Computations for finding the Longitude by Observations taken **4th Oct. 1772**	
Observations and means **T1**	*Computations continued* **T6**
Computing Greenwich apparent time **T2**	*Computation of Refraction by M^r Lyons table* **T7**
For Computing the Apparent Time **T3**	*For Parallax* **T8**
To Compute from the Observations above **T4**	*By the Ephemeris* **T9**
By the Ephemeris **T5**	
Nota Bene ***NB***	By Robert Bishop

T1 : Observations and means

Time by Watch	*Dist. ☉ or ✶ & ☽*	*Altitude ☉ or ✶*	*Altitude ☽*
H ' "	H ' "	H '	H '
4 20 15	102 24 45	19 14	31 48
4 26 0	102 27	18 08	32 42
4 32 45	102 29	16 40	33 44
13 19	307 20 45	54 02	98 14
4 26 20	102 26 55	18 01	32 45
Mean	*Mean*	*Mean*	*Mean*

T2 : Estimating Greenwich Apparent Time

				H ' "	
For rectifying the Watch Observ'd at ……				4 26 20	
	° '				
Altitude ☉ Lower limb	18 01	*Watch by*			
Supposed apparent time ……					
	° ' "			° ' "	
Latitude comp^d.	27 22	*Longitude comp^d.*		27	
-From 90°. Co Lat	62 38	*+ or – in time = p.6.*		1 48	
Time observ'd by Watch ……				4 26 20	
Suppos'd Apparent time at Greenwich ……				6 14 20	

T3 : For Computing the Apparent time

For Computing the Apparent time									
	th	°	'	"				° ' "	
☉ Declination	4	4	39	42	*H*			4 39 42	
D°	5	5	2	50					
Difference in 24 hours			23	08		=		6	
☉ Declination at the time of Observation ……								4 45 42	
+ or – from 90°. is Polar Distance ……								94 46	
Altitude ☉ lower limb Observ'd……								18 01	
+ ☉ Semidiameter lefs by dip & Refraction						=		7	
Altitude ☉ center corr^d……								18 08	
– From 90°. is Zenith Distance ……								71 52	
		°	'	"					
Zenith Distance		71	52						
Polar Distance		94	46		*Ar. Comp^t. Sine*			00150	
Co Latitude		62	38		*Ar. Comp^t. Sine*			05154	
Sum		229	16			° '			
½ Sum		114	38		=	65 22	*Sine*	95856	
½ Sum - Zenithal Distance					=	42 46	*Sine*	83188	
Sum ……								184348	
		°	'						
½ Sum is CoSine		33	22		……			92174	
doubled			2					H ' "	
Horary ∠		66	44		*p.6.* ……			4 26 56	
Time by Watch when the Altitude ☉ was taken								4 26 20	
Difference is Watch ……							*by*		36

T4 : To Compute from the Observations above

	H	'	"
Time by the Watch when Dist ☽ was taken	4	26	20
Watch being by			36
Apparent time at taking the Distance ☽	4	26	56
+ or – for Longitude from Geenwich comp^{d}			
Apparent time at Greenwich			
	°	'	"
Mean of the observed Altitude of ☺ or ✶	18	01	
+ Semidiameter lefs by Dip		10	
Altitude of the ☺ or ✶ corr^{d}	18	11	
Mean of Observ'd Altitude ☽	32	45	
+ or – Semidiam^{r}. according wich limb is Observ'd		21	
Altitude of ☽ coor^{d}.	32	24	

T5 : By the Ephemeris

By the Ephemeris

		'	"			'	"
Semidiameter ☽ at		15	26	*H*		15	26
D^{o}. at		15	20				
12 hours Difference			6	=			3
						15	23
+ for Increase of Altitude	*☽*			*p. 153.*	=		8
Apparent Semidiameter	*☽*					15	31
+ Semidiameter	*☺*					16	4
Sum of Apparent Semidiameter ☺ & ☽						31	35

T6 : Computations continued

Computations continued

		'	"					
Hor^{l}. Par. ☽ at		56	37	*Prop^{l}. Logarithm*	5023			
At		56	14	*D°*	5053			
Prop^{l}. Logarithm	5023			*12H Difference*	30			
Prop^{l}. part + or -	15			*D° is Prop^{l}. part*				
Prop^{l}. Logarithm	5038			=	*Hor^{l}. Parallax*			
						°	'	"
Distance ☺ or ✶ & ☽ Observ'd					102	26		55
+ or – Semidiameter ☺ & ☽						31		35
Distance of the ☺ or ✶ and ☽ centers					102	58		30

T7 : Computation of Refraction by M^{r}. Lyons Table

Computation of Refraction by M^{r}. Lyons Table

	°	'		°	'						
Alt ☺ or ✶corr^{d}.	18	1		32	18	*T. N.*	*1136*		*D° T. N.*	*1136*	
Alt. ☽ D°.	32	45		33	10		*1196*			*1031*	
T. N. ……				*1136*		*1st. Diff^{ee}.*	*60*		*2^{d} Diff^{ee}.*	*105*	
				45		*1st.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^{t}. Distance						……..		.		*0112*	
Logarithm ……	……			*135*				*2*		*.1291*	
By Tab 2^{d} with Dift & Lefs	Alt.			*26*				*Distance lefs 90° - more+*			
							'	"			
Sum or Difference is the…	……			*161*		=	2	41	*Effect of Refract^{n}.*		
										°	'	"
Distance ☺ or ✶ & ☽ centers ……						……				102	58	30
Effect of Refraction ……						……			+		2	41
Distance clear'd of Refraction ……						……				103	01	11

T8 : For Parallax

For Parallax

	°	'	"					
Altitude ☺ or ✶ corr^{d}.	18	11						
- Refraction p. 2.		3						
Alt. ☺ or ✶ corr^{d}.	18	8		*Co.Sec^{t}.*		10.5069		
Dist ☺ or ✶ & ☽ cl'd Ref	103	1		*Sine*		9.9887		
Prop^{l}. Log Hor^{l}. Parallax ……				……		.5038		
Prop^{l}. Log Arch 1st ……	18	2		……		.9994		
Altitude ☽ corr^{d}. ……	32	24						
- Refraction p. 2. ……		1						
Alt. ☽ corr^{d}. ……	32	23		*Co.Sec^{t}.*		10.2712		
Dist ☺ or ✶ & ☽ ……	103	1		*Tang^{t}.*		10.6360		
Prop^{l}. Log Hor^{l}. Parallax ……						5038		
Prop^{t}. Log Arch 2^{d}	6	59		……		1.4110		
Arch 1st ……NB	18	2						
Prin^{al}. Effect of Parallax	25	1				*or Parallax in Distance*		
						°	'	"
Distance clear'd of Refraction ……				……		103	1	11
Prin^{al}. Effect of Parallax ……				……			25	1
Distance clear'd of Principal Effect of Parallax ……						102	36	10
By Table 4th for second corr^{n}. Of Parallax ……								2
Reduced Dist. clear'd of Refraction & Parallax ……						102	36	8

T9 : By the Ephemeris

By the Ephemeris									
	th	H	°	'	"		°	'	"
Dist ☉ or ✶ & ☽	4	at 6	102	23	14		102	23	14
D°. at			103	51	23	*Red^d. Dist.*	102	36	08
In 3 hours		*1st Diff^ee.*	1	28	09	*2d Diff^ee.*		12	54
Proportional Logarithm of 1st Difference ……							2634		
D°. …… *2d Difference* ……							1.1447		
			H	'	"				
Proportional Log.				23	39	*Diff^ee.* ……	.8813		
+ hour of the 1st Dist.			6						
Gives Apparent time			6	23	39	*At Greenwich*			
Apparent time			4	26	56	*At taking the Dist. ☉ or ✶ & ☽*			
							°	'	"
Difference			1	56	43	*In time = p. 6.*	29	11	

Is Longitude between the Place of Observation and Greenwich

***Remarque** : Hors de ce cadre, en dessous de 1 56 43, dans le* nota bene*, on trouve l'annotation manuscrite :*
1 57 23

NB : Nota Bene

Distance clear of Refraction { *Lefs 90° take the Diff^ee of the two arches* / *More the Sum of the two Arches* } *is Principal Effect of Parallax* { *Arch first greatest –contra+* / *- for the Dist clear'd of Refr^n.*

By the Requisite Tables find the Parallax in Alt^de. & by table 4th with Distance &Parallax in { *Alt^de.* / *Dist.* } *Difference sec^d.corr^n. Parallax*

Which is to be + if distance is lefs 90° but more -

By the requisite Tables page 3. 4 & 5 with App^t. Altitude ☽ and Hor^l. Parallax gives the Parallax in Altitude.

By Robert Bifhop.