

Computations for finding the Longitude by Observations taken 1st Oct 1772

Time by Watch	Dist. \odot or \star	Altitude \odot or \star	Altitude γ
A. 20. 18	102. 28. 48	19. 12	31. 40
A. 26. 0	102. 27	10. 00	32. 12
A. 32. 0	102. 24	16. 40	33. 13
A. 19	107. 20. 25	13. 10	33. 11
A. 26. 20	102. 26. 55	10. 01	32. 45
Mean	Mean	Mean	Mean

For rectifying the Watch Observ'd at	A. 26. 20
Altitude \odot lower limb 10. 01	Watch by
Suppos'd Apparent time	
Latitude comp. 27. 22	Longitude comp. 27. 1
-From \odot to Lat. 62. 33	+ or - in time = p. 6 7. 40
Time Observ'd by Watch	A. 26. 20
Suppos'd Apparent time at Greenwich	6. 11. 20

For Computing the Apparent time.

\odot Declination	A. 39. 42	"	A. 39. 42
D ^o	6. 2. 17		
Difference in 24 hours	23. 28		6
\odot Declination at the time of Observation	A. 45. 42		
+ or - from \odot is Polar Distance	92. 46		
Altitude \odot lower limb Observ'd	10. 01		
+ \odot Semidiameter left by dip & Refraction	7		
Altitude \odot center corr'd	10. 08		
-From \odot is Zenith Distance	11. 52		
Zenith Distance γ 62			
Polar Distance γ 4. 46	Ar. Comp. Sine	10. 15. 0	
Co Latitude 62. 38	Ar. Comp. Sine	0. 51. 5 A.	
Sum	224. 16		
$\frac{1}{2}$ Sum	112. 08	Sine	95. 05. 6
$\frac{1}{2}$ Sum - Zenith Distance	= 42. 46	Sine	0. 31. 0. 0
Sum			103. 3. 4. 0
$\frac{1}{2}$ Sum is Co Sine	51. 22		92. 17. 4
Doubled			
Hourly \angle	66. 44	p. 6	A. 26. 16
Time by Watch when the Altitude \odot was taken	A. 26. 20		
Difference is Watch	by		36

To Compute from the Observations above

Time by the Watch when Dist γ was taken	A. 26. 20
Watch being by	36
Apparent time at taking the Distance	A. 26. 16
+ or - for Longitude from Greenwich comp.	
Apparent time at Greenwich	
Mean of the Observ'd Altitude \odot or \star	10. 34
+ Semidiameter left by Dip	16
Altitude of the \odot or \star corr'd	10. 11
Mean of Observ'd Altitude γ	32. 45
+ or - Semidiameter according which limb is Observ'd	21
Altitude of γ corr'd	12. 24

By the Ephemeris.

Semidiameter γ at	A. 26	"	15. 26
D ^o at	15. 26		
12 hours Difference	6		3
			15. 23
+ For Increase of Altitude γ	p. 53.		15. 4
Apparent Semidiameter γ			16. 4
+ Semidiameter			16. 4
Sum of Apparent Semidiameter \odot & γ			17. 8. 8

Computations continued

Hor ^l Par. at	16. 37	Prop ^l Logarithm	50. 20
At	16. 14	D ^o	52. 3
Prop ^l Logarithm	50. 20	12 th Difference	3. 8
Prop ^l part + or -	11	D ^o is Prop ^l part	18
Prop ^l Logarithm	50. 31	Hor ^l Parallax	
Distance \odot or \star γ Observ'd		102. 26. 53	
+ or - Semidiameter \odot & γ		17. 38	
Distance of the \odot or \star and γ centers		102. 44. 30	

Computation of Refraction by M. Lyons Table.

Alt. \odot corr'd 10. 1	32. 10	T. N.	1136	D ^o T. N.	1136
Alt. γ D ^o 32. 45	33. 10		1146		1031
T. N.	1136	1 st Diff.	60	2 ^d Diff.	105
+ 1 st Prop ^l part	45	1 st Prop ^l part	45	2 ^d Prop ^l part	2
Sum	1181				
- 2 ^d Prop ^l part	2				
to this	1179	Number for an Index	2		1179
+ Logarithm Co Sec ^l Distance					0. 112
Logarithm	1. 75				2. 1294
By Tab. 2 nd with Dist γ & 10. 1	26	Distance less γ go - more +			
Sum or Difference is the	161	= 1 st Effect of Refrac ⁿ			
Distance of \odot or \star γ centers		102. 58. 20			
Effect of Refraction		2. 41			
Distance clear'd of Refraction		103. 31. 11			

For Parallax

Altitude \odot or \star corr'd	10. 11		
- Refraction p. 2	3		
Alt. \odot or \star corr'd	10. 8	Co. Sec ^l	10. 5069
Dist \odot or \star γ clear'd Ref ⁿ	103. 1	Sine	9. 9087
Prop ^l Log Hor ^l Parallax			50. 50
Prop ^l Log Arch 1 st	10. 2		9994
Altitude γ corr'd	32. 44		
- Refraction p. 2	1		
Alt. γ corr'd	32. 23	Co. Sec ^l	10. 2712
Dist \odot or \star γ	103. 1	Tang ^l	10. 8368
Prop ^l Log Hor ^l Parallax			50. 50
Prop ^l Log Arch 2 ^d	6. 59		1. 1110
Arch 1 st	103. 2		
Prin ^l Effect of Parallax	23. 21	or Parallax in Distance	
Distance clear'd of Refraction		103. 1. 11	
Prin ^l Effect of Parallax		23. 1	
Distance clear'd of Principal Effect of Parallax		102. 36. 10	
By Table 4 th for second corr ⁿ of Parallax		2	
Reduc'd Dist clear'd of Refraction & Parallax		102. 36. 8	

By the Ephemeris

Dist. \odot or \star γ	A. at 6. 12. 23	A D ^o	12. 23. 19
D ^o at	15. 26. 22	Red ^l Dist	12. 36. 0
in 3 hours	1 st Diff ⁿ 1. 30. 79	2 ^d Diff ⁿ	12. 30
Proportional Logarithm of 1 st Difference			26. 31
D ^o		2 ^d Difference	1. 1347
Proportional Log.			0. 0113
hour of the 1 st Dist.	6		
Gives Apparent time	6. 13. 13	at Greenwich	
Apparent time	A. 26. 16	at taking the Dist. \odot or \star γ	
Difference	1. 16. 43	In time = p. 6	29. 11
is Longitude between the Place of Observation and Greenwich			

NB Distance clear'd of Refraction { less γ go. take the Diffⁿ of the two Arches } is Principal Effect of Parallax { Arch first greatest - contr. + }
 By the Requisite Tables find the Parallax in Alt^o & by Table 4th with Distance & Parallax in Alt^o { Difference rec^d corr^d Parallax }
 which is to be + if distance is less γ go. but more -
 By the requisite Tables page 3 & 25 with App^l Altitude γ and Hor^l Parallax gives the Parallax in Altitude.
 By Robert Bishop.