilon$	-52 22	-42 42	-31 47
$\log \cos(\lambda + \epsilon)$	+9.72576	+9.26554	+9.92944
" $\tan \lambda$	+9.59614	+9.22707	+0.17423
$\sin$	+9.32190	+9.75261	+0.10427
" $\cos \lambda$	+9.32921	+9.60503	+9.75605
" $\tan \lambda$	+9.99269	+0.14752	+0.34222
$\lambda$	224 31	234 33	245 51
" $\tan(\lambda + \epsilon)$	$\sim 0.11293$	$\sim 9.96662$	$\sim 9.79213$
" $\sin \lambda$	$\sim 9.24579$	$\sim 9.91096$	$\sim 9.96022$
" $\tan \lambda$	+9.95272	+9.27752	+9.75235
$\lambda$	+42 17	+37 2	+29 29
" $\cos(\lambda + \epsilon)$	+9.72576	+9.26554	+9.92944
" $\cos \lambda$	+9.32921	+9.60503	+9.75605
" Fraction	+0.39655	+0.26051	+0.17339
" $\cos \lambda$	+9.26913	+9.90216	+9.93977
" $\sin \lambda$	$\sim 9.24579$	$\sim 9.91096$	$\sim 9.96022$
" Numerator	$\sim 9.71492$	$\sim 9.21312$	$\sim 9.29999$
" $\cos \beta$	+9.75362	+9.76695	+9.20626
" $\sin \lambda$	$\sim 9.56472$	$\sim 9.72576$	$\sim 9.91976$
" Denom.	$\sim 9.31240$	$\sim 9.55271$	$\sim 9.72662$
" Check.	+0.39652	+0.26041	+0.17337
$\lambda$	14 52 41	15 32 12	16 23 24



Comet a 1910.

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Dec. 29 <sup>r</sup>	Jan. 2 <sup>r</sup> (1910)
+40 40 <sup>r</sup>	+22 52 <sup>r</sup>
255 56 <sup>r</sup>	274 40 <sup>r</sup>
+9.93406 <sup>r</sup>	+9.62504 <sup>r</sup>
~9.92672 <sup>r</sup>	~9.99247 <sup>r</sup>
~9.94722 <sup>r</sup>	~9.62657 <sup>r</sup>
-41 32 <sup>r</sup>	-22 56 <sup>r</sup>
+23 27 <sup>r</sup>	+23 27 <sup>r</sup>
-12 5 <sup>r</sup>	+0 31 <sup>r</sup>
+9.97200 <sup>r</sup>	+9.99992 <sup>r</sup>
+0.60102 <sup>r</sup>	~1.07526 <sup>r</sup>
+0.57902 <sup>r</sup>	~1.07524 <sup>r</sup>
+9.27423 <sup>r</sup>	+9.96424 <sup>r</sup>
+0.70425 <sup>r</sup>	~1.11160 <sup>r</sup>
252 50 <sup>r</sup>	274 25 <sup>r</sup>
~9.51392 <sup>r</sup>	+7.95510 <sup>r</sup>
~9.99170 <sup>r</sup>	~9.99271 <sup>r</sup>
+9.50562 <sup>r</sup>	~7.95321 <sup>r</sup>
+17 46 <sup>r</sup>	-0 31 <sup>r</sup>
+9.97200 <sup>r</sup>	+9.99992 <sup>r</sup>
+9.27423 <sup>r</sup>	+9.96424 <sup>r</sup>
+0.10377 <sup>r</sup>	+0.03574 <sup>r</sup>
+9.97272 <sup>r</sup>	+9.99992 <sup>r</sup>
~9.99170 <sup>r</sup>	~9.99271 <sup>r</sup>
~9.97042 <sup>r</sup>	~9.99269 <sup>r</sup>
+9.27996 <sup>r</sup>	+9.96445 <sup>r</sup>
~9.92672 <sup>r</sup>	~9.99247 <sup>r</sup>
~9.26674 <sup>r</sup>	~9.96292 <sup>r</sup>
+0.10374 <sup>r</sup>	+0.03577 <sup>r</sup>
17 15 20.	12 17 40.







Const  $a$  1910.  
 Calculations from Kobold's Orbit given in  
 H. C. O. Circular 323.

	Mar. 1. 1910. 2732.5	Apr. 1. 1910 2763.5	Jan. 29. 1910 2701.5
$t - T$	+43.12	+74.12	+12.12
$\log C_0$			
" $q^{\frac{3}{2}}$			
" $m$	+2.04096	+2.04096	+2.04096
" $(t - T)$	+1.63464	+1.26994	+1.02350
" $Ab$	+3.67564	+3.91090	+3.12446
" $v$	+159 39	+163 7	142
" $\frac{1}{2}v$	+79 49	+81 34	74 2
$\log \sec \frac{1}{2}v$	+0.75252	+0.23369	0.56054
" $\sec^2 \frac{1}{2}v$	+1.50504	+1.66732	1.12102
" $q$	+2.61272	+2.61272	+2.61272
" $n$	+0.11722	+0.22016	+9.73326
" $q2.9$	+1.96202	+1.96202	+1.96202
$\log R$ (miles)	+2.02524	+2.24212	+1.70122
" $R$ (" )	121.9 mil. m.	177.1 mil. m.	50.3 mil. m.





Comet  $\alpha$  1910.  
 Calculations from Kobold's Orbit given in  
 N.C.O. Bulletin 323.

	Mar. 1. 1910.	Apr. 1. 1910.
	2732.5	2763.5
$v$	$+159^{\circ} 39'$	$+163^{\circ} 7'$
$u = v + w$	$+62^{\circ} 45'$	$+66^{\circ} 13'$
$\log \tan u$	$+0.22216$	$+0.35525$
$u \cos i$	$+9.66779$	$+9.66779$
Sum logs.	$+9.95595$	$+0.02364$
$l - \delta$	$+42^{\circ} 6'$	$+46^{\circ} 34'$
$\log \sin (l - \delta)$	$+9.22635$	$+9.26104$
$u \tan i$	$+0.27922$	$+0.27922$
Sum logs	$+0.10557$	$+0.14026$
$b$	$+51^{\circ} 54'$	$+54^{\circ} 6'$
$l$	$+51^{\circ} 2'$	$+55^{\circ} 30'$
$\log r$	$+0.11722$	$+0.22016$
$u \cos b$	$+9.79031$	$+9.76217$
$u \cos (l - \odot)$		
Sum logs.		
$2y$		
$R$		
$\Delta \cos \beta \cos (\lambda - \odot)$		
$\log do$		
$\log r$		
$u \cos b$		
$u \sin (l - \odot)$		
$\Delta \cos \beta \sin (\lambda - \odot)$		
$u \tan (\lambda - \odot)$		
$\odot$		
$l - \odot$		
$\log R$		
$R$		





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Comet a 1910.  
 Calculations from Kobold's Orbit given in  
 H. C. O. Circular <sup>Buffeting</sup> 323.

Mar. 1. 1910. Apr. 1. 1910.  
 2732.5 2763.5

$\text{Log tan}(x - \odot)$

$x - \odot$

$\text{Log sin}(x - \odot)$

"  $\Delta \cos \beta$

"  $\Delta$

"  $\sin b$

"  $\Delta \sin \beta$

"  $\tan \beta$

$\beta$

"  $\sin \beta$

"  $\Delta$

" 92.9

"  $\Delta$  (miles)

$\Delta$  (miles)



































$t - I$  —

$\log m$

"  $(t - I)$

"  $M_0$  —

$v$

$\frac{1}{2} v$

$\log \text{rec. } \frac{1}{2} v$  —

"  $\text{rec. } \frac{1}{2} v$

"  $g$  —

"  $h$





v

$$u = v + w$$

Log tan  $i$ " cos  $i$ 

Semi logs

 $l - R$ Log sin  $(l - R)$ " tan  $i$ 

Semi logs

 $h$  $l$ Log  $r$ " cos  $b$ " cos  $(l - \odot)$ 

Semi logs

2 $\log$  $R$  $\Delta \cos \beta \cos(l - \odot)$ Log  $d_0$ Log  $r$ " cos  $b$ " sin  $(l - \odot)$ "  $\Delta \cos \beta \sin(l - \odot)$ " tan  $l - \odot$  $\odot$  $\lambda$





$\log_{10} (\lambda - \theta)$  -  
 "  $\Delta \cos \beta$  -  
 "  $\sin$  -  
 "  $\sin b$  -  
 "  $\Delta \sin \beta$  -  
 "  $\tan \beta$  -  
 $\beta$  -  
 "  $\sin \beta$  -  
 "  $\Delta$  -  
 "  $g_{2.9}$  -  
 "  $\Delta$  (miles) -  
 $\Delta$  miles -





$\beta$   
 $\lambda$   
 $\log \tan \beta$   
 $\cos \lambda$   
 $\tan \lambda$   
 $\lambda$   
 $\varepsilon$   
 $\lambda + \varepsilon$   
 $\log \cos (\lambda + \varepsilon)$   
 $\tan \lambda$   
 $\sin$   
 $\cos \lambda$   
 $\tan \lambda$   
 $\lambda (\text{over})$   
 $\tan (\lambda + \varepsilon)$   
 $\sin \lambda$   
 $\tan \lambda$   
 $\lambda$   
 $\cos (\lambda + \varepsilon)$   
 $\cos \lambda$   
 $\text{Fraction}$   
 $\cos \lambda$   
 $\sin \lambda$   
 $\text{Numerator}$   
 $\cos \beta$   
 $\sin \lambda$   
 $\text{Denom.}$   
 $\text{Check}$   
 $\text{Time}$











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Brooks' Comet = 1911 c.

Calculation of Ephemeris from Parabolic Elements given in  
 A. N. 149, 455. Wilcox's coordinates used.

### Elements:

$$\begin{aligned}
 T &= 1911, \text{ Oct. } 27.7189 \text{ Berlin} \\
 \omega &= 152^\circ 50' 32.4'' \\
 \log q &= 9.64954
 \end{aligned}
 \left. \begin{aligned}
 N &= 293 \quad 6 \quad 14.9 \\
 i &= 33 \quad 56 \quad 44.5
 \end{aligned} \right\} 1911.0$$

$$\begin{aligned}
 x &= [9.93350] r \sin(\nu + 120^\circ 3' 34.6'') \\
 y &= [9.92802] r \sin(\nu + 62^\circ 1' 6.0'') \\
 z &= [9.86457] r \sin(\nu + 123^\circ 2' 50.7'')
 \end{aligned}
 \quad 1911.0$$





Brooks Comet = 1911 c.

	Per. I.	Per. II	Per. I.	Per. I.
	1912 Feb. 18	1912, Feb. 11	1912, Feb. 21	1912 Mar. 2
	9434.5	9444.5	9454.5	9464.5
t - I	96.78	106.78	116.78	126.78
log m	0.42576	0.42576	0.42576	0.42576
" (t - I)	1.92579	2.02849	2.06737	2.10305
" ab	2.41155	2.45425	2.49313	2.52421
" v	119° 49' 22"	122° 12' 42"	124° 57' 13"	126° 6' 42"
" $\frac{1}{2}$ v	59 54 41	61 6 21	62 8 36	63 3 21
log sec. $\frac{1}{2}$ v	+0.29987	+0.31588	+0.33044	+0.34379
" sec $\frac{1}{2}$ v	+0.59974	+0.63176	+0.66088	+0.68758
" $\gamma$	+9.64958	+9.64958	+9.64958	+9.64958
" $\gamma$	+0.28932	+0.32134	+0.35046	+0.37716
				221.4 mil.



Beards Comet = 1911 c.

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Bar. J.	Bar. J.	Bar. J.	Bar. J.	Bar. J.
1912 Apr. 21.5	1912 Apr. 12.5	1912 Apr. 22.5	1912 Apr. 1.5	1912 Apr. 11.5
95.14.5	94.74.5	94.44.5	94.94.5	95.04.5
196.78	136.78	146.78	156.78	166.78
0.42576	0.42576	0.42576	0.42576	0.42576
2.24743	2.13603	2.16667	2.19529	2.22215
2.67319	2.56179	2.59243	2.62105	2.64791
132° 47' 22"	127° 44' 2"	129° 11' 17"	130° 30' 5"	131° 41' 47"
66 23 41	63 52 1	64 35 3A	65 15 2	65 50 54
0.39747	+0.35609	+0.36751	+0.37015	+0.38211
0.79494	+0.71218	+0.73502	+0.75630	+0.77622
+9.62952	+9.62952	+9.62952	+9.62952	+9.62952
+0.42452	+0.40176	+0.42460	+0.44522	+0.46520
243.5 mil.	234.3 mil.	247.0 mil.	259.4 mil.	271.5 mil.

Brooks' Comet = 1911 c

	1912. Feb. 15	1912. Feb. 11.5	1912. Feb. 21.5	1912. Mar. 20
$t - T$	96.72	106.72	116.72	126.72
$v$	119 49 22	122 12 42	124 17 13	126 6 42
$A'$	120 3 35	120 3 35	120 3 35	120 3 35
$A' + v$	299 52 57	302 16 17	304 20 42	306 10 17
$\log \sin \delta$	$\sim 9.93204$	$\sim 9.92713$	$\sim 9.91679$	$\sim 9.90701$
" $\mu$	$+0.24932$	$+0.32134$	$+0.35046$	$+0.37716$
" $\alpha$	$+9.93350$	$+9.93350$	$+9.93350$	$+9.93350$
" $\kappa$	$\sim 0.16026$	$\sim 0.12197$	$\sim 0.20075$	$\sim 0.21767$
" $\chi$	$-1.44230$	$-1.52045$	$-1.52763$	$-1.65070$
$B'$	62 1 6	62 1 6	62 1 6	62 1 6
$B' + v$	127 50 22	190 13 42	192 12 19	194 7 42
$\log \sin \delta$	$\sim 9.13490$	$\sim 9.24934$	$\sim 9.32262$	$\sim 9.32761$
" $\mu$	$+0.24932$	$+0.32134$	$+0.35046$	$+0.37716$
" $b$	$+9.92202$	$+9.92202$	$+9.92202$	$+9.92202$
" $y$	$\sim 9.35224$	$\sim 9.49270$	$\sim 9.60710$	$\sim 9.69279$
" $\gamma$	$-0.22503$	$-0.31522$	$-0.40467$	$-0.49295$
$C'$	123 2 51	123 2 51	123 2 51	123 2 51
$C' + v$	242 52 13	245 21 33	247 26 4	249 15 33
$\log \sin \delta$	$\sim 9.94977$	$\sim 9.95253$	$\sim 9.96541$	$\sim 9.97090$
" $\mu$	$+0.24932$	$+0.32134$	$+0.35046$	$+0.37716$
" $c$	$+9.26257$	$+9.26257$	$+9.26257$	$+9.26257$
" $z$	$\sim 0.10766$	$\sim 0.14244$	$\sim 0.12444$	$\sim 0.21663$
" $z$	$-1.22132$	$-1.40742$	$-1.52911$	$-1.64677$



Brooks Comet = 1911 c.

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1912, Apr. 21.5	1912, Mar. 12.5	1912, Mar. 22.5	1912, Apr. 1.5	1912, Apr. 11.5
176.7A	136.7A	146.7A	156.7A	166.7A
132 47 22.127 44 2.	129 11 17.	130 30 5.	131 41 47.	
140 3 35	140 3 35	140 3 35	140 3 35	
31250 57	307 47 37.	309 14 52.	310 33 40.	311 45 22.
wg. 26519	wg. 29775	wg. 22297	wg. 22065	wg. 27273
+0.44452	+0.40176	+0.42460	+0.44522	+0.46520
+9.93350	+9.93350	+9.93350	+9.93350	+9.93350
wo. 28321	wo. 23301	wo. 24707	wo. 26003	wo. 27203
-1.91961	-1.71004	-1.76632	-1.21923	-1.27023
62 1 6.	62 1 6.	62 1 6.	62 1 6.	62 1 6.
200 42 2	195 45 2	197 12 23.	192 31 11.	199 42 53.
wg. 55040	wg. 43373	wg. 47102	wg. 50192	wg. 52207
+0.44452	+0.40176	+0.42460	+0.44522	+0.46520
+9.92202	+9.92202	+9.92202	+9.92202	+9.92202
wg. 96294	wg. 76351	wg. 22364	wg. 27522	wg. 92129
-0.91220	-0.52011	-0.66626	-0.75132	-0.23540
123 2 51.	123 2 51.	123 2 51.	123 2 51.	123 2 51.
255 56 13.	250 52 53.	252 20 2.	253 32 56.	254 50 32.
wg. 92679	wg. 97536	wg. 97902	wg. 92207	wg. 92462
+0.44452	+0.40176	+0.42460	+0.44522	+0.46520
+9.26257	+9.26257	+9.26257	+9.26257	+9.26257
wo. 33922	wo. 24569	wo. 27219	wo. 29652	wo. 31299
-2.12715	-1.76072	-1.27150	-1.97932	-2.02443



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Brooks Comet = 1911 c

	1912. Feb. 1.5	1912. Feb. 11.5	1912. Feb. 21.5	1912. Mar. 2.5
$t - T$	96.72	106.72	116.72	126.72
$x$	-1.44230	-1.52045	-1.52763	-1.65070
$X$	+0.65634	+0.77673	+0.87332	+0.94319
$x + X$				-0.70751
$\log$ do.				wg. 24974
$y$	-0.	-0.	-0.	-0.49293
$Y$	-0.67434	-0.55291	-0.42624	-0.22060
$y + Y$				-0.77353
$\log$ do.				wg. 22242
$z$	-1.			-1.64677
$Z$	-0.29252	-0.24245	-0.12490	-0.12172
$z + Z$				-1.76849
$\log$ do.				no. 24760
" $\tan \delta$				+0.03274
" $\delta$ (arc)				227° 33' 7"
" $\delta$ (time)				15h 10m 12s
" $(z + Z)$				no. 24760
" $\sin \delta$				wg. 26799
" $\sin$ long.				+0.11559
" $(y + Y)$				wg. 22242
" $\tan \delta$				no. 22711
" $\delta$				-59° 20' 29"
" $(z + Z)$				no. 24760
" $\sin \delta$				wg. 93461
" $\delta$				+0.31299
" $\delta$				1910 miles



Brooks Comet = 1911 c.

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1912. Apr. 21 <sup>h</sup>	1912. Mar. 12 <sup>h</sup>	1912. Dec. 22 <sup>h</sup>	1912. Apr. 15 <sup>h</sup>	1912. Apr. 11 <sup>h</sup>
-176.72	136.72	146.72	156.72	166.72
-1.91961	-1.71004	-1.76632	-1.81923	-1.87023
+0.85769	+0.92460	+0.99642	+0.97249	+0.93177
-1.06192	-0.72544	-0.76990	-0.84134	-0.93906
no. 02689	no. 26060	no. 22643	no. 92497	no. 97269
-0.91220	-0.52011	-0.66626	-0.75132	-0.83540
+0.44147	-0.12650	+0.03149	+0.12242	+0.33992
-0.43673	-0.70661	-0.63477	-0.56224	-0.49542
no. 64021	no. 24912	no. 20262	no. 75032	no. 69502
-2.18715	-1.76072	-1.87150	-1.97932	-2.08443
+0.20226	-0.05422	+0.01366	+0.02176	+0.14745
-1.97229	-1.81560	-1.85724	-1.89756	-1.93692
no. 29629	no. 25902	no. 26901	no. 27220	no. 22713
+9.61412	+9.92254	+9.91619	+9.82541	+9.72233
202 21 20 224 14 42	219 30 21	213 46 13	207 49 4	13 29 25
13 <sup>h</sup> 29 <sup>m</sup> 25 <sup>s</sup>	14 <sup>h</sup> 56 <sup>m</sup> 59 <sup>s</sup>	14 <sup>h</sup> 32 <sup>m</sup> 1 <sup>s</sup>	14 <sup>h</sup> 15 <sup>m</sup> 2 <sup>s</sup>	13 <sup>h</sup> 51 <sup>m</sup> 16 <sup>s</sup>
no. 29629	no. 25902	no. 26901	no. 27220	no. 22713
no. 52012	no. 24370	no. 20356	no. 74510	no. 66900
+9.87647	+0.10272	+0.07257	+0.02330	+9.95613
no. 64021	no. 24912	no. 20262	no. 75032	no. 69502
no. 23626	no. 25354	no. 26995	no. 27292	no. 26111
-59 52 6	-60 50 54	-61 45 36	-61 55 23	-61 16 16
no. 29629	no. 25902	no. 26901	no. 27220	no. 22713
no. 93696	no. 94112	no. 94496	no. 94563	no. 94295
+0.35933	+0.31724	+0.32405	+0.33257	+0.34412
212.5 <sup>mil.</sup>	193.1 <sup>mil.</sup>	195.9 <sup>mil.</sup>	199.8 <sup>mil.</sup>	205.2 <sup>mil.</sup>

## Brooks Comet - 1911

	1912, May 1, $\checkmark$	1912, May 11, $\checkmark$	1912, May 21, $\checkmark$	1912, May 31, $\checkmark$
$(t - T)$	186.7d	196.7d	206.7d	216.7d
$\frac{t - T}{\text{yr}}$	9524.5	9534.5	9544.5	9554.5
log. m	+0.42576	+0.42576	+0.42576	+0.42576
" $(t - T)$	+2.27133	+2.2939d	+2.31551	+2.33602
" lb	+2.69709	+2.71974	+2.74127	+2.7617d
" r	133 47 44	134 43 23	135 35 7	136 23 17
" $\frac{1}{2} r$	66 53 52	67 21 42	67 47 34	68 11 34
log sec. $\frac{1}{2} r$	+0.40630	+0.41464	+0.42256	+0.4300d
" sec <sup>2</sup> $\frac{1}{2} r$	+0.81260	+0.8292d	+0.84512	+0.86016
" q	+9.6295d	+9.6295d	+9.6295d	+9.6295d
" r	+0.5021d	+0.51226	+0.53470	+0.54974
n miles	295.3 mil.	306.2 mil.	312.2 mil.	329.4 mil.





## Brooks Comet = 1911 c.

	1912, May 15	1912, May 16	1912, May 21	1912, May 31
$t - T$	186.72	196.72	206.72	216.72
$r$	133 47 44	134 43 23	135 35 7	136 23 17
$A'$	120 3 35	120 3 35	120 3 35	120 3 35
$A' + r$	313 51 19	314 46 58	315 38 42	316 26 52
Log sine $\delta$	09.25799	09.25117	09.24454	09.23223
" $r$	+0.50212	+0.51226	+0.53470	+0.54974
" $a$	+9.93350	+9.93350	+9.93350	+9.93350
" $x$	00.29367	00.30347	00.31274	00.32147
" $y$	-1.96641	-2.01127	-2.05467	-2.09632
$B'$	62 1 6	62 1 6	62 1 6	62 1 6
$B' + r$	201 42 50	202 44 29	203 36 13	204 24 23
Log sine $\delta$	09.57007	09.55724	09.60250	09.61617
" $r$	+0.50212	+0.51226	+0.53470	+0.54974
" $b$	+9.92202	+9.92202	+9.92202	+9.92202
" $y$	00.00027	00.03412	00.06522	00.09393
" $y$	-1.00063	-1.02172	-1.16203	-1.24146
$C'$	123 2 51	123 2 51	123 2 51	123 2 51
$C' + r$	256 56 35	257 52 14	258 43 52	259 32 25
Log sine $\delta$	09.92263	09.99020	09.99155	09.99271
" $r$	+0.50212	+0.51226	+0.53470	+0.54974
" $c$	+9.86257	+9.86257	+9.86257	+9.86257
" $z$	00.35932	00.37763	00.39422	00.41102
" $z$	-2.22752	-2.32772	-2.42211	-2.57644





## Brooks Comet = 1911 c.

	1912, May 1, v	1912, May 11, v	1912, May 21, v	1912, May 31, v
$t - \text{II}$	126.72	196.72	206.72	216.72
$x$	-1.96641	-2.01127	-2.05467	-2.09632
$X$	+0.75270	+0.63792	+0.49272	+0.34551
$x + X$	-1.20771	-1.37335	-1.55529	-1.75087
Log do.	no. 04197	no. 13772	no. 19192	no. 24326
$y$	-1.00063	-1.02172	-1.16203	-1.24146
$Y$	+0.60295	+0.71296	+0.80240	+0.87479
$y + Y$	-0.39164	-0.36276	-0.35363	-0.36667
Log do.	no. 59293	no. 55962	no. 54255	no. 56427
$z$	-2.24722	-2.32572	-2.42211	-2.57644
$Z$	+0.26416	+0.31127	+0.35062	+0.37947
$z + Z$	-2.02342	-2.07391	-2.13143	-2.19697
Log do.	no. 30609	no. 31679	no. 32267	no. 34122
" $\tan \delta$	+9.51096	+9.42124	+9.35657	+9.32101
" $\delta$ (arc)	197-52 6	194 47 47	192 40 12	191 49 40
" $\delta$ (time)	13 11 52	12 59 11	12 51 13	12 47 19
" $(z + Z)$	no. 30609	no. 31679	no. 32267	no. 34122
" $\sin \delta$	no. 9.44924	no. 9.40720	no. 9.34563	no. 9.31169
" $\tan \delta$	+9.79533	+9.72399	+9.67430	+9.65351
" $(y + Y)$	no. 59293	no. 55962	no. 54255	no. 56427
" $\tan \delta$	no. 20240	no. 16437	no. 12575	no. 02924
" $\delta$	-57 53 33	-55 35 33	-53 10 53	-50 50 44
" $(z + Z)$	no. 30609	no. 31679	no. 32267	no. 34122
" $\sin \delta$	no. 9.92791	no. 9.91647	no. 9.90332	no. 9.88955
" $\delta$	+0.37212	+0.40032	+0.42529	+0.45227
$\Delta$ miles	221.9 mil.	233.5 mil.	247.4 mil.	263.2 mil.













