1915phae.proj.1

KG
11366
v.995

CXLIII

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Harvard Lunar Plates
Measures and Reduction

Ernestine Fuller.

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N 10030 Syr. 3 Star Measures. Tycho 22.7. 1591

	d		r		d		r	
1	18272		16779		16143		16178	
10.7	11610	08	13438	39	15023	27	7268	65
16.1	6		40		31		62	
	62		671		41		6160	
	10.66558		10.66660		16.11116		16.11104	
2	18228		17368		16280		16183	
20.6	12568		13020	18	10652	50	11800	99
8.6	68		16		48		11798	
	20		7360		84		6183	
	20.56555		20.56553		8.56332		8.56116	
3	17380		16882		16512		15839	
28.4	14490	91	9769	70	15136	38	7206	05
26.1	92		71		40		04	
	72		6870		08		5843	
	28.28877		28.28977		26.13774		26.13662	

Moon Measures

1					16078		16070	
23					11954	51	10182	79
14.5					48		76	
					68		6064	
					14.41223		14.41113	
2								
21					15619		15711	
14.7					8918		12414	12
					18		10	
					17		5709	
					14.67001		14.67003	
3	18609		16196					
20.7	12712	13	12103					
15	14		03					
	01		6196					
	20.58911		20.59007					

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10030 Dec 3 Star Measures Tycho 227 1581

d r d r

1 18272 16779 16143 16178
10.7 11610 08 10437 39 15023 27 72645
6.1 6 40 311 62
62 6771 41 6160
106658 106760 161116 161104

2 18228 17368 16280 16188
-0.6 12568 13020 18 10652 50 11789 79
8.6 68 16 48 11798
20 7360 84 6183
20.56.55 20.56.53 8.56.32 8.56.16

3 17380 16482 16512 15439
-8.4 14490 91 17699 90 15136 38 72065
26.1 9 25 71 40 04
72 6420 08 5843
28.28.87 28.28.97 26.13.74 26.13.62

Moon Measures

1 16078 16070
-2 11954 51 10182 78
14.5 47 74
64 6064
144123 144113

2 15619 15914
21 8918 12417 12
147 18 10
17 5709
146701 146703

3 18609 16196
-20.7 12712 13 12103
15 14 03
07 6196
20.58.91 20.58.07

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Moon Measures. 2

4
20.1
16

	18314	15167
	17211 } 12	6261 } 65
	13 }	69 }
	08	5161
	20.11101	20.11103

5
20.1
16.4
X

	18809	14151
	17908 } 09	5042 } 44
	10 }	46 }
	91	4145
	20.08998	20.08998

6
20.3
17

	17850	14124
	15378	6580
	78	80
	36	4118
	20.24469	20.24459

7
21.
17.8

		16884
		8304 } 02
		00 }
		78
		17.85577

15870	
14432 }	38
42 }	
5870	
17.85568	

8
21.3
18

	16682	14518
	13692	7492 } 94
	92	96 }
	74	4508
	21.29788	21.29984

Star

4
35.2
17.7

	18361	18032
	16878	9521 } 22
	78	23 }
	51	8030
	35.14812	35.14912

19320	
12420 }	25
30 }	
9324	
17.68997	

17833	
14720	
26	
7833	
17.68887	

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Moon Measures

4
201
16

18324	151607	
17211	62611	45
13	69	
08	5161	
20.11101	20.11103	

5
201
16.4
X

18809	141511	
17908	50423	44
101	46	
91	4145	
20.09978	20.09978	

6
203
17

17850	141274	
15378	65380	
78	20	
36	4118	
20.24669	20.24659	

7
21.
17.8

16884	15820	
83041	14432	38
001	42	
78	5870	
17.85717	17.85668	

8
21.3
18

16642	145118	
13692	79921	94
92	96	
74	4508	
21.29788	21.29784	

Star

4
15.2
17.7

18361	18032	
14878	95211	22
78	23	
51	8030	
35.14682	35.14692	

19320	17283	
12420	14720	25
30	20	
9324	7833	
17.68977	17.67887	

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10030 Venus

Date Dec 16. 1915

Exp. to Stars	3	27		3	39	
" " Moon	3	33	01.7	3	33	02.1
Clock-fast		5	12.2			
M. Sid T.	3	27	49.7			
M. Long	4	44	31.05			
G. Sid. T	8	12	20.75			
Sid T. M. N.	17	36	11.25			
Interval	14	36	09.50			
Reduction		2	23.59			
G. M. T.	14	33	45.96			

$\Theta - \alpha = +1^h\ 21^m$

From Naut Alm. R. a. Dec

Moon - 14^h	02	05	26.16	+	18	10	15.5
Motion in 1^m			1.9895				+10.450
" " 33.7660	+	1	07.18			5	52.85
Tabular Place	02	06	33.34	+18	16	08.3	

Moon's Age 10.2 days

Parallax	54	40.56
Semid.	14	55.5
ρ		89 55.5
Aug		12.6
Fil	3	-0.3
ρ		907.8
ρ		1.94604
ap		-925
(1+d)ρ		1.85335
ρ		3.43354

937 = 13.7

a - 4994
27
- 4754

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10030 Lunes

Date Dec 16. 1915

Exp. t- Stars	3	27		3	39	
" " Moon	3	33	017	3	33	021
Clock fast		5	12.2			
H. Sid T.	3	27	49.7			
H. Long	9	14	31.0			
G. Sid T.	8	12	20.7			
Sid T. M.N.	17	36	11.2			
Interval	19	36	09.30			
Reduction		2	23.59			
G. M. T.	19	33	45.96			

$\theta - \chi = +1^h\ 21^m$

From Mark Obs. R. A. Dec

Moon - 19h	10	2	05	26.16	+18 10	13.5
Motion in 1m				1.248		10.450
" " 33.766.0			1	07.13	5	52.85
Tabular Place	02	06		33.34	+18 16	8.3

Moon's Type 10.2 Cap

Pol. Stellar	54	40.5
Semid.	14	55
12		895
Aug		12
Par 3		-0.
12		907
12	19	+6
Alt		-925
(1+W)12	1	85365
12	3	43588

939 = 13.7

a - 4994
27
-4754

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10030

	x
	10.6659
	20.5654
	28.2892
3	595205
	19.8402
	22-
	+2.1598
	31.8
	+1m 06.895

Plate center.

	y	α	δ	
	16.1110159	02.67	17 50	42.8
	8.5624 02 04	42.70	16 49	33.8
	26.1368 02 09	08.57	1 19 1 3	0.1
3	50.8102	35 72 53.94	3 53 53	17.7
	16.9367	2 04 17.98	17 57	459
	18-	+1 06.95	7	56.0
	+1.0633	2 05 24.93	18 05	41.9
	466.5			

Plate Center { A = 02 05 24.93
D = +18 05 41.9

x-ξ	+500x	-10.3y	-.6x	-8831
+.3671	+5333	=+9003 -166	=+8837 -6	=+8831
-.1352	+10283	=+8931 -88	=+8843 -12	+8831
-.5028	+14144	=+9116 -269	=+8847 -16	+8831
21.9454	+10973	-167	-13	22.1416

y-η	+500y	+13.41x	+2.8y	-8123
+.0120	+8055	=+7935 +143	=+8078 +45	=8123
+.3542	+4281	=+7823 +276	=+8099 +24	=8123
-.5398	+13068	=+7670 +380	=+8050 +73	=8123
16.2636	+8132	+294	+45	=16.2984

Tables a = +0.8 ℓ = 0.0 a-ℓ = +0.8 ℓ+d = -0.7
= -499.4 -502.8 +3.4 = -3.11

0-C -500.2 -502.8 -2.4

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1913.

Plate center.

	x	y	α	δ	
	10.6659	16.1110	02 05 24.67	17 50 42.8	
	20.5654	8.5124	02 04 42.70	16 49 33.8	
	28.2892	26.1368	02 09 08.57	19 13 01.1	
3	59.5205	3 50.8102	5 12 53.94	3 53.163	17.7
	19.8402	16.9367	2 04 17.98	17 57 45.9	
	22 -	18 -	- 1 04.95	7 56	
	+ 2.1598	+ 1.0633	2 05 24.93	18 05 41.9	
	31.5	46.5			
	+ 1" 06.995				

Plate Center { A = 02 05 24.93
D = + 18 05 41.9

x - 8	+ 5.00 x	- 10.3 y	- .6 x - 8831
+ 3.671 + 5.333	= + 9003	- 166	= + 8837 - 6 = + 8831
- 13.52 + 10.283	= + 8931	- 88	= + 8843 - 12 + 8831
- 5.128 + 14.144	= + 9116	- 264	= + 8847 - 16 + 8831
21.945 + 10.973		- 167	- 13 22.1416

y - 7	+ 5.00 y	+ 13.41 x	+ 2.8 y - 8123
+ .0120 + 8.055	= + 7935	+ 143	= + 8078 + 45 = 8123
+ 3.542 + 4.281	= + 7823	+ 276	= + 8099 + 24 = 8123
- 5.398 + 13.068	= + 7670	+ 380	= + 8050 + 73 = 8123
+ 8.132		+ 294	+ 45 = 16.2984

Tables a = + 0.8 e = 0.0 a - e = + 0.8 A + d = - 0.7
= - 499.4 - 5.028 + 3.4 = - 3.11

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Cape No. 331 Mag. 7.4

C	02	12	13.34
Ephem			13.33
E			13.33
Mean	02	12	13.33
Prec			+49.65
α	02	13	02.98
δ	02	05	24.93
α-17	+	07	38.05
Sun's R.A.			+458.05
log			2.660922
" cos δ			9.997805
" S_0			1.146217
S_0			+14.00026
S_1			.00677
S			36.00993
Y			35.14877
X-3	−		.8606

C	17	59	29.0
Ephem			28.9
E			29.4
Mean	17	59	29.1
Prec		+4	11.7
δ	18	03	40.8
Φ	18	05	41.9
δ-Φ		−2	01.1
tan γ			112.1
log η			2.083142
" η_0			9.414292
log tan δ			9.51134
" ξ_1^2			9.29024
" η_1			8.85992
η_0			−.2396
η_1			.0723
η			19.81279
Y			17.68922
y-η			−.1235

curvature of plate

						+3.37
						−2
3.						
	P 3	−4.25				
−11.720	−1.993	+40	+49	= +9	+1	= +8
−1.330	−9.779	−3	+5	= +2	−5	= −3
−6.79	+8.666	+20	−29	= −9	+4	= −5
+14.00	−0.266	+66	−59	= +7	−0	= +7
+0.14	−1.770	−0	−2.87	−1	−1	= −3
			−4	+ 5′ = +1		
			−25′	+ 27 = +2		
			+26	− 24 = +2		
				+ 1 = +0		
				+ 5′ = +4		

Curve. $\begin{cases} \alpha = -0.01 \\ \delta = +0.2 \end{cases}$

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	Cape No. 297	Mg 6.4		Cape No. 311	Mg. 6.4		Cape No. 322.	Mg. 7.1	
c	01	5.8	13.43	02	03	53.38	02	08	18.76
q	1		13.43			53.33			18.77
ε			13.46			53.42			18.76
Mean	01	58	13.44	02	03	53.38	02	08	18.76
Prec			+49.23			+49.32			+49.81
α	01	59	+02.67	02	04	42.70	02	09	08.57
A	02	05	24.93	02	05	24.93	02	05	24.93
α − A		−6	22.26			− 42.23		+3	43.64
Sin(α − A) =		−3	82.21			− 42.23		+	223.63
log "	2.58230 n			1.62562 n			2.34953		
" cos δ	9.97854			9.98100			9.97510		
" ξ_0	1.06808 n			0.11386 n			0.83187		
ξ_0	−11.6971			−1.2997			+6.7900		
ξ_1	−.0040			.0003			+.0020		
ξ	10.2989			20.7006			28.7920		
X	10.6659			20.5654			28.2892		
X − ξ	+.3670			−.1352			−.5028		
c	+17	46	21.8	+16	45	18.8	+19	08	46.0
q			21.7			18.4			46.2
ε			21.5			18.9			47.1
Mean	+17	46	21.7	+16	45	18.7	+19	08	46.4
Prec		+4	21.1		+4	15.1		+4	14.7
δ	+17	50	42.8	+16	49	33.8	+19	13	01.1
D	18	05	41.9	18	05	41.9	18	05	41.9
δ − D		−14	59.1	−1	16	8.1	+1	7	19.2
tan(δ − D)		−	899.1			−4568.1			+4039.2
log "	2.95381 n			3.65974 n			3.60629		
" η_0	0.28496 n			0.99089 n			0.93744		
log tan δ	9.5078			9.4806			9.5423		
" ξ_0^2	2.1407			0.2277			1.6637		
" η_1	8.7019			6.7617			8.2594		
η_0	+1.9273			−9.7924			+8.6584		
η_1	.0503			.0006			.0182		
η	16.1230			8.2082			26.6766		
y	16.1110			8.5624			26.1368		
y − η	−.0120			+.3542			−.5398		

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Y0030 Standard Coordinates 5

	Cape No. 297 Mg. 6.4	Cape No. 311 Mg. 6.4	Cape No. 322 Mg. 7.1
	C 01 58 13 43	02 03 53 38	02 08 18.76
	4 13 43	53 33	18.77
	E 13.46	53 42	18.76
	Mean 01 58 13 44	02 03 53 38	02 08 18.76
	Prec + 49 23	+ 49 32	+ 47.81
	α 01 59 -02 67	02 04 42 70	02 09 08.57
	A 02 05 24 93	02 05 24 93	02 05 24.93
	α - A - 6 22.26	- 42 23	+ 3 43.64
	Sm (α - A) = - - 3 8 2 21	- 42.23	+ 23.68
	log " 3.558230m	1.625620m	3.349533
	" cos δ 9.997854	9.998100	9.997510
	" ξ₀ 1.068088n	0.113866m	0.831887
	ξ₀ - 11.69711	- 1.29977	+ 6.79000
	I₀ - .00490	0003	+ .00020
	ξ + 0.29889	2.70006	28.79220
	X 10.66459	2.05655+	28.28412
	-ξ + 3.6970	- .13552	- .50288
	C + 17 46 21.8	+ 16 45 18.8	+ 19 08 46.0
	4 21.7	18.4	46.2
	E 21.5	18.9	47.1
	Mean + 17 46 21.7	+ 16 45 18.7	+ 19 08 46.4
	Prec + 4 31.1	+ 4 15.1	+ 4 14.7
	δ + 17 50 42.8	+ 16 49 33.8	+ 19 13 01.1
	E 18 05 41.9	18 05 41.4	18 05 41.9
	δ - E - 14 59.1	- 1 - 7.6 8.1	+ 1 17.2
	tan (δ - E) + .9991	- 4568.1	# 40392
	log " 2.956815n	3.659774n	3.606229
	" η₀ 0.284796n	0.990889n	0.937444
	log tan δ 9.50788	9.48060	9.54239
	ξ₀ 2.14077	0.22777	1.66374
	" η₀ 8.70119	6.76417	8.25944
	η₀ - 1.92735	- 1.79124	8.65844
	η .05038	.00086	.01772
	η .16.12310	8.20892	26.67766
	η 16.11110	8.56234	26.13688
	η - η - .01200	+ .35442	- .53978

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10038 a Moon's Center. 6.

		X	$X - X_0$	Δx	$(X-X_0)^2$	$+(Y-Y_0)^2$	O-C
1		22.0000	+ .0570	− 1	0.0032	3.4301	− 57
2		21.0000	− .9430	− 1	0.8892	3.4262	− 96
3		20.5899	− 1.3531	− 1	1.8309	3.4261	− 97
4		20.1102	− 1.8328	− 0	3.3592	3.4284	− 74
5	X	20.0898	− 1.8532	+ 0	3.4343	3.4343	− 15
6		20.2464	− 1.6966	+ 0	2.8784	3.4216	− 142
7		21.0000	− 0.9430	+ 1	0.8892	3.4310	− 48
8		21.2986	− 0.6444	+ 1	0.4152	3.4324	− 34

R^2 3.43544

		y	$y - y_0$	Δy	$(y-y_0)^2$		
1	y	14.4118	− 1.8512	− 1	3.4269	180 −	Too large + 4
2		14.6702	− 1.5928	− 1	2.5370	217	
3		15.0000	− 1.2630	− 1	1.5952	227	
4		16.0000	− 0.2630	− 0	0.0692	262	
5		16.2630	+ 0.0000	+ 0	0.0000	270	
6		17.0000	+ 0.7370	+ 0	0.5432	293	
7		17.8573	+ 1.5943	+ 1	2.5418	329	
8		18.0000	+ 1.7370	+ 1	3.0172	340	160

approx. Center

X = 21 y = 14.6702
17.8573
32.5275

y_0 = 16.2637
y_{min} = 14.4118
R = 1.8519
Com R = 1.8536
Y_{min} = 20.0898
X_0 = 21.9434

Moon Center { X_0 21.9430
Y_0 16.2630

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10030 Moons Center. 6.

	X	$X - X_0$	ΔX	$(X-X_0)^2$	$+(Y-Y_0)^2$	O-C
1	22.0000	+ .0570	-0	0.0032	3.43301	- 57
2	21.0000	- .9430	-0	0.8892	3.42693	- 76
3	20.5899	- 1.3531	-0	1.8309	3.42641	- 97
4	20.1102	- 1.8328	-0	3.3592	3.42884	- 74
5 X	20.0898	- 1.8532	+0	3.4348	3.43443	- 15
6	20.2464	- 1.6966	+0	2.8784	3.42164	- 142
7	21.0000	- .9430	+0	0.8892	3.43110	- 48
8	21.2986	- 0.6444	+0	0.4152	3.43234	- 34

R^2 3.4355-4

	Y	$Y - Y_0$	ΔY	$(Y-Y_0)^2$		
1 Y	14.4118	- 1.8512	-0	3.4269	180°	too large +4
2	14.6702	- 1.5928	-0	2.5371	247	
3	15.0000	- 1.2630	-0	1.5952	262	
4	16.0000	- 0.2630	-0	0.0692	231	
5	16.2630	+ 0.0000	+0	0.0000	270	
6	17.0000	+ 0.7370	+0	0.5432	294	
7	17.8573	+ 1.5943	+0	2.5418	329	
8	18.0000	+ 1.7370	+0	3.0172	340	160

Approx Center

$X = 21$ $y = 14.6702$

17.8573

32.5275

$Y_0 = 16.2637$

$y_{min} = 14.4118$

$R = 1.8519$

Corr $R = 1.8536$

$y_{min} = 20.0498$

$X_0 = 21.9434$

Moons Center $\begin{cases} X_0 & 21.9430 \\ Y_0 & 16.2630 \end{cases}$

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Normals.

1	− 0.11	− 3.4	+ 105.0
2	+ 1.49	+ 90.0	+ 153.0
3	+ 1.70	+ 131.0	+ 122.0
4	+ 0.47	+ 135.2	+ 19.2
5	+ 0.00	+ 27.8	+ 00.0
6	− 1.24	+ 241.4	− 103.8
7	− 1.49	+ 45.0	− 76.4
8	− 1.10	+ 21.8	− 58.8
	+ 3.66	+ 692.2	+ 399.2
	− 3.94	− 3.4	− 239.0
	− 0.28	+ 688.8	+ 160.2
		− 37.0	− 3.6
		+ 652.	+ 156.6

−a	−b	+15 +ΔC
+ 1	− 2	+ 14
− 9	− 2	+ 4
− 13	− 1	+ 1
− 18	− 0	− 3
− 18	+ 0	− 3
− 17	+ 1	− 1
− 9	+ 2	+ 8
− 6	+ 2	+ 11

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10030 Conditional Equations 7

										O − C	Corr
					+4						
1	+0.06	−1.85	= −	57	+	1	−24	= −23	−	34	−20
2	−0.94	−1.59	= −	96	−	45	−19	= −64	−	32	−28
3	−1.35	−1.26	= −	97	−	65	−15	= −80	−	17	−16
4	−1.83	−0.26	= −	74	−	88	− 3	= −91	+	17	+14
5	−1.85	+0.00	= −	15	−	89	+ 0	= −89	+	74	+71
6	−1.70	+0.73	= −142		−	82	+ 9	= −73	−	69	−76
7	−0.94	+1.59	= −	48	−	45	+19	= −26	−	22	−14
8	−0.64	+1.73	= −	34	−	34	+21	= −13	−	21	−10
	−9.19	−0.91						+91	−195		

13.70 − 0.28 = +652. − 9.19 average 36

−0.28 + 13.73 = +156.6 − 0.91

+0.28 − 0.00 = + 13.04 −0.19

+13.73 = +169.64 −1.06 b = +12.3 − 0.07

13.70 = +652 + 5.4 = +657.4 a = +48.0 − 0.67

arc 160 $\frac{\Sigma v}{n}$

$\frac{\Sigma}{n}$ = .19 −13 $\frac{-13}{19} = -.69$ ΔR = −.49

Corr −0.2

True ΔR = −0.7

−ΔR = −3.71 −ΔR Corr = +0.74 +15

$\Delta b = -0.05^{-1}$ Δδ = −0.0

Δa = −0.50 Δα = −0.02

−10

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10030 Conditional Equations 7

					+4.						6=8
1	+0.06	−1.85	= −5.57	+	1	− 24	= 23	−	34		
2	−0.94	−1.59	= − 96	−	45	− 19	= − 64	−	32		
3	−1.35	−1.26	= − 97	−	65	− 15	= − 80	−	17		
4	−1.83	−0.24	= − 74	−	88	− 3	= − 91	+	17		
5	−1.85	+0.00	= − 15		89	+ 0	= − 89	+	74		
6	−1.70	+0.73	= −1.42		82	+ 9	= − 73	−	67		
7	−0.94	+1.59	= − 48		45	+ 19	= − 26	−	22		
8	−0.64	+1.73	= − 34		34	+ 24	= − 10	−	21		
							+91	=	195		

13.70 − 0.28 = +6.52 average 36

−0.28 + 13.73 = +1566

+0.28 − 0.00 = + 13.04

13.73 = +169.64 1/n = +12.3

13.70 = +65.2 + 5.4 = +657.4 a = +48.0

arc 160 $\frac{\Sigma l}{n}$

$\frac{\Sigma}{n} = .19$ −13 $-\frac{13}{19} = -.69$ 0.2 = 0.9

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10038

Moon's Mean Position

X_0 21.9430
+24
21.9454

Y_0 16.2630
+6
16.2636

From Plate Constants.

X 22.1416
-22
ξ +.1416

y 16.2984
-18
-1.7016

log ξ_0 9.1516
log cos δ_0 9.9785 1
8.5072 4
log Sin(α-A) 0.6653 1
Sin (α-A) +4.633
α-A

A 02 05 24.93
α_0 02 05 29.56
Red +4.74
α' 02 05 34.30

log tan δ 9.5083
log ξ^2 8.3021
7.0534
log η_1 4.8638
η_1 0.00006
η_0 -1.7016
log " 0.2308 6
7.3315
log tan (δ-D) 2.8997 1
tan δ-D -793.80
δ-D -13 13.8
D 18 05 41.9
δ_0 17 52 28.10
Red +29.28
δ' 17 52 57.38

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10038 Theoris Mean Position 8

X_0 21 44 30
+ 24
21 45 54

Y_0 16 26 30
+6
16 26 36

From Plate Constants.

X 22.1416
-22
S +.1416

Y_0 16.2984
β -18
-1.7016

log S. 9.151061
log cos δ 9.978511
8.507241
log Sin(α-A) 0.465531
Sin (α-A) +4.632
α - A

log Tan S 9.506431
log S 8.30211
70534
log η_1 4.86388
η_1 0.00000
η_0 -1.71116
log η_0 0.230486
7.331155
log Tan (-E) 2.899711

A 02 05 24.93
α_0 02 05 29.56
Red 4.74
α' 02 05 34.30

Tan S-E -793.80
S-E -13 13.8
E 18 0.5 41.9
S_0 17 52 28.10
Red 27.28
S' 17 52 57.38

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(1) 2 0 2 27.49
32.68
+4.81

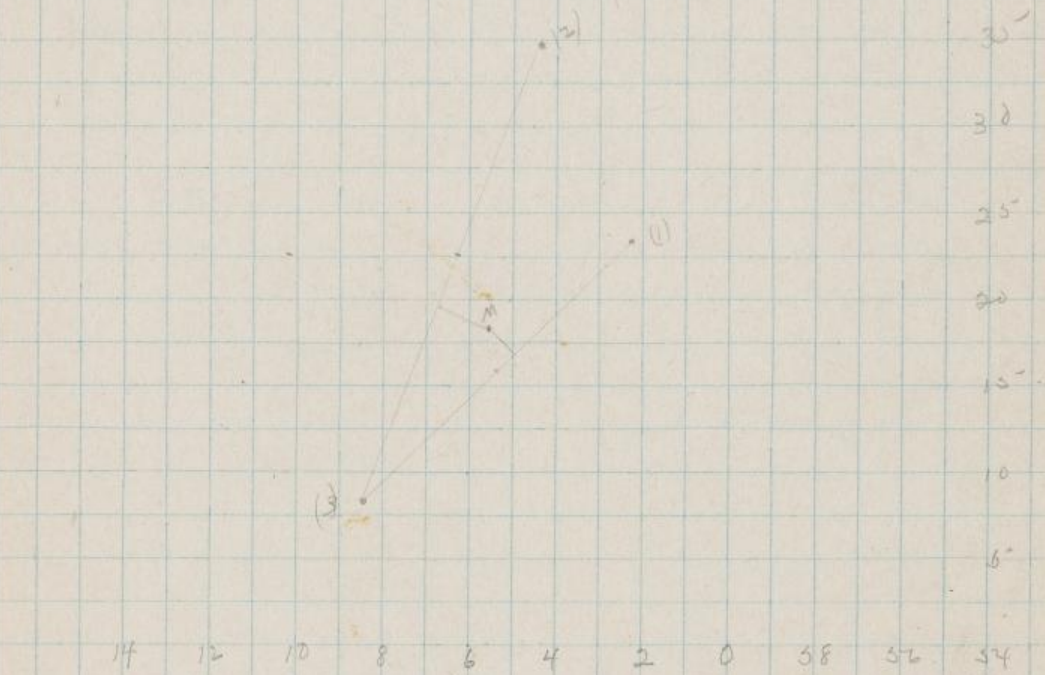
(2) 2 0 4 33.92
28.84
+5.08

(3) 2 0 8 34.19
29.55
+4.64

23 0 4 10.5
3 39.8
+8.07

3 4 3 5 42.2
06.5
+33.4

0 8 2 7 20.8
2 6 54.2
+26.6



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10030 Reduction to apparent Place 9

H+α	02	27.1	36°46'.5	
H	0	21.6		
α_0	01	05.5		
G	23	08.9		
G+λ	25	14.4	18° 36'	

log cos(G+λ)	9.9767	g'
log g	1.3936	
log Sin(G+N)	9.5037	g
" tan δ_0	9.5086	
	8.8239	

log (g')	1.3703
" (g)	9.2298

(g)	+3.712
(g)	+0.170
(h)	+1.858
	+4.740

δ_0	17° 52'.5	
log cos δ_0	9.9785	
log i	9.9206	
log (i)	9.8991	
log sin δ_0	9.4870	h'
Cos (H+α_0)	9.9036	
log k	1.3108	
log Sin (H+N)	9.7772	h
	8.8239	
Sec δ_0	0.0215	

log (h')	0.7014
" (h)	9.9337

g'	+23.46
h'	+05.03
(i)	+0.79
	+29.28

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10030 Reduction to Apparent Place 9

H+λ	02	27 1	34°44'5"	
H	0	21.6"		
λ	12	05.5"		
G	23	08.9"		
G+λ	25	14.4"	18' 36"	

log cos(G+λ)	9 9 7 6 7			
log q	1.3 9 3 6			
log sin(G+λ)	9.5 0 3 7 1			
tan δ₀	9 5 0 8 5			
	8 8 2 3 9			
log(q')	1.3 7 0 3			
q'	9 2 2 9 8			

δ₀		17' 52.5"		
log cos δ₀	9.9 7 8 5			
log i	9 9 2 0 6			
log(ii)	9.8 9 9 1			
log sin δ₀	9.4 8 7 0			
cos(H+λ)	9.9 0 3 6			
log k	1.3 1 0 8			
log sin(H+λ)	9.7 7 7 2			
	8.8 2 3 9			
sec δ	0 0 2 1 5			
log k'	0.7 0 1 7			
k'	9 9 3 3			

δ	+3.7 1 2			
q'	+0.1 7 0			
k'	+1 8 5			
	+4.7 4 0			

q'	+2 3 4 6			
k'	+0 5.0 3			
ii	+0 7 9			
	+29.2 8			

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10030 Lunar Parallax. 10

α'	02	05	34.38
θ	03	27	49.70
$\theta - \alpha'$	+01	22	15.40
=	20°	33'	51.0
$\frac{1}{2}(\alpha - \alpha')$		07	28.86
	20°	26'	22.14
log tang'	9.957277		
log cos $\frac{1}{2}(\alpha+\alpha')$	0.000000		
Sec $(\theta - \alpha') - \frac{1}{2}(\alpha - \alpha')$	0.002824		
log tan χ	9.985501		

χ	44	02	39.2
δ'	17	52	57.4
$\chi - \delta'$	26	09	41.8

log sin ϕ	9.826400
log sin π	8.201550
Sin $(\chi - \delta')$	9.644344
Cosec χ	0.157789
Sin $(\delta - \delta')$	7.830133

$(\delta - \delta')$		23'	14.96
δ	+18	16	12.4
Eph δ	+18	16	08.3
O−C			+4.1
Curv.			+0.2
2nd Ord. Ref			0.0
Irr. Cor −			0.8
δ =	+18	16	12.4
O−C =			+4.1

π		54'	40.56
log sin ϕ'		9.869.13	
log sin π		8.201550	
Sin $(\theta - \alpha')$		9.545622	
Sec eph δ		0.002+7	
Sin $(\alpha - \alpha')$		7.638722	

$\alpha - \alpha'$ +14' 57.73

= +59.85

α	02	06	34.15
Eph α	02	06	33.34
O−C			+0.81
Curv.			−0.01
Irr. Cor −			0.02
α =	02	06	34.13
O−C			+0.79

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Lunar Parallax.

12 05 34.30
03 27 49.70
+01 22 15.40
20 33 51.0
07 28 8.6
20 26 22.14

0 0 0 0 0 0
0 0 2 8 2 4
9.9 8 5 5 1

44 02 39.2

17 52 57.4
24 09 41.8

2

8 2 0 1 5 0
9 6 4 4 3 4
0 1 5 7 8 9
7.8 3 0 1 3

23 14.96

+18 16 12.4

+18 16 08.3

+4.1

Corr + 0.2
+0.2

2nd Ard Ref 00

Par Corr 0.0

δ = 18 16 12.4

O-C + 4.1

54 40.56

8 2 0 1 5 0
9.5 4 5 6 2
0.0 2 2 4 7
7.6 3 8 7 2

+14 57.73

+59.85

02 06 34.1

02 06 33.34

+0.81

Corr. - 0.01

Par Corr - 0.0

α = 02 06 34.1

O-C + 0.79

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10031 Dur. **Star Measures.** Tycho 23.8 15.8 11

1.	17606	15408	18582	16139
10.7	10981	12029	16756 }61	7972
16.2	81	29	66	72
	02	5462	86	6149
	10.6622	10.6623	16.1822	16.1824

2	18301	16598	17329	15970
20.6	12351	12558	10529 }26	12760 }57
8.6	51	12558	23	54
	05	6606	29	5970
	20.5950	20.5956	8.6803	8.6787

3	17935	15218	17082	15653
28.3	15562 }65	7601 }98	14157 }59	8573 }72
26.3	68	7595	14161	71
	40	5222	.82	5663
	28.2370	28.2376	26.2923	26.2913

Moon Measures.

1	18722	14213
22.6	10218 }16	12713
14.9	14	13
4 mm	18	.4213
	14.8503	14.8500

2	17785	17108
22	8350 }49	16518 }20
14.9+	48	22
	79	7112
	14.9431	14.9413

3	17109	17452
21.	9950	14596 }00
15.7	50	4604
	11	7450
	15.7159	15.7151

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C131 Jup 3. Star Measures. Tycho 23.8 15.8 11

	17426	15708		18582		16139	
7	11781	12027		16756	61	7972	
2	81	29		64		72	
	02	5402		84		6149	
	16.66.22	16623		16.18.22		16.18.24	

	18301	16598		17329		15978	
6	12351	12558		12529	24	12760	54
6	51	12558		23		54	
	05	6606		27		6970	
	20.59.50	20.59.56		86803		86787	
						47	

	17935	15218		17082		15693	
3	15562	7084	44	14157	59	8573	72
3	68	7595		14161		71	
	40	5222		82		5663	
	28.23.70	28.23.76		26.29.23		26.29.13	

Moon Measures.

				18722		14213	
6				10218	14	12713	
9				14		13	
				18		4213	
				14.85.03		14.85.00	

				17785		17108	
9				8350	49	16518	20
				48		22	
				79		2112	
				14.94.31		14.94.13	

				17109		17452	
7				9950		14596	90
				50		4604	
				11		7450	
				15.71.59		15.71.51	

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10031 Moon Measures 12.

4		14694				17801			
209		6130	}	31		16388	}	81	
16		32				82			
		98				7801			
	20.85566				20.85-80				

5		17486				16782			
20.7		10289	}	87		13944	}	42	
6.6		85				40			
		82				6786			
	20.71795				20.7179				

6									
20.7		16151				16708			
17		8708	}	69		1314.2	}	40	
		10				38			
		47				6712			
	20.74440				20.7432				

7									
21.3		16895				17012			
8		14389				9512	}	15-	
		89				18			
		91				7018			
	21.2505				21.2499				

8									
22.									
18.4									
						16443			
						11819	}	16	
						13			
						41			
					18.4627				

						17619			
						12248	}	45-	
						42			
						7623			
					18.4625				

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031 Moon Measures

14694			17801		
6130	31		16388	81	
32			82		
78			7801		
20.85566			20.85780		

17486			16782		
10217	19		13982	42	
			40		
86			6786		
207495			207178		

16181			16708		
8708	19		13142	40	
10			38		
47			6712		
207440			207432		

16895			17012		
14389			9598	15	
89			14		
91			7018		
212556			212599		

16443			17609		
11819	14		12288	45	
13			42		
41			7623		
184627			184625		

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10031 Times Etc

Dec 16. 1915

Exp'ts Stars	03	44			03	56	
" " Moon	03	49	31.7		03	49	31.3
Error Clock (fast)		05	12.2				
H Sid Time	03	44	+19.0		θ − α = +1h 37m		
H long.	04	44	31.05				
G. Sid Time	08	28	50.05				
Sid Time M. Nom	17	36	11.25				
Interval	14	52	38.80				
Reduction		2	26.24		14.83368		
G. M. T.	14	50	12.56				

From Naut. Almanac			RA		Decl.	
Moon 14h	02	05	26.16	+18	10	15.5
Motion +1m			1.9899			10.439
" " 50.2093		+1	39.91		+8	44.13
Tabular Place	02	07	6.074	+18	18	59.6

934 = 13.3

a = 5044
+24
−4764

Moons Age 10 days

Parallax	54'	40.29	
Semi diam	14	55.5	
R		895.5	
aug. 14		12.2	
Jup 4		−0.6	
R		907.1	
R		1.9444	
aR		−926	
(1+a)R		1.85518	
R²		3.42922	

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M 31 Time Etc 13
Dec 16 1915

Exp't Stars	03	44			03	56		
" Mean	03	49	31.1		03	49	31.3	
Error Clock (gain)		05	12.2					
☿ Sid Time	03	44	19.0		⊙ − λ = + 1h 37m			
☿ long.	04	44	31.05					
G Sid Time	08	28	50.05					
Sid Time M. Mean	17	8	11.25					
Interval	14	52	38.80					
Reduction		2	26.24					
G M T	14	52	12.56					

			RA		Decl.		
Mean Mant Equinox							
Mean 14h	02	05	26.16		18	10	15.5
Motion 1m			19899				10.432
" " 50.2093		-1	39917		+ 8	44	13
Tabular Place	02	07	6.0771		18	18	59.6

Mean Anom	10 day	
Parallax	54'	40.29
Sun diam	14	55.5
R		8955
Aug. 4		122
		- 0.6
Sun		9071
R		19444
R.		- 926
4R		18518
1 + 4R		34292
R²		

934 = 13 3'

a = 5 C C 4
+ 24
- 4 7 6 4

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10031 Plate Constants. 14

X	10.6622	20.5953	28.2373
ξ	10.2989	20.7006	28.7920
X-ξ	+.3633	-.1053	-.5547

y	16.1823	8.6795	26.2918
η	16.1230	8.2082	26.6766
y-η	+.0593	+.4713	-.3848

X-ξ +500X +38y +.4X -95.83

+.3633 + 5331 = -.8964 + 615 = 95.79 + 4 = 95.83
-.1053 + 10298 = 9245 + 330 = 95.75 + 8 = 95.83
-.5547 + 14119 = 8572 + 999 = 95.71 + 11 = 95.82
22.5705 + 11285 + 635 + 9 = 22.8051

y-η +500y -36X +1.7y -8329

.0593 + 8091 = 8684 - 384 = +8300 + 27 = 8327
+.4713 + 4340 = 9053 - 741 = +8312 + 15 = 8327
-.3848 + 13146 = 9298 - 1016 = +8282 + 44 = 8326
16.7023 + 8351 - 812 + 28 = 16.6268

Table a = +0.8 c = -0.1 a-c = +0.9 b+d = -1.0
Obs = -500.4 = -501.7 = +1.3 = -2.0

O-C -5012 -5016 -1.0

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1911 31 Plate Constants. 14

X	10.6422	31.5953	2823.73
ξ	10.2984	20.7106	2771.26
X-ξ	+.3433	-.1053	-.5517

Y	116.1823	8.6745	26.2718
η	116.1230	8.2082	34.7766
Y-η	+.0593	+.4713	-.3848

X-ξ +500X +38Y +1X -95.83

+.3433 + 53.31 = -.8964 + 615 = 95.79 + 4 = 95.83
-.1053 + 10.298 = 924.5 + 330 = 90.75 + 5 = 95.83
-.5517 + 14.119 = 857.2 + 999 = 95.71 + 11 = 95.82
22.570 + 112.5 + 635 + 4 = 22.1051

Y-η +500Y -36X +17Y -8327

+.0593 + 8.091 = .6847 - 324 + 8300 + 27 = 8327
-.4713 + 4.340 = 9053 - 71 = +8312 + 15 = 8327
-.3848 + 13.146 = 9298 - 1016 = +8282 + 44 = 8326
16.7023 + 8.351 - 212 - 28 = 16.6263

Table a = -0.8 c = -0.1 G-4 = -0.9 b = +1 -1.0
Obs = -500.4 = -50.17 = +1.3 = -2.0

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10031 Moore's Center 15-

	X	X − X₀	ΔX	(X − X₀)² + (Y − Y₀)²		O − C
1	22.5710	0.0000	− 2	00000	3.4288	− 4
2	22.0000	− 0.5710	− 2	03261	3.4226	− 66
3	21.0000	− 1.5710	− 1	2.4697	3.4409	+ 117
4	20.8573	− 1.7137	− 1	2.9364	3.4292	000
5 X	20.7187	− 1.8523	+ 0	3.4310	3.4310	+ 18
6	20.7436	− 1.8274	+ 0	3.3394	3.4282	− 10
7	21.2502	− 1.3208	+ 1	1.7447	3.4298	+ 06
8	22.0000	− 0.5710	+ 2	0.3262	3.4262	− 30

$R^2 = 34292$

	Y	Y − Y₀	ΔY			
1	14.8502	− 1.8518	− 1	3.4288	180°	
2	14.9422	− 1.7598	− 1	3.0965	198°	
3	15.7155	− 0.9865	− 0	0.9732	238°	
4	16.0000	− 0.7020	− 0	0.4928	248°	
5	16.7020	0.0000	+ 0	0.0000	270°	
6	17.0000	+ 0.2980	+ 0	0.0888	279°	
7	18.0000	+ 1.2980	+ 1	1.6851	315°	
8	18.4626	+ 1.7606	+ 1	3.1000	342°	162

approx Center

X = 22 y = 14.9422

18.4626

2 33.4048

Y_0 16.7024

Y_{min} 14.8502

R 1.8522

Com R. 1.8518

X_{min} 20.7187

1.8520

X_0 22.5707

Moore's Center X_0 22.5710

Y_0 16.7020

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10031 Moons Center 15-

	X	$x - x_0$	Δx	$(x-x_0)^2$	$(y-y_0)^2$	O-C
	225700	00000	+2	00000	34288	- 4
	220000	-0.5710	-2	03261	34226	- 61
	210000	-1.5710	-1	24697	34409	+ 117
	208573	-1.7139	-1	29364	34292	001
X	207187	-1.8523	+0	34310	34318	+ 15
	207436	-1.8274	+0	33394	34282	- 16
	212502	-1.3208	+1	17447	34298	+ 06
	220000	-0.5710	-2	03262	34262	- 31

R^2: 34292

	Y	$y - y_0$	Δy		
Y	148502	-1.8518	-1	34288	180°
	149422	-1.7598	-1	30465	198
	157155	-0.9865	-0	09732	233
	160000	-0.7020	-0	04928	248
	167020	0.00000	+0	00000	270°
	170000	+0.2980	+0	00888	279
	180000	+1.2980	+1	16855	325
	184626	+1.7606	+1	31000	342

Approx Center

X = 22 Y = 149422

184626

233048

y_0 167024

y max 14850 2

R 1.8522

Corr R 1.8518

x_{max} 207187

1.85220

x_c 225707

Moons Center x_0 225700

y_0 16.7020

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Formation by Normals.

1	+0.000
2	+0.998
3	+1.556
4	+1.220
5	+0.000
6	−0.555
7	−1.172
8	−1.000
	+3.774
	−3.277
	+0.497

	+000.0
	+376
	−184.0
	−0.0
	−33.3
	+18.3
	−7.9
	+12.0
	+72.9
	−225.2
	−152.3

	+7.4
	+116.0
	−11.6
	−0.0
	−0.0
	−3.0
	+7.8
	−53.8
	+131.2
	−67.4
	+63.8

a	b	−15 + pC
+0	+4	−11
+5	+3	−7
+14	+2	+1
+15	+1	+1
+17	+0	+2
+16	−1	+0
+12	−3	−6
+5	−3	−13

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10031 Conditional Equations 16

									O-C
1	+0.00	−1.85	= − 4	+00	− 9	− 9	+ 5		
2	−0.57	−1.76	= − 66	+ 6	− 9	− 3	− 33		
3	−1.57	−0.99	= +117	+17	− 5	+12	+105		
4	−1.71	−0.70	= +000	+18	− 4	+14	− 14		
5	−1.85	−0.00	= + 18	+20	− 0	+20	− 2		
6	−1.82	+0.30	= − 10	+19	+ 2	+21	− 31		
7	−1.32	+1.30	= + 06	+14	+ 7	+21	− 15		
8	−0.57	+1.76	= − 30	+ 6	+ 9	+15	− 45		
	−9.42	−1.94				+110	− 140		

arc 31

				Corr O-C
1457	+0.47	= −15230	−9.42	
				− 6
+ 0.47	+12.86	= + 6380	− 1.94	−40
				+106
+ 0.47	+ 0.01	= − 487	− 0.30	− 13
				0
	+12.85	= + 6867	− 1.64	−31
			b = +5.34	−21
1457	+ 2.51	= −1523	a = −10.62 ± 0.64	−58

arc 162

$\frac{f}{n}$ = .20	$\frac{\Sigma v}{n}$ − 3.7	$\frac{-3.7}{20}$ = − 18	Δ R = − 0.2
			Corr +0.2
			True Δ R = − 0.4

−ΔR = −3.7 δ Δ = −ΔR Corr = − 0.74 −15

Δ b = +0.10 (+2)

Δ δ = + 0.1

Δ a = + 0.47 (+9)

Δ α = + 0.02

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10031 Conditional Equations 16

										O-C
1	-0.000	-1.855	= - 4	+0.000	- 9	- 9	+ 5			
2	-0.537	-1.716	= - 46	+ 6	- 9	- 13	- 33			
3	-1.537	-0.499	= +117	+ 17	- 5	+ 12	+105			
4	-1.771	-0.710	= +000	+ 18	- 4	+ 14	- 14			
5	-1.855	-0.000	= + 18	+ 20	- 0	+ 20	- 2			
6	-1.813	+0.310	= - 10	+ 19	+ 2	+ 21	- 31			
7	-1.332	+1.310	= + 06	+ 14	+ 7	+ 21	- 15			
8	-0.537	+1.716	= - 30	+ 6	+ 9	+ 15	- 45			
						+110	-140			

$$14.57 + 0.47 = -152.30$$

$$+ 0.47 + 12.86 = +63.80$$

$$+ 0.47 + 0.01 = - 4.87$$

$$+ 12.85 = +68.97 \qquad \delta = +5.34''$$

$$14.57 + 2.51 = -152.3 \qquad \alpha = -10.62''$$

Arc 162

$$\frac{\Sigma v}{n}$$

$$\frac{\Sigma}{n} = .20 \qquad -3.7 \qquad -\frac{3.7}{20} = -.18 \qquad \Delta R = -0.2$$

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10031

Means Mean Position

X_0	22.57104	η_0	16.70208
	− 5		+ 3
	22.57054		16.70233

From Plate Constants

ξ	22.80551	η	16.62663
	−22		−18
	+.80551	$\eta_1+\eta_0$	−1.37337

log ξ_1	9.905855	log tan δ	9.50996
log cos δ_0	9.97841 } add	log ξ^2	9.81174
	8.50724		7.05534
log sin $(\alpha-A)$	1.42020	log η_1	6.37447
=	+26.31	η_1	0.00002
		η_0	−1.37339

A	02 05 24.93	log η_0	0.13796m
α_0	02 05 51.24		7.33115
Red	+4.74	log tan $(\delta-\Sigma)$	2.80681m
α'	02 05 55.98		−6409.3
		$\delta-\Sigma$	−10 40.9
		Σ	18 05 41.9
		δ_0	17 55 1.0
		Red	29.8
		δ'	17 55 30.8

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1 00 31

Mean Place

X_0 22.5710 − 5 = 22.5705

Y_0 16.7020 + 3 = 16.7023

From Plate Constants

ξ 22.8051 − 22 = +.8051

η 16.4263 − 18 = $\eta - \eta_0$ = −1.3737

log ξ 9.905885

log cos δ 9.977841

8.507274

log $m(\alpha - A)$ 1.420220 = +26.31

A 02 05 24.93

α_0 02 05 51.24

Red +4.74

α' 02 05 55.98

log tan δ 9.95196

log δ' 9.81117

7.05534

log η_0 6.37747

η_0 0.00002

η_0 − 1.37389

log η_0 0.137906

7.33115

log tan $(\delta - \delta')$ 2.80681n

−6409.3

$\delta - \delta'$ −10 40.9

δ 18 05 41.9

δ_0 17 55 1.0

Red 27.3

δ' 17 55 30.3

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α'	02	05	55.98	
θ	03	44	19.00	
$\theta-\alpha'$	1	38	23.02	
$\frac{1}{2}(\theta+\alpha')$	24	35'	45.30	
$\frac{1}{2}(\alpha-\alpha')$		8	52.05'	
$\frac{1}{2}(\theta+\alpha')-\frac{1}{2}(\alpha-\alpha')$	24	26	53.25	
log tan	9.95727			
log cos $\frac{1}{2}(\alpha-\alpha')$	0.00000			
log tan $\frac{1}{2}(\theta+\alpha')-\frac{1}{2}(\alpha-\alpha')$	0.04079			
log tan γ	9.99806			
γ	44	52	19.2	
δ'	17	55	30.3	
$\gamma-\delta'$	26	56	48.9	
log sin q'	9.82640			
log sin π	8.20153			
sin $(\gamma-\delta')$	9.65625			
cosec γ	0.15149			
sin $(\delta-\delta')$	7.83567			
$\delta-\delta'$		23	32.8	
δ	+18	19	03.1	
eph δ	+18	18	59.6	
O-C			+3.5	
Corr.			+0.2	
2nd Ord Red			0.0	
Dur. Corr			+0.1	
δ	+18	19	03.2	
O-C			+3.6	

π	54'	+0.29	
log sin q'	9.86913		
log sin π	8.20153		
" sin $\frac{1}{2}(\alpha-\alpha')$	9.61932		
" sec δ' eph	0.02258		
sin $(\alpha-\alpha')$	7.71256		
$\alpha-\alpha'$	1.7'	+4.1	
=	+1m	10.94	
α	02	07	06.92
eph α	02	07	06.07
O-C			+0.85
Corr.			-001
Dur Corr			+0.02
α	02	07	06.94
O-C			+0.87

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10031 Lunar Parallax. 19

	02	05	55.98
	03	44	19.00
$-x'$	1	37	23.02
$=$	24	35'	45.30
$(\alpha-\alpha')$		8	52.05
$\alpha'+\frac{1}{2}(\alpha-\alpha')$	24	26	53.25

tan f	9.995727
$\frac{1}{2}\cos(\alpha+\alpha')$	c.c.c.c.c.1
$\frac{1}{2}(\alpha-\alpha')\sin 1''$	0.004075
tan y	9.199806

y	44	52	19.2
δ'	17	55	30.8
$x-\delta'=\delta'$	26	56	48.9

log sin y	9.826400
log sin π	8.201533
sin $(y-\delta')$	9.453125
cosec y	0.151491
sin $(\delta-\delta')$	7.835625

$\delta-\delta'$		23	32.8
δ	+18	19	03.1
Eph. δ	+18	18	59.6
O-C			+3.5
Corr.			+0.2
2nd Aid Ref			0.0
Fin Corr			+1.1
δ	+18	19	03.2
O-C			+3.6

π		54'	+0.29
log sin 1'			7.463727
log sin π			8.201533
" sin $\frac{1}{2}x'$			9.461932
" sec δ' sin $\frac{1}{2}x$			0.022556
sin $(\alpha-\alpha')$			7.712.556
$x-x'$		1.7'	+7.1
$=$		1'	10.94

a	02	07	06.92
Eph α	02	07	04.07
O-C			+2.85
			-0.01
Fin Corr			+2.84

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10072 Dec 4 Star Measures Tycho 23.6 15.8 21

1	15752	18042	18514	18645
12.7	8213 } 16	15578 } 76	15738 } 34	11418
36.3	19 }	74 }	30 }	18
	48	8040	14	8641
	12.75 33	12.95 35	26.27 80	26.27 76
2	11 83 48	16651	18236	16083
27.1	16573 } 72	8438 } 39	17586 } 84	6732 } 30
9.1+	71 }	40 }	82 }	28 }
	44	6651	38	6083
	27.17 76	27.17 88	9.06 52	9.06 47
3	15919	17499	18049	18206
28.8	8002 } 05	15410	16603	9632 } 36
23.1	08 }	10	03	40 }
	13	74.91	49	8206
	28.79 10	28.79 13	23.14 46	23.14 80

Moon Measures

1	17237	15820	16976	16676
34.4	14246 } 44	8832 } 31	13950	9690
15.3	42 }	30 }	50	90
pe.	27	5822	72	6676
	24.29 91	24.30 09	15.30 25	15.30 15
2	14712	16148		
24.9+	4958 } 60	15868 } 73		
16	62 }	78 }		
	08	61.48		
	24.99 48	24.97 26		
3	16820	16107		
25.2	14835 } 39	8080		
16.8	44 }			
Y	6818	6107		
	25.19 81	25.19 73		

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172 Dec 4 Star Measures Tycho 23.4 15.8 21

15752	18042	18514	18645
8213 } 16	15578 } 76	15738 } 34	11418
79	74	30	18
48	8040	14	8641
12.7533	12.7536	26.2780	26.2776

118348	16651	18284	16083
16573 } 72	8438 } 39	13586 } 84	66732 } 30
71	41	82	28
44	6651	18	6083
27.1776	27.1788	9.0450	9.0647

15909	17499	18049	18226
8002 } 05	15410	16603	9632 } 36
08	10	03	40
13	7491	49	8226
28.7910	28.7913	23.1446	23.1480

Moon Measures

17237	15820	16976	16676
14246 } 44	8832 } 31	13950	9690
42	30	50	90
22	5820	72	6676
24.2996	24.3009	15.3025	15.3014

14712	16148
4958 } 60	15868 } 73
62	78
08	6148
24.9748	24.9728

16820	16107
14832 } 39	8080
44	
6818	6107
25.1981	25.1973

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Mean measures.

10072.

4. 158.25 — 161.19
9.5.2 — 138.82 } 81 — 80.58 } 60
170 — 80 — 62
21 — 61.13
25.1943 — 25.1945

5. 17162 — 16132
25 — 10056 — 13.230 } 32
17.8 — 56 — 34
62 — 61.42
17.7106 — 17.7096

6. 15978 — 18722
24.8 — 78.72 } 77 — 168.39 } 40
18.0 — 82 — 41
80 — 87.14
24.8103 — 24.8119

7. 17321 — 17434
240 — 11381 — 13386 } 91
18.6 — 81 — 96
11 — 7440
18.5936 — 18.5950

8. 16560 — 16972
9470 } 77 — 14071 } 73
72 — 75
6564 — 6972
18.7089 — 18.7101

9. 15532 — 16116
23 — 8792 — 12842 } 47
17.7 — 92 — 52
5532 — 6112
18.6740 — 18.6732

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1915phae.proj.1

Mean Measures

10072
15825
13822 } 21
2121
25.1943

16119
8558 } 60
62
6113
25.19481

17162
10056
56
62
17106

16132
13230 } 32
34
6142
17096

15778
7872 } 77
82
80
24810 3

18732
16839 } 40
41
8714
24819

17321
11381
81
11
18.59.36

17434
13486 } 91
96
7440
18.59.50

16560
9484 } 71
72
6564
18.70.89

16272
14071 } 73
151
6972
18.71.04

15532
8792 } 47
92
5532
18.67.40

16116
12842 } 47
52
6112
18.67.32

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4 0 0 72.

Times etc

Dec 21. 1915

Sid Time	06	49	23.05		07	01	
Mean Time	06	54	44.7		06	54	45.0
Clock fast		5	21.8				
Sid Time	06	49	23.05	$s-\alpha = +0^h\ 19^m$			
Long.	04	44	31.05				
Sid Time	11	33	54.10	17.38.52			
Sid. Time M Noon	17	35	54.04				
Interval	17	38	0.06				
Reduction		2	53.33				
M. Mean Time	17	35	6.73				

From Naut. Alm.

			RA		Decl.
Moon 17h	06	29	04.94	+26	01 36.1
Motion in 1m			2.1818		-3.791
" 35.1122		1	16.61	-2	13.1
Tabular Place	06	30	21.55	+25	59 23.0

Moon's age 15.5

934 = 15

Parallax 54 00.21

Semi-diam 14 44.5

R 884.5

Dip 13.4

4 -0.6

R 897.3

R 1923.5

2R -922

1+q R 1831

R^2 3.35 37

a = -503.3
+24
-479.3

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3 55 1 1 1 3
17 5 8 55 1 9

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Dec 21. 1915

Eq ☆ Stars	06	49			07	01		
" " Moon	06	54	44.7		06	54	45.0	
Clock Error (fast)		5	21.8					
H. Sid Time	06	49	23.05					
H Long	04	44	31.05		$\Theta - \alpha = +0^h\ 19^m$			
G. Sid Time	11	33	54.10					
G Sid Time M Noon	17	55	54.04					
Interval	17	38	00.06					
Reduction		2	53.33					
G. M. T.	17	35	6.73					

From Naut. Almanac R.A. Decl.

Moon 17^h 2	06	29	04.94		26	01	36.1	
Motion in 1^m			2.18	18			3.7	91
" " 35.1122		1	16.61			2	13.1	1
Tabular Place.	06	30	21.55		25	59	23.0	

Moons age 15.5 days

Parallax	54		0.21
Semi diam	14	44.5	
R		884.5	
aug		13.4	
Syn 4		-0.6	
R		897.3	
R		1.9.23	
a R		92	2
(1+a) R		1.831	3
R		33	37

934 = 15

a = -503.3
+24
-479.3

a =
+24

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10072 Plate Center 24

12.7534 26.2778 06 23 37.08 27 01 25.1
27.1782 9.0650 06 32 14.65 24 39 44.3
28.7912 23.1438 06 33 22.69 26 34 26.8
3 | 68.7228 3 | 58.4866 3 | 19 29 14.42 3 | 78 15 36.2
22.9076 19.4955 6 29 44.81 26 05 12.1
22 - 18 - - 28.13 - 11 37.4
- .9076 - 1.4955 06 29 16.68 25 53 34.7
31s 466.5
- 28.1356

Plate Center { A = 06 29 16.68
D = 25 53 34.7

X-ξ +500X +126.8ξ +3.3X-14590
+.4839 + 6.377 = 1.216 + 3332 = 1455 48 + 42 = 14590
-.0238 + 13589 = 13351 + 1149 = 14500 + 90 = 14590
-.2835 + 14395 = 11560 + 2934 = 14494 + 95 = 14589
233665 + 1183 = +2140 +77 = 23.2975

Y-η +500y -1264X +5ξ -6637
-.5032 + 13139 = 8107 - 1601 = 6506 + 131 = 6637
-.5496 + 4532 = 10028 - 3436 = 6592 + 45 = 6637
.1412 + 11572 = 10160 - 3639 = 6521 + 115 = 6636
16.8778 + 8439 -2953 +84 = 16.7711

Table a = -0.1 c = -0.1 a-c = 0.0 b+d = 0.0
= -503.3 = -505 = +1.7 -0.4

O-C -503.2 -504.9 -0.4

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10.672, –

Plate center.

24

1	12.7534	26.2778	06	23	37.08	27	01	25.1
2	27.1782	4.0650	06	32	14.63	24	37	44.3
3	28.7912	23.1438	06	33	22.69	26	34	26.5
3 |	68.7228	3 | 53.4816	3 | 19	29	14.42	3 | 78	15	36.2
	22.9076	17.8272	6	29	44.81	26	05	12.1
	22	18			28.13		11	32
	.9076	1.4955	06	29	16.68		53	34
	31.5	466.5						
	28.1356							

Plate Center { A = 06 29 16.68 ; δ 25 53 34

X – 5 + 502 X + 1268 Y – 3.3 Y – 14590

+.4839 + 6377 = 11218 + 3332 = 14548 + 42 = 14590

–.0235 + 13589 = 13554 + 1149 = 14500 + 90 = 14590

–.2835 + 14395 = 11560 + 2934 = 14494 + 95 = 14589

23366 + 1683 = 5047 + 2140 = + 77 = 23.2975

1 – 71 + 500 Y – 1284 X + 5Y – 6637

.5032 + 13139 = 8187 = 1601 = 6506 = 131 = 6637

.5496 + 4532 = 10028 = 3436 = 6592 = 45 = 6637

.1412 + 11572 = 10160 = 3634 = 6521 = 115 = 6636

16.8978 + 8429 – 2953 + 84 = 16.7711

Table a = – 0.1 b = – 0.1 a – d = 0.0 b + d = 0

= – 503.3 – 503 = + 1.7 – 0.4

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Curvature of Plate:

	ξ	η	Δξ	−3.2ξ	0+c	+.5η	+6
1.	−9.73	+8.73	−40	+31	−9	+4	=−5
2	+5.20	−9.50	+16	−17	−1	−5	=−6
3.	+7.07	+5.26	+14	−23	−9	+3	−6
Moon	+1.30	−1.23	0	−4.		−1.	= +1

Δη	−2.87η	+15	−4
+37	−24 =	+13 −10	=+3
−28	+27 =	−1 +5	=+4
+11	−14 =	−3 +7	=+4
	+3	+1	= 0

	R.A.	Decl.
Correction to Moon	0.00	0.0

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	Cape No 923 mg 6.5	Cape No 943. mg 6.5	Cape No 946 mg 8.7
C	06 22 40 85	06 31 19.49	06 32 26.65
4	40 81	46	26.74
E	40 81	43	26.61
Mean	06 22 40.82	06 31 19.45	06 32 26.67
Prec	+56.26	+55.20	+56.02
Q	06 23 37 08	06 32 74 65	06 33 22.69
A	06 29 16.68	06 29 16.68	06 29 16.68
Q-A	− 5 39.60	+ 2 57.97	+ 4 06.01
Sin(Q-A)	− 339.56	+ 177.97	+ 246.00
log "	2.530925	2.250355	2.390944
" Cos δ	9.994979	9.958466	9.951551
" ξ_0	0.987955	0.716055	0.849769
ξ_0	−9.7264	+5.2005	+7.0743
ξ_1	− 0041	+.0015	0014
ξ	12.2695	27.2020	29.0757
X	12.7534	27.1782	28.7912
X-ξ	+.4839	−.0238	−.2835

C	27 01 55.55	24 40 260	26 35 09.9
4	55.9	262	09.8
E	54.8	256	09.6
Mean	27 01 55.4	24 40 25.9	26 35 09.8
Prec	−30.3	−41.6	−43.0
δ	27 01 25.1	24 39 44.3	26 34 26.8
Θ	25 53 34.7	25 53 34.7	25 53 34.7
δ-Θ	+1 07 50.4	−1 13 50.4	+ 40 52.1
tan δ-Θ	+ 4070.9	−4431.1	2452.2
log "	3.609169	3.646551	3.389556
log η_0	0.940844	0.977666	0.720711
log tan δ	9.70776	9.66191	9.69911
log ξ_0^2	1.97559	1.43211	1.69933
log m_1	8.73369	8.14774	8.45118
η_0	+8.72655	−9.49866	+5.25677
m_1	0.05450	0.01402	0.02833
η	26.78105	8.51540	23.28509
y	26.27782	9.06500	23.14387
y-η	−.50323	+.54960	−.14122

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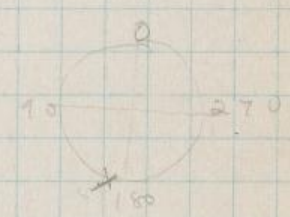
10072 Standard Coordinates 25

	Cape No. 923 mg 6.5	Cape No. 943 mg 6.5	Cape No. 946 mg 8.7
C	06 22 40.85	06 31 19.47	06 32 26.65
9	40.81	19.46	26.74
8	40.81	19.43	26.61
Mean	06 22 40.82	06 31 19.45	06 32 26.67
Prec	+5.26	+5.20	+5.02
α	6h 23m 37.08	6h 32m 14.65	6h 33m 22.
A	06 29 16.68	06 29 16.68	06 29 16.68
α-A	− 5 39.60	+ 2 57.97	+ 4.0601
sin B·N	− 339.56	+ 177.99	+ 246.00
log "	2.530972	2.250835	2.390944
log cos β	9.947727	9.995846	9.975151
" ξ₀	0.987795	0.716005	0.647469
ξ₁	−9.7264	+5.2005	+7.0743
ξ₂	− 0.0456	+.0012	.0014
ξ	12.26955	27.2020	29.0757
Y	12.75334	27.17782	28.7912
Y−ξ	+ .4839	− .0238	− .2835

	Cape No. 1	Cape No. 40	Cape No. 260	Cape No. 35	09.9
C	27 01 55.5	24 40 26.0		26 35	09.9
9	55.9	26.2			09.8
8	54.8	25.6			09.6
Mean	27 01 55.4	24 40 25.9		26 35	09.8
Prec	−30.3	−11.6			−4.30
δ	27 01 25.1	24 39 44.3		26 34 21.	
Φ	25 53 34.7	25 53 34.7		25 53 34.7	
δ−Φ	+1 07 50.4	−1 13 50.4		+ 40 52.1	
ten "	+ 4 670.9	− 4438.4		2452.2	
log "	3.609160	3.646511		3.384956	
log η₀	0.940844	0.977766		0.720711	
log tan δ	9.707611	9.668195		9.699114	
" ξ₀²	1.975599	1.432141		1.699818	
" η₁	8.733697	8.145974		8.451828	
η₀	.8726	−.9486		−.32567	
η₁	0.05345	0.01412		0.02283	
η	24.18427	25.15154		23.28350	
4	24.27785	9.06550		23.14385	
y−η	.5032	+.5496		−.1412	

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10072 Moores Center 26

	X	$X-X_0$	ΔX	$(X-X_0)^2$	$+(Y-Y_0)^2$	O−C	
1	24.30000	+0.93740	0	0.87924	3.35559	+	19
2	24.99737	+1.60777	0	2.58479	3.35556	+	16
3 X	25.19777	+1.83147	0	3.35551	3.35551	+	11
4	25.19444	+1.82847	0	3.34430	3.35799	+	89
5	25.00000	+1.63740	0	2.67700	3.36224	+	84
6	24.81111	+1.47451	0	2.08833	33472	−	68
7	24.00000	+0.63740	0	0.40620	3.34874	−	56
8	23.36600	+0.00000	0	0.00000	33548	+	8
9	23.00000	−0.36600	0	0.13340	33585	+	35

Should be +3 larger

$R^2 = 3.35537$

	Y	$Y-Y_0$	ΔY	$(Y-Y_0)^2$		
1	15.30200	−1.57760	−1	2.48835	149	
2	16.00000	−0.87800	+0	0.77109	119 v	
3	16.87780	0.00000	+0	0.00000	90 v	
4	17.00000	+0.12220	+0	0.01493	86 v	
5	17.71101	+0.83321	+0	0.69424	63 v	
6	18.00000	+1.12220	+0	1.25889	52 v	
7	18.59433	+1.71653	+1	2.94644	20 v	
8 y	18.70935	+1.83155	+1	3.35548	0 v	
9	18.67366	+1.79586	+1	3.22445	349 v	161

approx. Center

Com R = 1.83114
X max = 25.19777
X_0 = 23.36663

Moores Center { X_0 23.3660
Y_0 16.87780

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10072 Moons Center 286

	X	X - X_0	ΔX	$(X-X_0)^2$ + $(Y-Y_0)^2$	O - C
1	24.3000	+0.9340	0	0.87924 3.35559	+ 19
2	24.9737	+1.6077	0	2.58477 3.35556	+ 12
3 X	25.1977	+1.8317	0	3.35551 3.35551	+ 11
	25.1944	+1.8287	0	3.34430 3.35799	+ 39
	25.0000	+1.6340	0	2.67000 3.31224	+ 84
	24.8111	+1.4451	0	2.08833 3.33472	- 68
1	24.0000	+0.6340	0	0.40200 3.34881	- 56
1.	23.3660	+0.0000	0	0.00000 3.35481	+ 8
	23.0000	-0.3660	0	0.13400 3.35485	+ 35

Should be +3 Van

$R^2 = 3.35537$

	Y	Y - Y_0	ΔY	$(Y-Y_0)^2$	
1	15.3020	-1.3760	-1	2.48350	150
2	16.0000	-0.8780	+0	0.77109	130
3	16.8780	0.0000	+0	0.00000	90
4	17.0000	+0.1220	+0	0.01489	83
5	17.7101	+0.8321	+0	0.69224	163
6	18.0000	+1.1220	+1	1.25889	30
7	18.5943	+1.7163	+1	2.94464	20
8	18.7093	+1.8313	+1	3.35548	10
9	18.6736	+1.7956	+1	3.22465	349 161

approx. Center

Corr R = 1.8314

Y_{max} = 25.1977

X_0 = 23.3663

Moons Center $\begin{cases} X_0 & 23.3660 \\ Y_0 & 16.8780 \end{cases}$

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Formation of Normals.

1	− 1.47	+ 17.7	− 30.0
2	− 1.42	+ 25.8	− 14.1
3	+ 0.00	+ 19.0	− 00.0
4	+ 0.22	+ 71.5	+ 4.7
5	+ 1.35	+ 137.0	+ 73.0
6	+ 1.61	− 98.0	− 76.0
7	+ 1.08	− 35.3	− 96.0
8	+ 0.00	+ 0.00	+ 14.6
9	− 0.66	− 13.0	+ 62.5
	+ 4.26	+ 2711.0	+ 1548
	− 3.55	− 1463	− 216.1
	+ 0.71	+ 1247	− 61.3
		Error ± 28.6	Error ± 14.8
		+ 153.3	− 46.5

− a	− b	-15^{s} + ΔC	
+ 8	− 8	− 15	✓
+ 14	− 4	− 5	✓
+ 16	− 0	+ 1	✓
+ 16	+ 1	+ 2	✓
+ 15	+ 4	+ 4	✓
+ 13	+ 5	+ 3	✓
+ 6	+ 9	+ 0	✓
+ 0	+ 9	− 6	✓
− 3	+ 9	− 9	✓

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10072 Conditional Equations 27

						O − C
1 + 0.93	− 1.58	= + 19	+ 8	+ 1	+ 19	0
2 + 1.61	− 0.88	= + 16	+ 13	+ 1	+ 14	+ 2
3 + 1.83	− 0.00	= + 11	+ 15	+ 0	+ 15	− 4
4 + 1.83	+ 0.12	= + 39	+ 15	− 0	+ 15	+ 24
5 + 1.63	+ 0.83	= + 84	+ 14	− 0	+ 14	+ 70
6 + 1.44	+ 1.12	= − 68	+ 12	− 1	+ 11	− 79
7 + 0.63	+ 1.72	= − 56	+ 5	− 1	+ 4	− 60
8 + 0.00	+ 1.83	= + 8	+ 00	− 1	− 1	+ 7
9 − 0.37	+ 1.79	= + 35	− 3	− 1	+ 4	+ 31
	Error + 3					+ 134 − 143
						or. 31

15.45 + 0.71 = ~~+ 1247~~ = + 153.3 ± 9.59

+ 0.71 + 14.75 = ~~− 611.3~~ = − 46.5 ± 4.95

+ 0.71 + 0.03 = ~~+ 5.72~~ = + 7.04 ± 43

+ 14.72 = ~~− 69.0~~ = − 53.5 + 5.38 b = − 3.6 ± 0.31

~~+ 5.45 = 1247 − 0.6 = + 1241~~ a = + 10.1 ± 0.60

15.45 = 153.3 + 25 = + 155.8

				O − C	Corr.
+ 9	+ 6	= + 15	+ 7	− 8	
+ 16	+ 3	= + 19	+ 0	− 5	
+ 18	+ 0	= + 18	− 4	− 3	
+ 18	− 0	= + 18	+ 24	+ 26	
+ 16	− 3	= + 13	+ 74	+ 78	
+ 14	− 4	= + 10	− 75	− 72	
+ 6	− 6	= 0	− 53	− 53	
+ 0	− 7	= − 7	+ 18	+ 12	
− 4	− 6	= − 10	+ 48	+ 39	
			+ 171 − 132		
			or. = 38		

arc 161 $\frac{\Sigma K}{n}$

$\frac{P}{n}$ = .20 + 4.3 $\frac{+43}{20}$ = + 21

Δ R = + 0.3
Corr. + 0.2
Δ R = + 0.1

− 2RC = − 0.73 − 15

Δ b = − 0.23 − 5 Δ S = − 0.1

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10072 Conditional Equations 27

							O - C
1	0.93	- 1.58	= + 19	+ 8	+ 1	+ 19	0
2	1.61	- 0.88	= + 16	+ 13	+ 1	+ 14	+ 2
3	1.83	+ 0.00	= + 11	+ 15	+ 0	+ 15	- 4
4	1.83	+ 0.12	= + 39	+ 15	- 0	+ 15	+ 24
5	1.63	+ 0.43	= + 84	+ 14	- 0	+ 14	+ 70
6	1.44	+ 1.12	= - 64	+ 12	- 1	+ 11	- 79
7	0.63	+ 1.72	= - 56	+ 5	- 1	+ 4	- 60
8	1.00	+ 1.83	= + 8	+ 00	- 1	- 1	+ 7
9	0.37	+ 1.79	= + 35	- 3	- 1	- 4	+ 31

equinox +3 + 134 - 143

av. 31

15.45 + 0.71 = ~~+ 24.7~~ = + 15.33

+0.71 + 14.75 = ~~- 61.3~~ = - 46.5

+0.71 + 0.03 = ~~+ 5.72~~ = + 7.04

~~+ 14.72 = - 69.0 = - 53.5~~

15.45 = 12.47 - 6.6 = ~~+ 12.41~~

15 45 = 15 3.3 + 25 = ~~15 5.8~~

				O - C
+ 9	+ 6	= + 15		+ 7
+ 16	+ 3	= + 19		+ 0
+ 18	+ 0	= + 18		- 4
+ 18	- 0	= + 18		+ 24
+ 16	- 3	= + 13		+ 74
+ 14	- 4	= + 10		- 75
+ 6	- 6	= 0		- 53
+ 0	- 7	= - 7		+ 18
- 4	- 6	= - 10		+ 48

+ 171 - 132

arc 161 ΣK av. = 38

$\frac{P}{2}$ = .20 + 43 $\frac{+43}{20}$ = + 21 ΔR = +03

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10072 Uccons Mean Position 28

X_0 23.3660
+5
23.3665

Y_0 16.8780
-2
16.8778

From plate Constants.

X 23.2975
-22
ξ_0 +1.2975
log ξ_0 0.113110
" cos δ 9.954464
8.507274
log sin (α-A) 1.651222
sin (α-A) +44.79
(α-A) +44.79

A 06 29 16.68
α_0 06 30 01.47
Red +6.08
α' 06 30 07.55

Y 16.7711
-18
$\eta+\eta_0$ -1.2289
log tan δ 9.68330
log ξ_0^2 0.22662
7.05534
log η_1 6.9626

η_1 0.0009
η_0 -1.2298
log η_1 0.08984 n
7.33115
log tan (δ-D) 2.75869 n
tan (δ-D) -573.71
-9' 33.7"
D 25° 53 34.7"
δ_0 25 44 01.0
Red +0.9
δ' 25 44 01.9

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10172 Hecuba Mean Position 28

X_0 23.366 0"
+5"
23 36 64"

Y_0 16.878 0"
-12"
16.877 8"

Frame plate Constants

Y 23.297 5"
-22"
ξ +1.297 75

log ξ 0.113 10"
log sin δ 9.954 64"
8.507 24"
log m (λ-A) 1.665 122
δ (λ-A) +44.79
(λ-A) +44.79

A 06 29 76.68"

λ_0 06 30 01.47"

Red +6 -6.08

λ' 06 30 07.55"

η 16.877 11"
-18"
$\eta - \eta_0$ -1.229 89"

log tan δ 9.683 30"
log ξ² 0.226 22"
7.053 34"
log η_1 6.962 6"

η_1 0.000 09"
η_0 -1.229 98"
log η_2 0.089 84"
7.331 15"
log tan (δ-ε) 2.758 69"
tan (δ-ε) -573.71
-9° 33.9'

E 25° 53 34.7"

δ_0 25 44 01.0"

R.1 +0.9"
δ 25 44 01.9"

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06	24	00.81	
06	23	54.98	
		+5.83	

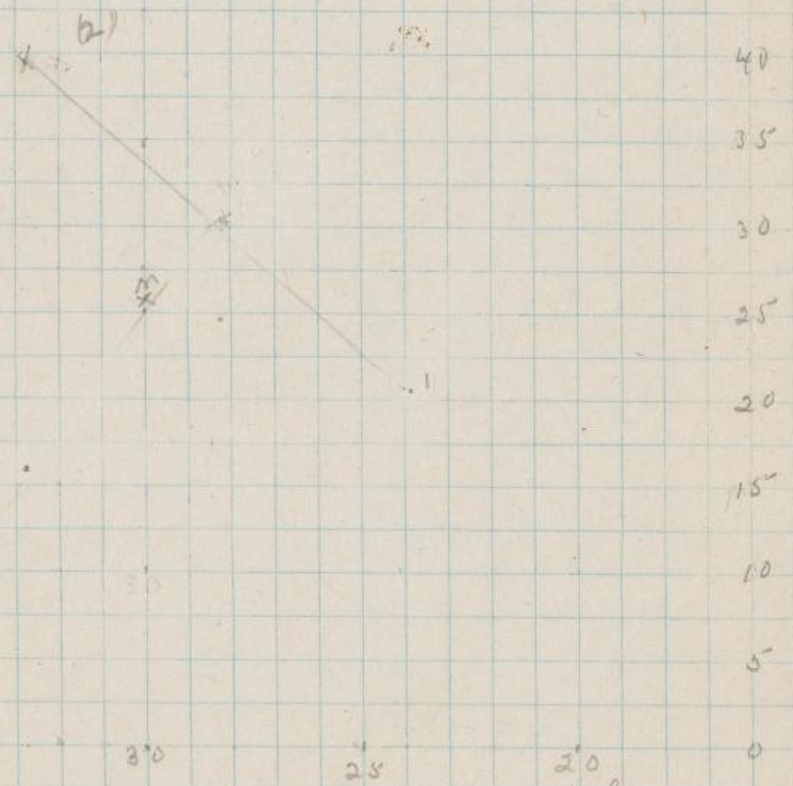
20	16	03.1	4
20	16	01.0	
		+2.1	4

2 06	32	53.11	
06	32	46.21	
		+6.90	

39	28	00.6	
39	28	00.7	4
		−0.1	

3 06	32	53.80	
06	32	48.13	
		+5.67	

16	28	22.9	4
16	28	21.9	
		+1.0	



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10072 Reduction to apparent Place 29

H+α	06	32.5	98°	7.5	δ₀	25 44 0
H	0	2.5			log cos δ₀	9.95466
α₀	06	30.0			log i	+8.9980
G	23	11.2			log (i)	8.95266
G+α	29	41.2	85°	18'		

log cos (G+α)	8.91349	log sin δ₀	9.63771
log g	1.40127	cos (H+α₀)	9.15021
" Sin (G+α)	9.99854	log k	1.31110
" tan δ₀	9.68303	Sin (H+α₀)	9.99956
	8.8239	Sec δ₀	0.04544
			8.8239

log (g)'	0.31487	log (k)'	0.09900
log (g)	9.90677	" (k)	0.17600

ζ	+3.7722
(g)	+0.8077
(k)	+1.4999
Red.	+6.0798

(g')	+2.06444
(k')	-1.25600
(i)	0.08977
Red	+0.89821

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H+x	06	32.5	98° 7.5'	
H	0	2.5		
x_0	06	30.0		
C	23	11.2		
C−x	29	41.2	85°	18.'

δ_0	25°	44.0
log cos δ_0	9.95466	
log i	+8.99780	
log (i)	+8.95246	
log sin δ_0	9.63777	
cos (H+x)	9.45021	
log f	1.31111	
Sin (H+x)	9.99565	
Sec δ_0	0.04548	
	8.82239	

log cos (H+N)	8.91349	
log g	1.40127	
∴ Sin (G+x)	9.99854	
∴ tan δ_0	9.68303	
	8.82239	

log (g)'	0.31488
log (f)	9.90697

log k'	0.09930
∴ (k)	0.17600

z	+3.7712
(g)	+0.8087
(k)	+1.4799
Red.	+6.0798

(g')	+2.06444
(k')	−1.25600
(i)	0.08997
Red'	+0.89841

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α'	06	30	07.55
θ	06	49	23.05
$\theta-\alpha'$	+19	15.50	
=	4°	48'	52.50
$\frac{1}{2}\alpha-\alpha'$		1	51.90
$\delta-\alpha'-\frac{1}{2}(\alpha-\alpha')$	4°	47	0.60

log tan δ'	9.995727
log cos $\frac{1}{2}(\theta-\alpha')$	0.000000
C $(\theta-\alpha')-\frac{1}{2}$"	0.000.152
log tan γ	9.995879

γ 42° 17 09.2

δ' 25 44 01.9

$\gamma-\delta'$ 16 33 07.3

log Sin ζ	9.826400
log Sin π	8.196813
Sin $\gamma-\delta'$	9.454677
Cosec γ	0.172100
Sin $(\delta-\delta')$	7.649300

$(\delta-\delta')$ +15' 19."9

δ +25 59 21.8

eph δ +25 59 23.0

O-C −1."2

corr. of plate	0.0
Dm.	−0.1
2nd Ord. ref.	0.0
δ =	+25 59 21.7
O-C	−1.3

π	54' 00.21"
log Sin ζ'	9.869113
log Sin π	8.196813
" Sin $(\theta-\alpha)$	8.923892
" Sec δ' Eq.	0.046630
Sin $(\alpha-\alpha')$	7.035548

$\alpha-\alpha'$ 3' 43."8

= +14.92

α 06 30 22.47

eph α 06 30 21.55

O-C +0.92

Corr.	0.00
Dm.	−0.02
α =	06 30 22.45
O-C	+0.98

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α 06 30 07.55
δ 06 49 23 05
ε-λ +19 15 50
= 4' 42 52 50
x-x' 1 51.90
x' 4° 47 0 60

π 54" 00 21.0
log sin 4' 9.8699133
log sin π 8.9961373
" sin (ε-λ) 8.9239252
" cc δ' 6 0 0 4 6 3 0
Σ (λ-x) 7 0 3 5 4 8

tan 4' 9.957727
log ½(λ-λ') 0.000000
ε-λ-½ 0 0 0 1 5 2
tan χ 9.957879

x-x' 3 43.7
= +1492

χ 42 17 09.2

δ' 25 44 01.9

γ-δ' 16 33 07.3

log sin 1 9.8264402
log sin π 8.9961373
sin γ-δ' 9.4546775
cosec γ 0.1721020
sin δ-δ' 7.6493300

(δ-δ') 15 19"9

δ +25 59 21.8

α 06 30 22.49

cpk δ +25 59 23.0

cpk α 06 30 21.55

O-C -1.2

O-C +0.92

curv in plate 0.0
Dec -0.1
2nd cc-1 ref 0.0
δ +25 59 21.7
O-C -1.3

Curv. 0.00
Dec -0.02
α 06 30 22.45
O-C +0.91

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