

KG
11366
1999

CXLVII
147

Plate	Date	Page
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10385

X

Star Measures

Tycho 24.2

15.1

1

y

1 17006
 17.7 8351 } 52
 21.6 53
 02

17.8651

17659
 16320 } 21
 21
 7659

17.8662

18518
 12548 } 46
 44
 21
 6358

21.597321.5960

2 18196
 26.7 11772 } 75
 7.7 78
 92
26.6418

16081
 12522 } 20
 18
 6087
26.6437

18587
 11999 } 13
 13 } 12
 8591
7.6591
7.6589

3 18112
 30.7 11246 } 48
 22.6 50
 16
30.6868

18048
 14925 } 21
 17
 8042
30.6875

17747
 12499 } 98
 97
 47
22.5249
22.5232

Moon Measures

1 18423
 23 18170 } 75
 15 30
 71
 0.0298

18473
 18170 } 75
 80
 71
15.0298
15.0294

2 17088
 22.5 12891 } 94
 16 97
 88
22.4194
22.4182

18441
 12622
 22
 8437

3 17578
 22.4 13873 } 74
 16.5 75
 74
22.3702
22.3722

16158
 9878
 78
 6154

10385

$\begin{array}{r} \text{L} \\ 17.7 \\ 21.6 \end{array} \begin{array}{r} 17006 \\ 8351 \\ 53 \\ 02 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 52$

1786512

$\begin{array}{r} 26.7 \\ 7.7 \end{array} \begin{array}{r} 18196 \\ 11772 \\ 78 \\ 92 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 75$

2664183

$\begin{array}{r} 30.7 \\ 22.6 \end{array} \begin{array}{r} 18112 \\ 11246 \\ 50 \\ 16 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 48$

306868

Star Measures

$\begin{array}{r} 17659 \\ 16320 \\ 22 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 21$

7659

178662

16081

$\begin{array}{r} 12522 \\ 18 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 20$

6087

266437

18048

$\begin{array}{r} 149257 \\ 17 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 21$

8042

306875

Tycho 24.2 15.1

18518 16356

$\begin{array}{r} 12548 \\ 44 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 46$

21

215973

6358

215960

18597

$\begin{array}{r} 11999 \\ 53 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 12$

18598

76591

16622

$\begin{array}{r} 13212 \\ 14 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 13$

6628

76589

17747

$\begin{array}{r} 12499 \\ 97 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 98$

47

225249

16372

$\begin{array}{r} 11607 \\ 01 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 1$

6372

225232

Moon Measures

$\begin{array}{r} 23 \\ 15.1 \end{array} \begin{array}{r} 18473 \\ 18170 \\ 36 \\ 71 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 15$

150298

18473

$\begin{array}{r} 18170 \\ 36 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 15$

71

150298

18043

$\begin{array}{r} 8338 \\ 36 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 37$

8043

150294

$\begin{array}{r} 22.5 \\ 16 \end{array} \begin{array}{r} 17088 \\ 12891 \\ 97 \\ 88 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 94$

224194

18441

12622

22

8437

224182

$\begin{array}{r} 22.4 \\ 16.5 \end{array} \begin{array}{r} 17578 \\ 13873 \\ 75 \\ 74 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} 74$

223702

16158

9878

78

6154

223722

10385

Moon Measures

17086	16756
12412	11413
16	11
82	6750
<u>224670</u>	<u>224660</u>

5
3
17.8

17451	18148
9400	16200
9374	98
61	8144
<u>17.8062</u>	<u>17.8052</u>

17578	17582
14778	10316
78	16
7578	7578
<u>23.2740</u>	<u>23.2737</u>

1
24
18.2

18098	17638
15578	10140
84	10142
8098	7632
<u>18.2517</u>	<u>18.2509</u>

8
24.4
18.2

18506	17141
15868	9771
72	9775
8504	7143
<u>18.2636</u>	<u>18.2630</u>

10385

Moon Measures

4	17086	16756
52.5	12412	11413
17	16	11
	82	6750
	<u>224670</u>	<u>224660</u>

5
23
178

17451	18148
9400	16200
9394	98
61	8144
<u>178062</u>	<u>178052</u>

6	17518	17582
23.2	14778	10298
18	28	16
	7518	7578
	<u>232740</u>	<u>232737</u>

1
24
18.2

18098	17638
15578	10140
84	10142
8098	7632
<u>182517</u>	<u>182509</u>

8
244
18.2

18506	17041
15868	19791
72	9775
8504	7043
<u>182636</u>	<u>182830</u>

10385-

Times etc.

Date: Feb. 15, 1916

Exp to Stars 8^h 41^m 8^h 53^m " " Moon 8 47 06.3 8 47 06.5 clock fast 05 23.6 h.a. = $+01^h 01^m$ H. Sid Time 8 41 42.8^v H. Long 04 44 31.05^v G. Sid Time 13 26 13.85^v Sid time M.N. 21 36 41.26^v 15.78251 Interval 15 49 32.59^v Reduction 02 35.56^v G. M. T. 15 46 57.03^v

R.A.

Decl.

From Naut. Alman. 07 38 $53.35^v + 22$ 55 51.7^v Moon 15^d $\nearrow$ motion in 1^m 02.1037^v -07.651^v 46.9505 01 38.77^v -05 59.2^v

Tabular Place

 07 40 $32.12^v + 22$ 49 52.5^v Moon's age 12^d

Parallax

Semi-Diam

R

Aug.

Sine (4)

R

R

 $(1+a) R$

R

 R^2 $9.34'' = 14.4$ $54.27.99^v$ 14 49.9^v 889.9^v 13.0^v -0.6^v 912.3^v 1.9342^v -918^v 1.8424^v 3.3944^v $a = -498.8$ $+24$ -474.8

10385-

Times etc.

Date Feb. 15, 1916

Exp. stars 8ⁿ 41^m8ⁿ 53^m

" " Moon 8 47 06.3

8 47 06.5

Clock fast 05 23.6

K.A. : +01^h 01^m

H Sid Line 8 41 42.8

H Young 04 44 31.05

C Sid Line 13 26 1.3 85

Sid time M.N. 21 36 41.26

1578281

Interval 15 49 32.59

Reduction 02 35.56

C.M.T. 15 46 57.03

R.A.

D = Cl.

- From Naut. Alm. 07 38 53 35 +22 50 51.7

Moon 15^h ↗motion in 1^m

02 1037

07.651

" 46.9505

01 38.77

05 59.2

Tabular Place 07 40 32 12 +22 49 52.5

Moon's age 12^d

Parallax

Semi-Diam

R

Aug.

Sun 14

R

R

(1 + R)

R²R²

54. 27.97

14 49.9

889.9

13.0

-0.6

912.3

1.9342

-918

1.8424

3.3944

a = -498.8

+24

-474.8

X
+
+
+

4
+
+
+

10385:

Plate Constants + Center

4

X	y	a	S.
17.8656	21.5977	07 35	56.86
26.6428	7.6590	07 41	10.36
30.6872	22.5240	07 43	32.37
37.51956	351.7807	3 23	0 39.59
25.0652	17.2602	07 40	13.20
22-	18-	- 01	35.02
-3.0652	+0.7398	Plate Center {	
3 ^p	466.5		
-95.0212	+345.12		
		A = 07.	38 38.18
		D = 22	43 33.04

$$\begin{aligned}
 X-S & +500X & -80.5y & -1.2X & -1350.4 \\
 +.6331 +8933 = 15264 & -1739 = 13525 & -21 = 13504 \\
 +.0831 +13321 = 14152 & -616 = 13536 & -32 = 13504 \\
 +.0009 +15344 = 15353 & -1813 = 13540 & -37 = 13503 \\
 242137 +12168 = & -1328 & -29 = 23.9444
 \end{aligned}$$

$$\begin{aligned}
 y-7 & +500y & +81X & +2y & -10512 \\
 -1778 +10799 = +9021 & +1447 = 10468 & +43 = 10511 \\
 +4510 +3829 = +8339 & +2158 = 10497 & +15 = 10512 \\
 -3280 +11262 = +7982 & +2485 = 10467 & +45 = 10512 \\
 164189 +8209 & +1961 & +33 = 163880
 \end{aligned}$$

$$\begin{aligned}
 \text{Table } a & = +0.6 & e & = +0.2 & a-e & = +0.4 & b+d & = -0.1 \\
 ah & = -4988 & & = -502.0 & & = +3.2 & & = -0.5
 \end{aligned}$$

$$\begin{aligned}
 D-C & -4994 & -502.2 & & -0.4
 \end{aligned}$$

X
+
+
+

-
+
-
1

123855

Plate Constants + Center

4

x	y	α	δ
178656	215977	07 35	56 86
266428	76590	07 41	10 36
306872	225240	07 43	32 37
3751956	3517807	23 0	39 59
250652	172602	07 40	13 20
22	18	01	35 02
-30652	+07398		+05 45.12
31	466.5	Plate Center	
-950212	+345.12		
		A = 07	38 38.18
		D = 22	43 33.04

$$\begin{aligned}
 x-5 & +500x & -80.5y & -1.2x & -13504 \\
 +.6331 +8933 & = 15264 & -1739 & = 13525 & -21 = 13504 \\
 +.0831 +13321 & = 14152 & -616 & = 13536 & -32 = 13504 \\
 +.0009 +15344 & = 15353 & -1813 & = 13540 & -37 = 13503 \\
 242137 +12168 & = 4385 & -1328 & -29 & = 23.9444
 \end{aligned}$$

$$\begin{aligned}
 y-7 & +500y & +81x & +2y & -10512 \\
 -1778 +1079.9 & = +9021 & +1447 & = 10468 & +43 = 10511 \\
 +4510 +3829 & = +8339 & +2158 & = 10497 & +15 = 10512 \\
 -3280 +11262 & = +7982 & +2485 & = 10467 & +45 = 10512 \\
 164989 +0249 & & +1961 & +33 & = 163880
 \end{aligned}$$

$$\begin{aligned}
 \text{Table } a & = +0.6 & b & = +0.2 & a-b & = +0.4 & b+d & = -0.1 \\
 ah & = -4988 & & = -502.0 & & = +3.2 & & = -0.5
 \end{aligned}$$

S	3	AS	-2S	+3n		-5
-4.77	+3.76	-5	+9	= +4	+1	= +5
+4.56	-10.88	+17	-9	= +8	-3	= +5
+8.68	+4.82	+21	-17	= +4	+1	= +5
+1.94	-1.61		-4	0		-9
		AS	-3n	-35'S	+6	<u>-9</u>
		+3	-11	= -8	+2	= -6
		-36	+32	= -4	-2	= -6
		+13	-14	= -1	-4	= -5
			+5	0		+11
						<u>11</u>

10385				Standard Coordinates				5			
Cape No. 1076				Mg 6.3				Cape No. 1088			
Mg 6.3				Cape No. 1091				Mg 6.3			
C	07	34	59.31	07	40	13.64	07	42	34.91		
L			59.34			13.65			34.97		
E			59.29			13.63			34.89		
Mean	07	34	59.31	07	40	13.64	07	42	34.92		
Pre			+ 57.55			+ 56.72			+ 57.45		
A	07	35	56.86	07	41	10.86	07	43	32.37		
A	07	38	38.18	07	38	38.18	07	38	38.18		
A-A	-	02	41.32	+ 02	32.18		+ 04	54.19			
sin(x-A)			- 161.32		+ 152.18			+ 294.17			
log "	2.20	768m		2.18	235		2.46	860			
log cos S	9.96	334		9.96	919		9.96	289			
" S ₀	0.67	826m		0.65	878		0.93	873			
E ₁	-4.76	71		+ 4.55	81		+ 8.68	42			
E ₂	-0.00	04		+ 0.00	16		+ 0.00	21			
S	17.23	25		26.55	97		30.68	63			
X	17.86	56		26.64	28		30.68	72			
X-S	+ .63	81		+ .08	31		+ .00	09			
C	+23	14	58.93	+21	21	52.00	+23	23	18.93		
L			59.21			51.92			18.14		
E			58.68			51.44			18.26		
Mean			58.94			51.79			18.44		
Pre	- 02.	09.76		- 02	16.46		- 02	19.19			
S	+23	12	49.18	+21	19	35.33	+23	20	59.25		
D	22	43	33.04	22	43	33.04	22	43	33.04		
S-D	+ 29	16.14	- 01	23	57.71		+ 37	26.21			
tan(S-D)	+ 17	56.14		- 30	38.71		+ 22	46.31			
log "	3.24	455		3.70	232m		3.35	147			
" m ₀	0.57	570		1.03	347m		0.68	262			
log tan S	9.63	23		9.59	15		9.63	52			
" S ₀ ²	1.85	65		1.31	76		1.87	74			
" n ₁	8.04	22		7.96	25		8.56	60			
n ₀	+3.76	45		-10.80	12		+4.81	52			
n ₁	0.01	10		+ 0.00	92		0.03	68			
n ₂	21.77	55		9.20	80		32.85	20			
y	21.59	77		2.65	90		22.52	40			
y-n ₁	- .17	78		+ .45	10		- .32	80			

10385					Standard Coordinates					5				
Cape No.	1076	mg	6.3		Cape No.	1088	mg	7.5		Cape No.	1091	mg	6.3	
C	07	34	59.31		07	40	13.64	07	42	34.91				
δ			59.34				13.65			"		34.97		
E			59.29				13.63					34.89		
Mean	07	34	59.32		07	40	13.64	07	42	34.92				
Prec			+57.55				+56.72					+57.45		
α	07	35	56.86		07	41	10.86	07	43	32.35				
A	07	38	38.18		07	38	38.18	07	38	38.18				
$\alpha - A$	-	02	41.82		+02	32.18		+04	54.19					
$\sin(\alpha - A)$			-161.32			+152.18			+294.17					
$\log "$	2.20	768m			+2.18	235		2.46	860					
" $\cos \delta$	9.96	334			9.96	919		9.96	289					
" $\sin \delta$	0.67	826m			0.65	878		0.93	873					
δ	-4.76	71			+4.55	81		+8.68	42					
E	-0.00	04			+0.00	16		+0.00	21					
δ	19.23	25			26.55	9.7		30.68	63					
χ	17.86	56			26.64	28		30.68	72					
$\chi - \delta$	+6.33	1			+0.83	7		+0.00	09					
C	+23	14	58.93	+21	21	52.00	+23	23	18.93					
δ			59.21			51.92			18.14					
E			58.68			51.44			18.26					
Mean			58.94			51.79			18.4					
Prec	-02	09.76		-02	16.46		-02	19.19						
δ	+23	12	49.18	+21	19	35.33	+23	20	59.					
δ	22	43	33.04	22	43	33.04	22	43	33.04					
$\delta - \delta$	+29	16.14		-04	23	57.71	+37	26.21						
$\tan(\delta - \delta)$	+17	56.14		-50	38.71		+22	46.31						
$\log "$	3.24	45.5		3.70	232m		3.35	147						
" η_0	0.57	570		1.03	347m		0.68	262						
$\log \tan \delta$	9.63	234		9.59	15		9.63	52						
" η_0^2	1.35	652		1.31	76		1.87	74						
" η_1	8.04	22		7.96	25		8.56	60						
η_0	+3.76	45		-10.80	12		+4.81	52						
η_1	0.01	10		+0.00	92		0.03	68						
η_2	21.77	55		17.20	80		22.85	20						
η_3	21.59	77		7.65	90		22.52	40						
η_4	-1.77	78		+4.51	10		-3.28	80						

103.85

x

Normal Center.

6.

o-c-

1	23.0000	-1.2140	1.4738	+3.4014	+70
2	22.4188	-1.7952	3.2227	3.3974	+30
3	22.3712	-1.8428	3.3959	3.3959	+15
4	22.4665	-1.7475	3.0537	3.3915	-29
5	23.0000	-1.2140	1.4738	3.3995	+51
6	23.2739	-0.9401	0.8838	3.3865	-79
7	24.0000	-0.2140	0.0458	3.4068	+124
8	24.2140	0.0000	0.0000	3.4058	+114

$$R^2 = 3.3944$$

	y	y - y ₀	(y - y ₀) ²	
1	15.0296	-1.3884	1.9276	221
2	16.0000	-0.4180	0.1747	257
3	16.4180	-0.0000	0.0000	270
4	17.0000	+0.5812	0.3378	288
5	17.8057	+1.3877	1.9257	319
6	18.0000	+1.5820	2.5027	329
7	18.2513	+1.8333	3.3610	353
8	18.2633	+1.8453	3.4058	360

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Range

Approx. Center.

$$y = 15.0296$$

$$= 17.8057$$

$$23.28353$$

$$y_0 = 16.4176$$

$$y_{\max} = 18.2633$$

$$R = 1.8457$$

$$\text{Comp } R = 1.8424$$

$$y_{\min} = 22.3712$$

$$x_0 = 24.2140$$

$$x_0 = 24.2140$$

$$y_0 = 16.4180$$

103.85

x

Morns Center.

6

o-c.

1	23.0000	-1.2140	1.4738	+ 3.4014	+ 70
2	22.4188	-1.7952	3.2227	3.3974	+ 30
3	22.3712	-1.8428	3.3959	3.3959	+ 15
4	22.4665	-1.7475	3.0537	3.3910	- 29
5	23.0000	-1.2140	1.4738	3.3995	+ 51
6	23.2739	-0.9401	0.8838	3.3868	- 79
7	24.0000	-0.2140	0.0458	3.4068	+ 124
8	24.2140	0.0000	0.0000	3.4058	+ 114

$$R^2 = 3.3944$$

	y	y - y ₀	(y - y ₀) ²	
1	15.0296	-1.3884	1.9276	229
2	16.0000	-0.4180	0.1747	257
3	16.4180	-0.0000	0.0000	270
4	17.0000	+0.5812	0.3378	288
5	17.8057	+1.3877	1.9257	319
6	18.0000	+1.5820	2.5027	329
7	18.2513	+1.8333	3.3610	354
8	18.2633	+1.8453	3.4058	360

139

Range

Approx. Center.

$$y = 23.0296$$

$$= 17.8057$$

$$23.28353$$

$$y_0 = 16.4176$$

$$y_{\max} = 18.2633$$

$$R = 1.8457$$

$$\text{Comp } R = 1.8424$$

$$y_{\min} = 22.3712$$

$$x_0 = 24.2140$$

$$x_0 = 24.2140$$

$$y_0 = 16.4180$$

Normal Equations

1	+ 1.68	-	84.7	-	97.3
2	+ 0.75	-	53.7	-	12.6
3	+ 0.00	-	27.6	-	00.0
4	- 1.01	+	50.5	-	16.8
5	- 1.68	-	61.7	+	70.9
6	- 1.48	+	74.2	-	125.8
7	- 0.38	-	26.0	+	226.9
8	- 0.00	-	00.0	+	209.7
	+ 2.43		+ 124.7		+ 507.5
	- 4.55		- 253.7		- 252.5
	- 2.12		- 131.0		+ 255.0

-a	-b	-15 + ΔC
+ 11	- 5	- 9
+ 16	- 2	- 1
+ 17	- 0	+ 2
+ 16	+ 2	+ 3
+ 11	+ 5	+ 1
+ 8	+ 6	- 1
+ 2	+ 7	- 6
+ 0	+ 7	- 8

10380

Conditional Equations

								0 - d con
1	-1.21	-1.39	= +70	+ 8	- 24	-16	+ 86	+77
2	-1.79	-0.42	= +30	+12	- 7	+ 3	+ 25	+24
3	-1.84	-0.00	= +15	+13	- 0	+13	+ 2	+4
4	-1.74	+0.58	= -29	+12	+ 10	+21	-50	-47
5	-1.21	+1.39	= +51	+ 8	+ 24	+32	+ 19	+20
6	-0.94	+1.58	= -79	+ 6	+ 28	+34	-113	-114
7	-0.21	+1.83	= +124	+ 4	+ 32	+36	+ 88	+82
8	-0.00	+1.84	= +114	+ 0	+ 32	+32	+ 82	+74
	-8.94	+5.41					+302	-163

av 58

$$13.55 - 2.12 = -131 - 8.94$$

$$- 2.12 + 13.63 = +255.00 + 5.41$$

$$+ 2.12 - 0.33 = - 20.44 - 1.40$$

$$+ 13.30 = +234.56 + 4.016 = +17.6 - 0.30$$

$$13.55 - 37.3 = -131.0$$

$$a = - 6.9 - 0.61$$

$$\frac{p}{n} = .12$$

$$\frac{\epsilon_V}{n} = +17$$

$$\frac{+17}{.12} = +142$$

$$\Delta R = +1.7$$

$$\text{Corr} = +0.2$$

$$\text{True } \Delta R = +1.5$$

$$-2R = -3.68 \quad -2R_{\text{Corr}} = -0.73 -15$$

-4

$$\Delta t = -0.22$$

$$\Delta S = -0.1$$

$$\Delta a = +0.45$$

$$\Delta \alpha = +0.02$$

+9

10385

Conditional Equations

7

								C - C
1	-1.21	-1.39	= +70	+ 8	- 24	-16	+ 86	
2	-1.79	-0.42	= +30	+ 12	- 7	+ 5	+ 25	
3	-1.84	-0.00	= +15	+ 13	- 0	+ 13	+ 12	
4	-1.74	+0.58	= -29	+ 12	+ 10	+ 21	- 50	
5	-1.21	+1.39	= +51	+ 8	+ 24	+ 32	+ 19	
6	-0.94	+1.58	= -79	+ 6	+ 28	+ 34	- 113	
7	-0.21	+1.83	= +124	+ 4	+ 32	+ 31	+ 88	
8	-0.00	+1.84	= +114	+ 0	+ 32	+ 32	+ 82	
							+ 302 - 163	
							or 52	

$$13.55 - 2.12 = -131$$

$$-12.12 + 13.63 = +255.00$$

$$+ 2.12 - 0.33 = - 20.44$$

$$+ 13.30 = +234.56$$

$$b = +17.6$$

$$13.55 - 37.3 = -1310$$

$$a = -6.9$$

$$\frac{p}{h} = .12$$

$$\frac{E}{h} = +17$$

$$\frac{+17}{.12} = +142$$

$$AR = +1.7$$

10385-

Moon's Mean Position

8

$$\begin{array}{r}
 X_0 \quad 24.2140 \\
 \quad \quad - 3 \\
 \hline
 \quad \quad 24.2137 \checkmark
 \end{array}$$

$$\begin{array}{r}
 y_0 = 16.4180 \\
 \quad \quad + .9 \\
 \hline
 \quad \quad 16.4189 \checkmark
 \end{array}$$

From Plate Constants.

$$\begin{array}{r}
 X \quad 23.9446 \checkmark \\
 \quad \quad - .22 \\
 \hline
 S \quad + 1.9444 \checkmark
 \end{array}$$

$$\begin{array}{r}
 y \quad 16.3880 \checkmark \\
 \quad \quad - .18 \\
 \hline
 \quad \quad 16.120 \checkmark
 \end{array}$$

$$\begin{array}{r}
 \log \xi \quad 0.28879 \checkmark \\
 \log \cos \delta_0 \quad 9.96556 \checkmark \\
 \quad \quad 8.50724 \\
 \log \sin(\alpha - A) \quad 1.81599 \\
 \sin(\alpha - A) \quad + 65.46 \\
 \alpha - A \quad \quad \quad "
 \end{array}$$

$$\begin{array}{r}
 \log \tan \delta \quad 9.6172 \checkmark \\
 \log \xi^2 \quad 0.5777 \checkmark \\
 \quad \quad 7.0534 \checkmark \\
 \log \eta_1 + \eta_0 \quad 7.2483 \checkmark
 \end{array}$$

$$01 \quad 05.46 \checkmark$$

$$\eta_1 \quad + 0.0018 \checkmark$$

$$A \quad 07 \quad 38 \quad 38.18 \checkmark$$

$$\eta_0 \quad - 1.6138 \checkmark$$

$$\alpha_0 \quad 07 \quad 39 \quad 43.65 \checkmark$$

$$\log \eta_0 \quad 0.20785 \checkmark$$

$$\log \tan(\delta - \delta_0) \quad 2.87670 \checkmark$$

$$\text{Red.} \quad \quad \quad + 2.79 \checkmark$$

$$\tan \delta - \delta_0 \quad - 75.283 \checkmark$$

$$\alpha' \quad 07 \quad 39 \quad 46.44 \checkmark$$

$$\delta - \delta_0 \quad - 12 \quad 32.83 \checkmark$$

$$\theta \quad 22 \quad 43 \quad 33.04$$

$$\delta^0 \quad 22 \quad 31 \quad 00.21$$

$$\text{Red} \quad \quad \quad - 1.00$$

$$S' \quad 22 \quad 30 \quad 59.21 \checkmark$$

10385-

Moon's Mean Position

8

$$\begin{array}{r} X_0 \quad 24.2140 \\ \quad - 3 \\ \hline 24.2137 \end{array}$$

$$\begin{array}{r} y_0 = 16.4180 \\ \quad + 9 \\ \hline 16.4189 \end{array}$$

From Plate Constants.

$$\begin{array}{r} X \quad 23.9446 \\ \quad 22 \\ \hline + 1.9444 \end{array}$$

$$\begin{array}{r} y \quad 16.9880 \\ \quad 18 \\ \hline - 1.6120 \end{array}$$

$$\begin{array}{r} \log 3 \quad 0.20879 \\ \log \cos \delta_0 \quad 9.96556 \\ \quad 250724 \\ \log \sin(\alpha-A) \quad 1.81599 \\ \sin(\alpha-A) \quad +65.46 \\ \alpha-A \quad \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.6172 \\ \log 8^2 \quad 0.5777 \\ \quad 7.0534 \\ \log 7.710 \quad 7.2483 \end{array}$$

$$01 \quad 05.46$$

$$\eta_1 + 0.0018$$

$$\eta_0 - 1.6138$$

$$A \quad 07 \quad 38 \quad 38.18$$

$$\log \eta_0 \quad 0.20785 \\ \quad 7.33115$$

$$\alpha_0 \quad 07 \quad 39 \quad 43.65$$

$$\log \tan(\delta-E) \quad 2.85670$$

$$\text{Red.} \quad + 2.79$$

$$\tan \delta-E \quad -76.243$$

$$\delta-E \quad -12 \quad 32.83$$

$$\alpha' \quad 07 \quad 39 \quad 46.44$$

$$\theta \quad 22 \quad 43 \quad 33.04$$

$$\delta^0 \quad 22 \quad 31 \quad 00.21$$

$$\text{Red} \quad -1.00$$

$$S' \quad 22 \quad 30 \quad 59.21$$

$$\begin{array}{r}
 1) \quad 07 \quad 34 \quad 56.72 \\
 \underline{54.33} \\
 + 2.39
 \end{array}$$

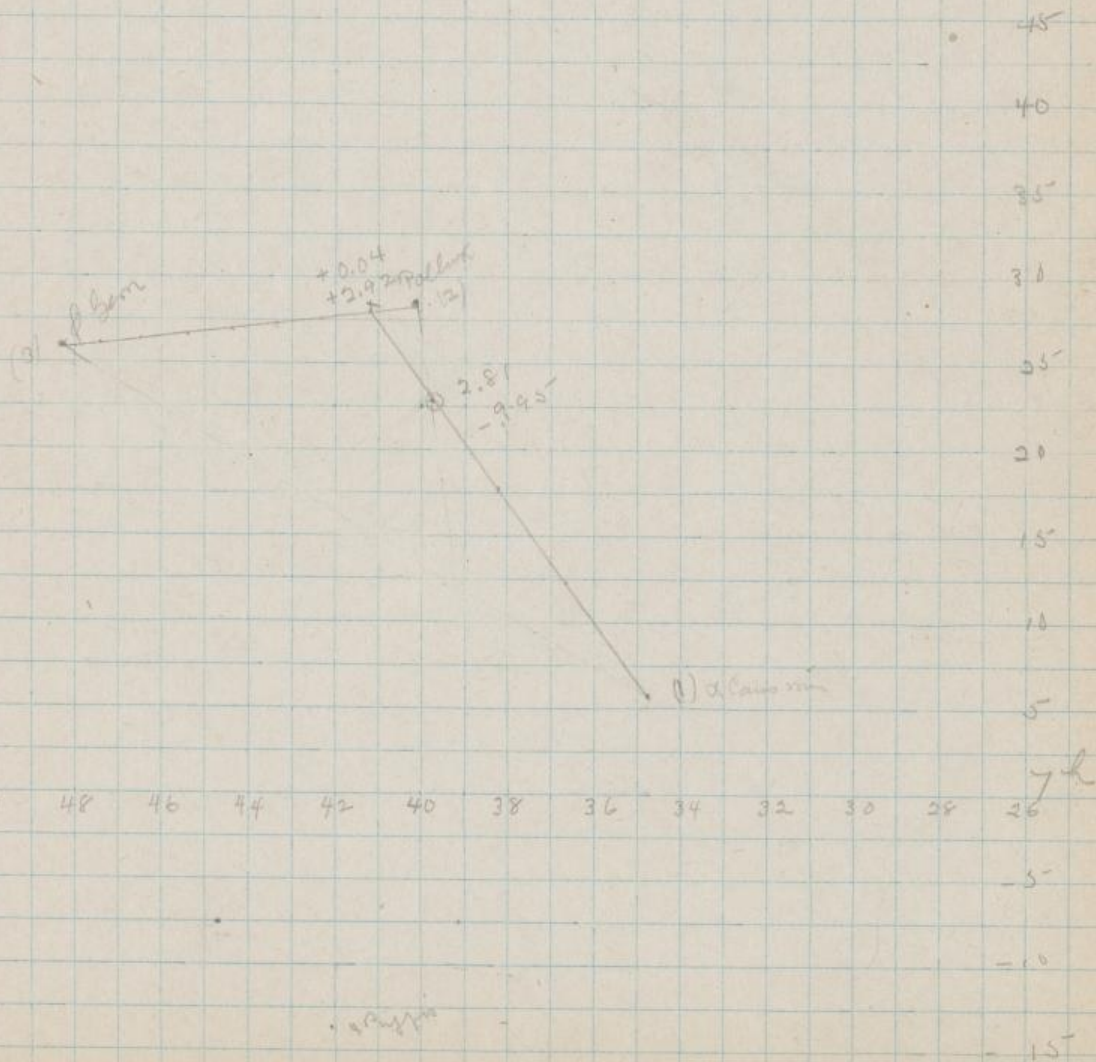
$$\begin{array}{r}
 5^0 \quad 26' \quad 23.37 \\
 \underline{27.47} \\
 - 4.10
 \end{array}$$

$$\begin{array}{r}
 (2) \quad 07 \quad 40 \quad 13.61 \\
 \underline{10.69} \\
 + 2.92
 \end{array}$$

$$\begin{array}{r}
 28 \quad 13 \quad 48.32 \\
 \underline{48.17} \\
 + 0.15
 \end{array}$$

$$\begin{array}{r}
 3) \quad 07 \quad 48 \quad 24.47 \\
 \underline{21.56} \\
 + 2.91
 \end{array}$$

$$\begin{array}{r}
 22.6 \quad 59 \quad 02.57 \\
 \underline{03.30} \\
 - 0.73
 \end{array}$$



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Reduction to Apparent Place

9

H + α	2.8	04.1	61°	01.5	δ_0	22	31.0
--------------	-----	------	-----	------	------------	----	------

H	2.0	24.4					
---	-----	------	--	--	--	--	--

α	0.7	39.7					
----------	-----	------	--	--	--	--	--

Q	2.1	42.9					
-----	-----	------	--	--	--	--	--

$Q + \alpha$	2.9	22.6	80	39.0			
--------------	-----	------	----	------	--	--	--

$\log \cos \delta_0$	9.9656
----------------------	--------

$\log (i)$	-0.8306
------------	---------

(i)	0.7962
-------	--------

$\log \cos Q + \alpha$	9.2108
------------------------	--------

$\log g$	1.0095
----------	--------

$\log \sin (Q + \alpha)$	9.9942
--------------------------	--------

$\log \tan \delta_0$	9.6176
----------------------	--------

	8.8239
--	--------

$\log \sin \delta_0$	9.5831
----------------------	--------

$\log H + \alpha$	9.6852
-------------------	--------

$\log h$	1.2860
----------	--------

$\log \sin H + \alpha$	9.9419
------------------------	--------

$\log \sec \delta_0$	0.0344
----------------------	--------

	8.8239
--	--------

$\log g'$	0.2203
-----------	--------

$\log g$	9.4452
----------	--------

$\log h'$	0.5543
-----------	--------

$\log h$	0.0862
----------	--------

z	+1.288
-----	--------

q	+0.279
-----	--------

h	+1.220
-----	--------

Red	+2.787
-----	--------

g'	+1.661
------	--------

h'	+3.584
------	--------

L	-6.255
-----	--------

	-1.010
--	--------

10385-

Reduction to Apparent Place

9

H + α	28	041	61°	01.5	δ_0	22	31.0
--------------	----	-----	-----	------	------------	----	------

H	20	24.4
---	----	------

α	07	39.7
----------	----	------

G	21	42.9
---	----	------

G + α	29	22.6	80	39.0
--------------	----	------	----	------

$\log \cos \delta_0$	9.9656
----------------------	--------

$\log (u)$	-0.8306
------------	---------

(u)	0.7962
-------	--------

$\log \cos G + \alpha$	9.2108
------------------------	--------

$\log g$	1.0095
----------	--------

" $\sin (G + \alpha)$	9.9942
-----------------------	--------

" $\tan \delta_0$	9.6176
-------------------	--------

	8.8239
--	--------

$\log \sin \delta_0$	9.5831
----------------------	--------

$\cos H + \alpha$	9.6852
-------------------	--------

$\log h$	1.2860
----------	--------

$\sin H + \alpha$	9.9419
-------------------	--------

$\sec \delta_0$	0.0344
-----------------	--------

	8.8239
--	--------

$\log g'$	0.2203
-----------	--------

$\log g$	9.4452
----------	--------

$\log$	
--------	--

$\log h'$	0.5543
-----------	--------

" h	0.0862
-------	--------

f	+1.288
-----	--------

g	+0.279
-----	--------

h	+1.220
-----	--------

Red	+2.787
-----	--------

g'	+1.661
------	--------

h'	+3.584
------	--------

L	-6.255
-----	--------

	-1.010
--	--------

9
h
h
Se
h

103.85

Lunar Parallax

10

$$\alpha \quad 07 \quad 39 \quad 46.44^{\circ}$$

$$\theta \quad 08 \quad 41 \quad 42.8^{\circ}$$

$$\theta - \alpha \quad 1 \quad 01 \quad 56.36$$

$$= \quad 15^{\circ} \quad 29' \quad 05.4^{\circ}$$

$$\frac{1}{2}(\alpha - \alpha') \quad 05 \quad 50.17^{\circ}$$

$$\theta - \alpha - \frac{1}{2}(\alpha - \alpha') \quad 15 \quad 23 \quad 15.23^{\circ}$$

$$\log \tan \delta \quad 9.95727^{\circ}$$

$$\log \cos \frac{1}{2}(\alpha - \alpha') \quad 0.00000^{\circ}$$

$$\sec(\theta - \alpha - \frac{1}{2}(\alpha - \alpha')) \quad 0.01586^{\circ}$$

$$\log \tan \gamma \quad 9.97313^{\circ}$$

$$\gamma \quad 43^{\circ} \quad 18 \quad 43.20^{\circ}$$

$$\delta \quad 22 \quad 36 \quad 59.21^{\circ}$$

$$\gamma - \delta \quad 20 \quad 42 \quad 43.99^{\circ}$$

$$\log \sin \delta \quad 9.82640^{\circ}$$

$$\log \sin \gamma \quad 8.19984^{\circ}$$

$$\sin(\gamma - \delta) \quad 9.54860^{\circ}$$

$$\cos \gamma \quad 0.16437^{\circ}$$

$$\sin(\delta - \delta') \quad 7.73921^{\circ}$$

$$(\delta - \delta') \quad + 18' \quad 51.4^{\circ}$$

$$\delta \quad + 22 \quad 49 \quad 50.6^{\circ}$$

$$\text{eph } \delta \quad + 22 \quad 49 \quad 52.5^{\circ}$$

$$O - C \quad - 0.19^{\circ}$$

$$\text{Curv} \quad + 0.5$$

$$2^{\text{nd}} \text{ order proper.} \quad 0.0$$

$$\text{Dir. Corr.} \quad - 0.1$$

$$\delta - \quad + 22 \quad 49 \quad 50.5$$

$$O - C \quad = - 2.0$$

$$\pi \quad 54 \quad 27.97^{\circ}$$

$$9.86913^{\circ}$$

$$\log \sin \pi \quad 8.19984^{\circ}$$

$$\sin(\theta - \alpha) \quad 9.42648^{\circ}$$

$$\sec \delta \text{ eph} \quad 0.03543^{\circ}$$

$$\sin(\alpha - \alpha') \quad 7.53088^{\circ}$$

$$\alpha - \alpha' \quad 11' \quad 40.34^{\circ}$$

$$= \quad + 46.69^{\circ}$$

$$\alpha \quad 07 \quad 40 \quad 33.13^{\circ}$$

$$\text{eph } \alpha \quad 07 \quad 40 \quad 32.12^{\circ}$$

$$O - C \quad + 1.01^{\circ}$$

$$\text{Curv} \quad - 0.03$$

$$\text{Dir. Corr.} \quad + 0.02$$

$$\alpha = 07 \quad 40 \quad 33.15^{\circ}$$

$$O - C \quad + 1.03$$

103.85

Lunar Parallax-

10

$$\begin{array}{rcl}
 \alpha & 07 & 39 & 46.44 \\
 \theta & 08 & 41 & 42.8 \\
 \theta - \alpha & 1 & 01 & 56.36 \\
 = & 15' & 29' & 05.4 \\
 1/(\alpha - \alpha') & & 05 & 50.17 \\
 (\theta - \alpha) - 1/(\alpha - \alpha') & 15 & 23 & 15.23
 \end{array}$$

$$\begin{array}{rcl}
 \log \tan \delta' & 9.95727 \\
 \log \cos 1/(\alpha - \alpha') & 0.00000 \\
 \sec (\theta - \alpha) + 1/(\alpha - \alpha') & 0.01586 \\
 \log \tan \gamma & 9.97313
 \end{array}$$

$$\begin{array}{rcl}
 \gamma & 43^\circ & 19 & 43.20 \\
 \delta' & 22 & 30 & 59.24 \\
 \gamma - \delta' & 20 & 42 & 43.94
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin \delta' & 9.82640 \\
 \log \sin \pi & 8.19984 \\
 \sin (\gamma - \delta') & 9.54868 \\
 \cos \gamma & 0.16437 \\
 \sin (\delta - \delta') & 7.73921
 \end{array}$$

$$(\delta - \delta') + 18' 51.4$$

$$\delta + 22 49 50.6$$

$$\text{eph } \delta 22 49 52.5$$

$$O-C - 0.9$$

$$\text{Curv} + 0.5$$

$$2 \text{ words ref. } 0.0$$

$$\text{Dir Corr} - 0.1$$

$$\delta + 22 449 50.5$$

$$O-C = -2.0$$

$$\begin{array}{rcl}
 \pi & 54 & 27.99 \\
 & 9.86913 \\
 \log \sin \pi & 8.19984 \\
 \sin (\theta - \alpha) & 9.42648 \\
 \sec \delta' \text{ eph} & 0.02543 \\
 \sin (\alpha - \alpha') & 7.53088
 \end{array}$$

$$\alpha - \alpha' 11' 40.34$$

$$= +46.69$$

$$\alpha 07 40 33.13$$

$$\text{eph } \alpha 07 40 32.12$$

$$O-C + 1.01$$

$$\text{Curv} - 0.03$$

$$\text{Dir Corr} + 0.02$$

$$\alpha = 07 40 33.15$$

$$O-C + 1.73$$

1
16
23
2
25
8
3
29
23
1
23
15
3
22
16
3
22
16
X
min

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Lrv. 4

Star Measures

Tycho 23.9 15.4(1)

1	18665	16192	18082	18709
169	9072	15796	17438	9328
22.0+	72	98	42	38
	71	6190	80	8707
	<u>16.9598</u>	<u>16.9605</u>	<u>22.0642</u>	<u>22.0626</u>
2	17536	16208	18094	17612
25.9	9392	14360	16338	9358
8.2	98	58	34	58
	42	6212	94	7614
	<u>25.8146</u>	<u>25.8150</u>	<u>8.1758</u>	<u>8.1744</u>
3	16428	16083	17222	17900
29.8	8680	13853	16588	8520
23.1	76	45	94	20
	32	6085	26	9900
	<u>29.7753</u>	<u>29.7765</u>	<u>23.0631</u>	<u>23.0620</u>

Mean Measures

1	16605	16542
23.0	16192	6943
15.1	92	43
	05	6536
	<u>15.0413</u>	<u>15.0407</u>
2	16095	17816
22.2	14494	9440
16	90	38
	95	7822
	<u>22.1603</u>	<u>22.1617</u>
3	16649	16348
22.0	16310	6695
165	08	03
	55	6352
X	<u>22.0340</u>	<u>22.0347</u>

1
1
16
23
3
25
8
3
29
23

1
23
15

3
22
16

3
22
16

X

10386

Lrv. 4

Star Measures.

Tycho 23.9 15.4(11)

1	18665	16192	18082	18709
169	9072	15796	17438	9328
229	72	98	42	38
	71	6190	80	8707
	<u>169598</u>	<u>169605</u>	<u>220642</u>	<u>220626</u>

2	17536	16208	18094	17612
259	9392	14360	16338	9358
82	98	58	34	58
	42	6212	94	7614
	<u>258146</u>	<u>258150</u>	<u>81758</u>	<u>81744</u>

3	16428	18083	17222	17900
298	8680	13853	16588	8520
23.1	76	45	94	30
	32	6085	26	7900
	<u>297753</u>	<u>297765</u>	<u>230631</u>	<u>230620</u>

Moon Measures

1	16605	16542
230	16192	6948
15.1	92	43
	05	6536
	<u>150413</u>	<u>150407</u>

2	16095	17816
22.2	14494	9440
16	90	38
	95	7822
	<u>221603</u>	<u>221617</u>

3	16649	16348
220	16310	16907
165	08	03
	55	6352
X	<u>220340</u>	<u>220348</u>

4
2
17

5
2
1

6
23
18

7
23
18

4
0

8
24
18

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Moon

12

$$\begin{array}{r}
 4 \quad 16129 \quad 18307 \\
 221 \quad 15404 \quad 9022 \\
 17 \quad 08 \quad 26 \\
 \quad 35 \quad 8307 \\
 \hline
 22.0724 \quad 22.0715
 \end{array}$$

$$\begin{array}{r}
 5 \quad 16669 \quad 17722 \\
 22.7 \quad 10608 \quad 13789 \\
 18 \quad 08 \quad 91 \\
 \quad 71 \quad 7722 \\
 \hline
 22.6062 \quad 22.6068
 \end{array}$$

$$\begin{array}{r}
 6 \quad 16113 \quad 18367 \\
 23 \quad 13246 \quad 11230 \\
 18.3 \quad 44 \quad 38 \\
 \quad 19 \quad 8367 \\
 \hline
 18.2870 \quad 18.2867
 \end{array}$$

$$\begin{array}{r}
 7 \quad 16580 \quad 18716 \\
 23.8 \quad 11449 \quad 13843 \\
 18.4 \quad 49 \quad 43 \\
 \quad 80 \quad 8716 \\
 \hline
 18.5131 \quad 18.5127
 \end{array}$$

$$\begin{array}{r}
 8 \quad 15200 \quad 18073 \\
 24 \quad 10149 \quad 13131 \\
 18.4 \quad 43 \quad 33 \\
 \quad 5200 \quad 8073 \\
 \hline
 18.5054 \quad 18.5059
 \end{array}$$

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Moon

12

4	16 129	18307
22.1	154042	902224
17	08106	26124
	35	8307
	<u>22.0724</u>	<u>22.0715</u>

5	16669	17722
22.7	10608	1388940
18	08	911
	71	7722
	<u>22.6162</u>	<u>22.6068</u>

6	16113	18360
3	1324645	112303
8.3	44	381
	19	8360
	<u>18.2870</u>	<u>18.2867</u>

1	16580	18716
18	12449	13843
2.4	49	43
	80	8716
4 m.	<u>18.5131</u>	<u>18.5127</u>

2	15200	18073
4	1014946	131313
1.4	43	331
	5200	8073
	<u>18.5054</u>	<u>18.5059</u>

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Date Feb. 15, 1916

Times Etc.

13

Expt to Stars	08	55		09	07	
" to Moon	09	00	56.5"	09	00	56.7"
Clock Fast		05	23.6"			
H. Sid Time	08	55	33.0"	$\theta = +1^h$	14^m	32^s
H. Long.	04	44	31.05"			
G. Sid Time	13	40	04.05"			
Sid Time M.N.	21	36	41.26"			
Interval	16	03	22.79"	16 ^h	01	24.9"
Reduction		02	37.83"			
G. M. T.	16	00	44.96"			

From Naut. Almanac		α			δ	
Moon 16 ^h	07	40	59.55	+22	48	11.9
Motion in 1 ^m			2.1019			- 7.718
" 0 ^m 49.3			+1.57			- 5.8
Tabular Place	07	41	01.12	+22	48	06.1

Moon's Age

12^d

$$934'' = 14.26$$

Parallax
Semi-diam

54 28.14

14 52.1

R

892.1

Ang

13.0

D₁ 4

-0.6

R

904.5

R

1.9390

(1+ α) R

- 922

R

1.8468

R²

3.4107

$$a = -499.6$$

$$+ 24$$

$$- 475.6$$

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Date Feb 15 1916

Times Etc

13

Expt to Stars	08	55		09	07	
" to Moon	09	00	56.5	09	00	56.7
Clock Fast		05	23.6			
H Sid Time	08	55	33.0	$\theta = +1^h 14^m 32^s$		
H Long	04	44	31.05			
G Sid Time	13	40	04.05			
sid Time M.N	-21	36	41.26			
Interval	16	03	02.79			
Reduction		02	37.83			
G. M. T.	16	00	44.96			

From Naut. Almanac		α			δ	
Moon 16 ^h	07	40	59.55	+22	48	11.9
Motion in 1 ^m			21049			- 7.718
" " 0.7493			+1.57			- 5.8
Tabular Place	07	41	01.12	+22	48	06.1

Moon's Age

12^d

$$934'' = 14.26$$

Parallax
Semi-diam

54 28.14

14 52.1

R

892.1

Ang

13.0

Duc

-0.6

R

904.5

R

1.9390

(1+R) R

- 922

R

1.8468

R~

3.4107

$$\alpha = -499.6$$

$$+ 24$$

$$475.6$$

X
-
-
-
-
23
+
+
+
16

10386

Plate Constants

14

$$\begin{array}{rcl}
 x & 16.9602 & 25.8148 & 29.7759 \\
 y & 17.2325 & 26.5597 & 30.6863 \\
 x-y & -0.2723 & -0.7449 & -0.9104
 \end{array}$$

$$\begin{array}{rcl}
 y & 22.0634 & 8.1751 & 23.0626 \\
 y & 21.7755 & 7.2080 & 22.8520 \\
 y-y & +0.2879 & +0.9671 & +0.2106
 \end{array}$$

$$\begin{array}{rcl}
 x-y + 500x & & -21.7y & -4x & -5.271 \\
 -0.2723 + 8480 & = & 5757 & -479 = 5278 & -7 = 5271 \\
 -0.7449 + 12907 & = & 5458 & -177 = 5281 & -10 = 5271 \\
 -0.9104 + 14888 & = & 5784 & -500 = 5284 & -12 = 5272 \\
 23.8826 + 11941 & & -362 & -9 = 24.5125
 \end{array}$$

$$\begin{array}{rcl}
 y-y + 500y & & +21.2x & +2.5y & -143.25 \\
 +0.2879 + 11032 & + & 13911 + 359 = 14270 & +55 = 14325 \\
 +0.9671 + 4088 & = & 13759 + 547 = 14306 & +20 = 14326 \\
 +0.2106 + 11531 & + & 13637 + 631 = 14268 & +57 = 14325 \\
 16.6643 + 8332 & & +506 & +41 = 16.1197
 \end{array}$$

$$\begin{array}{rcl}
 \text{Tables } a = +0.6 & e = +0.2 & a-e = +0.4 & b+d = -0.4 \\
 -499.6 & -502.5 & +2.9 & = +0.5
 \end{array}$$

$$\begin{array}{rcl}
 o-c & -500.2 & -502.7 & +0.9
 \end{array}$$

10386

Plate Constants

14

$$\begin{array}{rcl}
 x & 169602 & 25.8148 \\
 y & 17.2325 & 26.5597 \\
 x-y & -0.2723 & -0.7449
 \end{array}
 \quad
 \begin{array}{rcl}
 & & 29.7759 \\
 & & 30.6863 \\
 & & -0.9104
 \end{array}$$

$$\begin{array}{rcl}
 y & 22.0634 & 81751 \\
 y & 21.7755 & 72080 \\
 y-y & +0.2879 & +0.9671
 \end{array}
 \quad
 \begin{array}{rcl}
 & & 23.0626 \\
 & & 22.8520 \\
 & & +0.2106
 \end{array}$$

$$\begin{array}{rcl}
 x-y + 500x & & -21.7y & & -4x & & -5.271 \\
 -2723 + 8480 & = & 5757 & - & 479 & = & 5278 & - & 7 & = & 5271 \\
 -7449 + 82907 & = & 5458 & - & 177 & = & 5281 & - & 10 & = & 5271 \\
 -9104 + 14888 & = & 5784 & - & 500 & = & 5284 & - & 12 & = & 5272 \\
 23.8826 + 11941 & & & - & 362 & & & - & 9 & = & 24.5125
 \end{array}$$

$$\begin{array}{rcl}
 y-y + 500y & & +21.2x & & +2.5y & & -143.25 \\
 +2879 + 11032 & + & 13911 & + & 359 & = & 14270 & + & 5.5 & - & 143.25 \\
 +9671 + 41088 & = & 13759 & + & 547 & = & 14306 & + & 20 & = & 14326 \\
 +2106 + 11531 & + & 13637 & + & 631 & = & 14268 & + & 5.7 & = & 14325 \\
 16.6643 + 8332 & & & + & 506 & & & + & 41 & = & 16.1197
 \end{array}$$

$$\begin{array}{rcl}
 \text{Tables: } a = +0.6 & e = +0.2 & a-e = +0.4 & b+d = -0.4 \\
 & -499.6 & -502.5 & & +2.9 & & = +0.5
 \end{array}$$

1916
phae

10386

Mean Center

15-

	X	$X - X_0$	$(X - X_0)^2 + (Y - Y_0)^2$	O-C
1	23.0000	-0.8820 - 0	0.7779	3.4120 + 13
2	22.1610	-1.7210 - 0	2.9618	3.4027 - 80
3	22.0344	-1.8476 - 0	3.4136	3.4136 + 29
4	22.0720	-1.8100 + 0	3.2761	3.3890 - 217 ^{1/2}
5	22.6065	-1.2755 + 0	1.6269	3.4118 + 11
6	23.0000	-0.8820 + 0	0.7779	3.4117 + 10
7	23.8820	+0.0000 + 0	0.0000	3.4184 + 77
8	24.0000	+0.1180 + 1	0.0139	3.4058 - 49

 $R^2 = 3.4107$

	Y	$Y - Y_0$	ΔY	$(Y - Y_0)^2$
1	15.0410	-1.6230 - 0	2.6341	208
2	16.0000	-0.6640 - 0	0.4409	249
3	16.6640	-0.0000 - 0	0.0000	270
4	17.0000	+0.3360 + 0	0.1129	280
5	18.0000	+1.3360 + 0	1.7849	316
6	18.2869	+1.6229 + 0	2.6338	332
7	18.5129	+1.8489 + 0	3.4184	360
8	18.5057	+1.8417 + 0	3.3919	4

Range 156

approx. center.

X = 23	Y	15.0410
		18.2869
	2	33.3279
	Y_0	16.6639

$Y_{\max}$	18.5129
R	1.8490
R(erm)	1.8468

 $X_{\min}$ 22.0344 X_0 23.8820 $X_0 = 23.8820$ $Y_0 = 16.6640$

10386

Masses Center

15-

	x	$x - x_0$	$(x - x_0)^2 + (y - y_0)^2$	$0 - C$
1	23.0000	-0.8820	0.7779	+ 13
2	22.1610	-1.7210	2.9618	- 80
3	22.0344	-1.8476	3.4136	+ 29
4	22.0720	-1.8100	3.2761	- 217
5	22.6065	-1.2755	1.6269	+ 11
6	23.0000	-0.8820	0.7779	+ 10
7	23.8820	+0.0000	0.0000	+ 77
8	24.0000	+0.1180	0.0139	- 49

 $R^2 = 3.4107$

	y	$y - y_0$	$(y - y_0)^2$
1	15.0410	-1.6230	2.6341
2	16.0000	-0.6640	0.4409
3	16.6640	-0.0000	0.0000
4	17.0000	+0.3360	0.1129
5	18.0000	+1.3360	1.7849
6	18.2869	+1.6229	2.6338
7	18.5129	+1.8489	3.4184
8	18.5057	+1.8417	3.3919

Range 156

approx. center.

$$\begin{array}{rcl}
 x = 23 & y & 15.0410 \\
 & & 18.2869 \\
 & 2 & 33.3279 \\
 & y_0 & 16.6639
 \end{array}$$

$$\begin{array}{rcl}
 y_{\max} & 18.5129 \\
 R & 1.8490 \\
 R(\text{cm}) & 8468
 \end{array}$$

$$y_{\min} = 22.0344$$

$$x_0 = 23.8820$$

$$x_0 = 23.8820$$

$$y_0 = 16.6640$$

Normal Equations

$$\begin{array}{r}
 1 \quad + \quad 1.43 \\
 2 \quad + \quad 1.13 \\
 3 \quad + \quad 0.01 \\
 4 \quad - \quad 0.15 \\
 5 \quad - \quad 1.70 \\
 6 \quad - \quad 1.42 \\
 7 \quad + \quad 0.00 \\
 8 \quad + \quad 0.22 \\
 \hline
 + 2.78 \\
 - 3.27 \\
 \hline
 - 0.49
 \end{array}$$

$$\begin{array}{r}
 - \quad 1.14 \\
 + \quad 137.9 \\
 - \quad 53.6 \\
 + \quad 98.2 \\
 - \quad 14.0 \\
 - \quad 8.8 \\
 + \quad 0.0 \\
 - \quad 5.9 \\
 \hline
 + 236.1 \\
 - \quad 93.7 \\
 \hline
 + 142.4
 \end{array}$$

$$\begin{array}{r}
 - \quad 21.2 \\
 + \quad 52.8 \\
 - \quad 00.0 \\
 - \quad 18.5 \\
 + \quad 14.7 \\
 + \quad 16.2 \\
 + \quad 142.2 \\
 - \quad 90.4 \\
 \hline
 + 225.9 \\
 - \quad 129.7 \\
 \hline
 + \quad 96.2
 \end{array}$$

$$\begin{array}{r}
 -a \quad -b \quad -16 \\
 + \quad 9 \quad - \quad 6 \quad + \quad AC \\
 + \quad 17 \quad - \quad 3 \quad - \quad 13 \\
 + \quad 18 \quad - \quad 0 \quad + \quad 2 \\
 + \quad 18 \quad + \quad 1 \quad + \quad 3 \\
 + \quad 13 \quad + \quad 5 \quad + \quad 2 \\
 + \quad 9 \quad + \quad 6 \quad - \quad 1 \\
 - \quad 0 \quad + \quad 7 \quad - \quad 9 \\
 - \quad 1 \quad + \quad 7 \quad - \quad 10
 \end{array}$$

1038.6

Conditional Equations

 $+173 - 318$

av 61

$$12.84 - 0.49 = +142.4 - 8.29$$

$$-0.49 + 14.42 = +96.2 + 4.71$$

$$+ 0.49 - 0.02 = \pm 5.4 - 0.32$$

arc 156

$$\frac{p}{n} = 0,16$$

$$\frac{\partial v}{\partial t} = -18$$

$$\frac{-18}{-16} = -112$$

$$\Delta R = -1.4$$

$$\text{Corr} = +0.2$$

June DR: -1.6

$$-2 R = -3.96$$

$$-2 R. corr = -0.79$$

- 16

$$\begin{array}{r} -4 \\ \Delta t = -0.21 \\ \Delta q = +0.50 \\ +10. \end{array}$$

$$\Delta \delta = -0.1$$

10386

Conditional Equations

0-C¹⁶

1	-0.88	-1.62	= +13	-	10	-	11	= -21	+34
2	-1.72	-0.66	= -80	-	12	-	5	= -24	-56
3	-1.85	-0.00	= +29	-	21	-	0	= -21	+50
4	-1.81	+0.34	= -217	-	20	+	2	= -18	-149
5	-1.27	+1.34	= +11	-	14	+	9	= -5	+16
6	-0.88	+1.62	= +10	-	10	+	11	= +1	+14
7	+0.00	+1.85	= +77	+	0	+	13	= +13	+64
8	+0.12	+1.84	= -49	+	1	+	13	= +14	-63

+173 - 318

av 61

$$12.84 - 0.49 = +142.4$$

$$-0.49 + 14.42 = +96.2$$

$$+0.49 - 0.02 = +5.4$$

$$+14.4 = +101.6$$

$$1 = +7.0$$

$$12.84 = +142.4 + 3.4 = 145.8 \quad a = +11.3$$

$$\frac{10}{n} = 0.16$$

$$\frac{2v}{n} = -18$$

$$\frac{-18}{.16} = -112$$

$$\Delta R = -1.4$$

10386.

Morus Mean Position

17

$$\begin{array}{r} X_0 \quad 23.8820 \\ \quad \quad + 6 \\ \hline 23.8826 \end{array}$$

$$\begin{array}{r} y_0 \quad 16.6640 \\ \quad \quad + 3 \\ \hline 16.6643 \end{array}$$

From Plate Constants.

$$\begin{array}{r} X \quad 24.5125 \\ \quad \quad - 22 \\ \hline 3 \quad + 2.5125 \end{array}$$

$$\begin{array}{r} y \quad 16.1197 \\ \quad \quad - 18 \\ \hline \eta, \mu_0 \quad -1.8803 \end{array}$$

$$\begin{array}{r} \lg 3 \quad 0.40010 \\ \lg \cos \delta_0 \quad 9.96569 \\ \quad \quad 8.50724 \\ \lg \sin(\alpha - A) \quad 1.92719 \end{array}$$

$$\begin{array}{r} \lg \tan \delta \quad 9.6165 \\ \quad \quad 7.0534 \\ \lg \xi^2 \quad 0.8002 \\ \lg \eta_1 \quad 7.4701 \end{array}$$

$$\sin(\alpha - A) \quad + 84.56$$

$$\begin{array}{r} \eta_1 \quad +0.0029 \\ \eta_0 \quad -1.8832 \\ \lg \eta_1 \quad 0.27490 \\ \quad \quad 7.33115 \\ \quad \quad 2.94375 \end{array}$$

$$(\alpha - A) \quad + 01 \quad 24.56$$

$$\tan(\delta - \mu) \quad -878.52$$

$$A \quad 07 \quad 38 \quad 38.18$$

$$\delta - \mu \quad -14 \quad 38.52$$

$$\alpha_0 \quad 07 \quad 40 \quad 02.74$$

$$\mu + 22 \quad 43 \quad 33.04$$

$$\text{Red.} \quad +2.79$$

$$\delta_0 + 22 \quad 28 \quad 54.52$$

$$\alpha' \quad 07 \quad 40 \quad 05.53$$

$$\text{Red.} \quad -01.0$$

$$\delta' \quad 22 \quad 28 \quad 53.52$$

10386.

Morr's Mean Position

17

$$\begin{array}{r} X_0 \quad 23 \ 88 \ 20 \\ \quad \quad + \ 6 \\ \hline 23 \ 88 \ 26 \end{array}$$

$$\begin{array}{r} y_0 \quad 16 \ 66 \ 40 \\ \quad \quad + \ 3 \\ \hline 16 \ 66 \ 43 \end{array}$$

From Plate Constants.

$$\begin{array}{r} X \quad 24 \ 51 \ 25 \\ \quad - \ 22 \\ \hline 3 \quad + \ 2 \ 51 \ 25 \end{array}$$

$$\begin{array}{r} y \quad 16 \ 11 \ 97 \\ \quad - \ 18 \\ \hline \eta, \eta_0 \quad -1 \ 88 \ 03 \end{array}$$

$$\begin{array}{l} \log 3 \quad 0.40010 \\ \log \cos \delta_0 \quad 9.96567 \\ \quad \quad 8.50724 \\ \log \sin(x-A) \quad 1.92719 \end{array}$$

$$\begin{array}{l} \log \tan \delta \quad 7.6165 \\ \quad \quad 7.0534 \\ \log \delta_0 \quad 0.8002 \\ \log \eta \quad 7.4701 \\ \quad \quad +0.0029 \\ \quad \quad -1.8832 \\ \log \eta_0 \quad 0.27490 \\ \quad \quad 7.33115 \\ \quad \quad 2.94375 \\ \tan(\delta-A) \quad -878.52 \end{array}$$

$$\sin(x-A) \quad -94.56$$

$$(x-A) \quad + \ 01 \ 24 \ 56$$

$$A \quad 07 \ 38 \ 38.18$$

$$\alpha_0 \quad 07 \ 40 \ 02.74$$

$$\text{Red.} \quad +2.79$$

$$\alpha' \quad 07 \ 40 \ 05.53$$

$$\delta - \delta_0 \quad -14 \ 38.52$$

$$\delta + 22 \ 43 \ 33.04$$

$$\delta_0 + 22 \ 28 \ 54.53$$

$$\text{Red} \quad -01.0$$

$$\delta' \quad 22 \ 28 \ 53.5$$

10386

Reduction to Apparent Place

18

$H + \alpha$	28	04.4
H	20	24.4
α	07	40.0
β	21	42.9
$\beta + \alpha$	29	32.9

61° 06'

80 48.5"

S_0	+22	28.9
$\log \cos S_0$		9.9657
$\log i$		-0.8306
$\log (i)$		-0.7963 _m
(i)		

$\log \cos (\beta + \alpha)$	9.2073
$\log g$	1.0095
$\log \sin (\beta + \alpha)$	9.9943
$\log \tan S_0$	9.6168
	8.8239

$\log \sin S_0$	9.58257
$\cos (H + \alpha)$	9.6842
$\log h$	1.2860
$\sin (H + \alpha)$	9.9422
$\sec S_0$	0.0343
	8.8239

$\log g'$	0.2168
$\log g$	9.4445

$\log h'$	0.5527
h	0.0864

g	+1.288
g'	+0.278
h	+1.220
Red	+2.786

g'	1.647
h'	3.570
$\bar{c}$	-6.256
	-1.039

10386

Reduction to Apparent Place

18

$H + \alpha$	285	04.4
H	20	24.4
α	07	41.0
σ	21	42.9
$G + \alpha$	29	32.9

61' 06"

So 22 289

$\log \cos \delta_0$	9.9657
$\log i$	-0.8306
$\log (ii)$	-0.7963
(i)	

80 43.5"

$\log \cos (G + \alpha)$	9.2073
$\log g$	1.0095
$\log \sin (G + \alpha)$	9.9943
$\log \sin \delta_0$	9.6168
	8.8239

$\log \sin \delta_0$	9.5825
$\cos (H + \alpha_0)$	9.6842
$\log h$	1.2860
$\sin (H + \alpha)$	9.9422
$\sec \delta_0$	0.0343
	8.8239

$\log g'$	0.2168
$\log g$	9.4445

$\log h'$	0.5527
" h	0.0864

g	+1.288
g'	+0.278
h	+1.220
Red	+2.786

g'	1.647
h'	3.570
i	-6.256
	-1.739

10386.

Lunar Parallax

20

$$\begin{array}{rcll}
 \alpha & 07 & 40 & 05.53'' \\
 \theta & 08 & 55 & 33.00'' \\
 \theta - \alpha & 01 & 15 & 27.47'' \\
 = & 18 & 51 & 52.05'' \\
 \frac{1}{2}(\alpha - \alpha') & & 07 & 04.00'' \\
 (\theta - \alpha') - \frac{1}{2}(\alpha - \alpha') & 18 & 44 & 48.05''
 \end{array}$$

$$\begin{array}{rcll}
 & 9.95727 & & \\
 \log \cos \frac{1}{2}(\alpha - \alpha') & 0.00000 & & \\
 \sec(\theta - \alpha') - \frac{1}{2}(\alpha - \alpha') & 0.02367 & & \\
 \log \tan \gamma & 9.98094 & &
 \end{array}$$

$$\begin{array}{rcll}
 \gamma & 43 & 44 & 36.00'' \\
 \delta & 22 & 28 & 53.52'' \\
 \gamma - \delta & 21 & 15 & 42.48''
 \end{array}$$

$$\begin{array}{rcll}
 & 9.82640 & & \\
 \log \sin \gamma & 8.19986 & & \\
 \sin(\gamma - \delta) & 9.55946 & & \\
 \cos \gamma & 0.16035 & & \\
 \sin(\delta - \delta') & 7.74597 & &
 \end{array}$$

$$(\delta - \delta') + 19 \quad 09.2''$$

$$\delta + 22 \quad 48 \quad 02.7''$$

$$\text{aph } \delta + 22 \quad 48 \quad 06.1''$$

$$O-C \quad - \quad 3.4''$$

$$\begin{array}{rcll}
 \text{Curr} & + & 0.5'' \\
 \text{2 wordn. reproc} & & 0.0''
 \end{array}$$

$$\text{Err. Corr} \quad - 0.1''$$

$$\delta + 22 \quad 48 \quad 02.6''$$

$$O-C \quad - \quad 3.5''$$

$$\Pi \quad 54 \quad 28.14''$$

$$\begin{array}{rcll}
 & 9.86913 & & \\
 \log \sin \Pi & 8.19986 & & \\
 \sin(\theta - \alpha') & 9.50965 & & \\
 \sec \delta' & 0.03533 & & \\
 \sin(\alpha - \alpha') & 7.61397 & &
 \end{array}$$

$$\alpha - \alpha' + 14' \quad 08.0''$$

$$= + 56.53''$$

$$\alpha \quad 07 \quad 41 \quad 02.06''$$

$$\text{pha} \quad 07 \quad 41 \quad 01.12''$$

$$O-C \quad + 0.94''$$

$$\text{Curr} \quad - 0.03''$$

$$\text{Err. Corr} \quad + 0.02''$$

$$\alpha \quad 07 \quad 41 \quad 02.08''$$

$$O-C \quad + 0.96''$$

10386.

Lunar Parallax.

20

$$\begin{array}{rcl}
 \alpha & 07 & 40 \quad 05.53 \\
 \theta & 18 & 55 \quad 33.00 \\
 \theta - \alpha & 01 & 15 \quad 27.47 \\
 = & 18 & 51 \quad 52.15 \\
 \frac{1}{2}(\alpha - \alpha') & & 07 \quad 04.00 \\
 \theta - \alpha' - \frac{1}{2}(\alpha - \alpha') & 18 & 44 \quad 48.05
 \end{array}$$

$$\begin{array}{rcl}
 & 9.95727 \\
 \log \cos \frac{1}{2}(\alpha - \alpha') & 0.00000 \\
 \sec(\theta - \alpha') - \frac{1}{2}(\alpha - \alpha') & 0.02367 \\
 \log \tan \gamma & 9.98094
 \end{array}$$

$$\gamma \quad 43 \quad 44 \quad 36.00$$

$$S' \quad 22 \quad 28 \quad 53.52$$

$$\gamma - S' \quad 21 \quad 15 \quad 42.48$$

$$\begin{array}{rcl}
 & 9.82640 \\
 \log \sin \pi & 9.19986 \\
 \sin(\gamma - S') & 9.55946 \\
 \cos \gamma & 0.16025 \\
 \sin(S - S') & 7.74597
 \end{array}$$

$$(S - S') \quad +19 \quad 29.2$$

$$S - 22 \quad 48 \quad 02.7$$

$$\text{eph } S + 22 \quad 48 \quad 06.1$$

$$O-C \quad - \quad 3.4$$

$$\begin{array}{rcl}
 \text{Curv} & + & 0.5 \\
 2^{\text{nd}} \text{ order approx} & & 0.0
 \end{array}$$

$$\text{Inv. Corr} \quad -0.1$$

$$S \quad +22 \quad 48 \quad 02.6$$

$$O-C \quad - \quad 3.5$$

$$\pi \quad 54 \quad 28.14$$

$$9.86913$$

$$\log \sin \pi \quad 9.19986$$

$$\sin(\theta - \alpha) \quad 9.50965$$

$$\sec S' \text{ eph} \quad 0.03533$$

$$\sin(\alpha - \alpha') \quad 9.81397$$

$$\alpha - \alpha' \quad +14 \quad 08.05$$

$$= \quad +56.53$$

$$\alpha \quad 07 \quad 41 \quad 02.06$$

$$\text{eph } \alpha \quad 07 \quad 41 \quad 01.12$$

$$O-C \quad +0.94$$

$$\text{Curv} \quad -0.03$$

$$\text{Inv. Corr} \quad +0.02$$

$$\alpha \quad 07 \quad 41 \quad 02.08$$

$$O-C \quad +0.96$$

3. Diff. Images. of Star 3.

X			
18689	18268	18387	17750
15761	11213	14640	11490
63	15	40	96
87	8268	87	7754
30.2927	30.2946	11.3747	11.3741

17671		17776	18132
14742	11193	15446	10449
40	97	46	43
71		76	8134
30.2929	30.2927	11.2330	11.2312
19464	Star 3	17633	
16533		14575	
30.2931		11.3058	

Star 4.

18.3	18940	16158	18296	16560
19.2	16194	8894	16299	8539
	92	90	99	41
	40	58	96	6564
18.2746	18.2734	19.1987	19.1977	

10532 Dec. 3

Ptolemy 24.6 16.5 21

Star Measures

1	19089	17776	18512	17340
12.9+	9481	17369	10909	14928
5.8	79	65	13	30
	79	7782	18	7342
	<u>12.9599</u>	<u>12.9585</u>	<u>5.7605</u>	<u>5.7589</u>

2	18226	18862	18466	18950
23.9	9013	18090	16268	11130
24.2	17	84	64	32
	32	8870	62	8950
	<u>23.9216</u>	<u>23.9224</u>	<u>24.2194</u>	<u>24.2182</u>

3
30.3
11.3

30.2928 30.2936 11.3040 11.3027

Moon Measures

1	18734	18004
24	8770	17950
14.9+	80	54
	41	8008
	<u>14.9970</u>	<u>14.9952</u>

2	17705	18830
23	8618	17917
15.9+	22	17
	15	8830
	<u>15.9096</u>	<u>15.9087</u>

3	18300	17380
22.9+	8720	17156
16	20	50-53
	00	7580
	<u>22.9580</u>	<u>22.9573</u>

10532 Dr 3

Temperature 47.516.5 21

Star Measures.

	19089	17776	18512	17340
129+	9481	17389	17909	14928
5.2	79	65	13	30
	79	7782	18	7342
	<u>29599</u>	<u>29585</u>	<u>57605</u>	<u>57589</u>
2	18226	18862	18466	18950
3.9	9013	18090	16268	11130
4.2	17	87	64	22
	32	8870	62	8950
	<u>229216</u>	<u>239224</u>	<u>242194</u>	<u>242188</u>

3

30.3
1.3

30.2928 30.2936 11.3040 11.3027

Moon Measures.

2	18734	18734	18004
4	8770	8770	17950
5	40	80	54
	48	41	8008
		<u>149980</u>	<u>149952</u>
2		17885	18830
3		8618	17917
5.9		22	17
		15	8830
		<u>159096</u>	<u>159087</u>

2.43	18300	17580
2.9+	8720	17456
6	20	50-53
	00	7588

229580 229573

4

22

16

5

22

17

6

23

19.4

7

23.2

18

8

24

18

known

$$\begin{array}{r}
 4- \\
 229 \\
 165 \\
 \hline
 17362 \\
 9206 \\
 10 \\
 60 \\
 \hline
 22.8154
 \end{array}
 \quad
 \begin{array}{r}
 17252 \\
 15398 \\
 96 \\
 52 \\
 \hline
 22.8145
 \end{array}
 \left. \begin{array}{l} \\ \\ \end{array} \right\} 97$$

$$\begin{array}{r}
 5 \\
 229+ \\
 17 \\
 \hline
 18373 \\
 9992 \\
 98 \\
 77 \\
 \hline
 22.8385
 \end{array}
 \quad
 \begin{array}{r}
 16542 \\
 14918 \\
 12 \\
 42 \\
 \hline
 22.8373
 \end{array}
 \left. \begin{array}{l} \\ \\ \end{array} \right\} 15$$

$$\begin{array}{r}
 6 \\
 23 \\
 17.4 \\
 \hline
 18202 \\
 12932 \\
 80 \\
 02 \\
 \hline
 17.5270
 \end{array}
 \quad
 \begin{array}{r}
 18083 \\
 13340 \\
 50 \\
 83 \\
 \hline
 17.5262
 \end{array}
 \left. \begin{array}{l} \\ \\ \end{array} \right\} 45$$

$$\begin{array}{r}
 I \\
 23.3 \\
 18 \\
 \hline
 17602 \\
 14279 \\
 79 \\
 04 \\
 \hline
 23.3324
 \end{array}
 \quad
 \begin{array}{r}
 16513 \\
 9837 \\
 37 \\
 13 \\
 \hline
 23.3324
 \end{array}$$

$$\begin{array}{r}
 8 \\
 24 \\
 18.4 \\
 \hline
 17978 \\
 13588 \\
 88 \\
 84 \\
 \hline
 18.4392
 \end{array}
 \quad
 \begin{array}{r}
 1809 \\
 12476 \\
 76 \\
 98 \\
 \hline
 18.4378
 \end{array}$$

4
22
165
22
176
23
17.47
23.3
188
24
18

Mean

4-	17312	17252	
229	9206	15398	} 97
165	10	96	
	60	6652	
	<u>228154</u>	<u>228145</u>	

5	18373	16542	
229	9992	14918	} 15
17	98	12	
	77	42	
	<u>228385</u>	<u>228373</u>	

6		18202	18083	
23		12932	13340	} 43
7.4		80	50	
		02	83	
		<u>17.5270</u>	<u>17.5262</u>	

7	17602	16513	
233	14279	9837	
18	79	37	
	04	13	
	<u>233324</u>	<u>243324</u>	

8		17978	18098	
24		13588	13476	
18.4		88	76	
		84	98	
		<u>18.4392</u>	<u>18.4378</u>	

10532

Tuners etc

23

March 11, 1916

Expt Stars 07 03

07 15

" " Moon 07 08

07 08 52

Clock fast. 05

24.9

H. Sid Line 07 03

27.0

 $\Theta = +1^h 31^m$

H. Long 04 44

31.05

G. Sid Line 1.1 47

58.05

Sid Line Mean 23 15

15.11

Interval 12 32

42.94

Reduction - 02

03.31

Q.M.T 12 30

39.63

12^h 51 10 11

From Naut. Almanac

R.A.

Decl.

Moon 12^h 05 31

10.19 +26 51 41.4

Motion in 1^m

2.2126 -0.488

" 30^m 66.65

+01 07.84 -15.0

Tabular Place 05 32

18.03 +26 51 26.4

Moon Age

8d.

Parallax

54 16.0

Semi-diam

14 48.8

R

888.8

Aug.

13.2

In 3

-0.3

R

901.7

R

19329

(1+a) R

-920

R

18409

R²

33889

934 = 146

a = -499.8

+24

-475.8

10532

Times etc

23

March 11 1916

Expt Star	07	03	07	15	"
" " Moon	07	08	51.8	07	08 52
Clock fast		05	249		
71 Sid Line	07	03	270		
71 Long	04	44	3105		$\alpha = +1^h 31^m$
@ Sid Line	11	47	5805		
Sid Line Mean Am	23	15	15.11		
Interval	12	32	4294		
Reduction		02	03.31		
G M T	12	30	39.63		$12^h 51.701$

From Naut Almanac

R.A.

Decl.

Moon 12 ^h	05	31	10.19	26	51	41.4
Motion in 1 ^m			22126			-0.488
" 30 ^h 66.15		+01	17.84			-15.0
Jahalar Place	05	32	18.03	26	51	26.4

Moon age

8d.

Parallax

Semi-diam

R

Aug

In 3

R

R

(1+1) R

R

R²

$$934'' = 14.6$$

$$\alpha = -499.8$$

$$+24$$

$$-475.8$$

$$54' 16.0''$$

$$14' 48.8''$$

$$888.8$$

$$13.2$$

$$-0.3$$

$$901.7$$

$$19329$$

$$-920$$

$$18409$$

$$33889$$

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10532

Plate Center & Constants.

24

X	Y							
12.9592	5.7597	05	24	06.25	25	05	00.6	
33.9221	24.2188	05	31	39.17	27	36	31.4	
30.2932	11.3034	05	34	31.82	25	51	03.7	
167.1744	341.2819	316	29	17.22	3178	32	35.7	
22.3915	13.7606	05	29	45.74	26	10	51.9	
22	18			-12.14		+32	57.7	
-0.3915	+4.2394	05	29	33.60	+26	43	49.6	
31 ^s								
-12.14								

Plate Center { $A = 05 \ 29 \ 33.60$
 $D = +26 \ 43 \ 49.6$

$$\begin{aligned}
 X-5 &+ 500 X & - 56.3 Y & - .2 X = -11128 \\
 4974 + 6480 &= 11454 - 324 &= 11130 - 2 &= 11128 \\
 -0535 + 11961 &= 12496 - 1363 &= 11133 - 5 &= 11128 \\
 -3378 + 15147 &= 11769 - 636 &= 11133 - 6 &= 11127 \\
 946545 + 12327 & & - 941 & - 5 = 24.6798
 \end{aligned}$$

$$\begin{aligned}
 Y-7 &+ 500 Y & + 56.3 X & + .7 Y & - 7859 \\
 +4245 + 2880 &= 7125 + 730 &= 7855 + 4 &= 7859 \\
 -5614 + 12109 &= 6495 + 1347 &= 7842 + 17 &= 7859 \\
 +0495 + 5652 &= 6147 + 1705 &= 7852 + 8 &= 7860 \\
 167174 + 8359 & & + 1388 & + 12 = 169074
 \end{aligned}$$

Tables $a = +1.0$
 $= -499.8$

$e = +1.0$
 $= -500.7$

$a-e = 0$
 $= +0.9$

$b+d = -0.5$
 $= 0.0$

O-C -500.8

-501.7

$+0.5$

0532

Plate Center - Constants.

24

λ	η								
129592	57597	05	24	06.25	25	05	00.6		
239221	242188	05	30	39.17	27	36	31.4		
312932	113034	05	34	31.86	25	51	03.7		
31671744	31412819	3116	29	17.22	3178	32	35.7		
223915	137606	05	29	45.74	26	10	51.9		
22	18			-12.14		+32	57.7		
-03915	+42394	05	29	33.60	+26	+43	49.6		
31									
-12.14									

Plate Center { $A = 05 \ 29 \ 33.60$
 $\Theta = +26 \ 43 \ 49.6$

$$\begin{aligned}
 & \lambda - \eta \\
 & +4974 + 6480 = 11454 - 324 = 11130 - 2 = 11128 \\
 & +0535 + 11961 = 12496 - 1363 = 11133 - 5 = 11128 \\
 & -3378 + 15147 = 11769 - 636 = 11133 - 6 = 11127 \\
 & 241545 + 12327 = 253872 - 941 = 252931 - 5 = 252926
 \end{aligned}$$

$$\begin{aligned}
 & \eta - \lambda \\
 & +4245 + 2880 = 7125 + 730 = 7855 + 4 = 7859 \\
 & -5614 + 12104 = 6490 + 1347 = 7837 + 17 = 7854 \\
 & +0495 + 5652 = 6147 + 1705 = 7852 + 8 = 7860 \\
 & 167174 + 8359 = 175533 + 1382 = 176915 + 12 = 176927
 \end{aligned}$$

Tables $a = +1.0$
 $= -499.8$

$l = +1.0$
 $= -570.7$

$a-l = 0$
 $= +0.9$

$b+d = -0.5$
 $= 0.0$

788

7.1

0.5 26 12.91

12.96

12.96

0.5 26 12.94

+59.90

0.5 27 12.84

- 0.5 29 33.60

- 2 20.76

- 140.76

2.14848m

9.95019

0.60591m

 $Y = 18.2740$ $y = 19.1982$

+500x

-56.3y

-1.2x

-11128

S -4.0356

+3098 + 9137

-1081

-4

= -11150

S -0.0002

S -17.9642

X 18.2740

Y-S +3098

+56.3x

+1.7y

-7859

-1.2797 + 9599

+1029

+13

= -7834

AS -4.65

-5.7 +9

26 54 27.9

-9.53

-12.71

-59 + 44 = -15 + 6 = -9

28.9

+1.87

+6.78

+2 - 8 = -6 - 3 = -9

28.0

+8.63

-6.79

+27 - 39 = -12 + 3 = -9

S 26 54 28.3

M +2.67

-1.09

-12

+1 = -11

+46.4

-3.17

-25 +18

S=26 55 14.7

A3 -75 + 39 = -36 + 19 = -17

-26 43 49.6

+8 - 21 = -13 - 4 = -17

+11 25.1

-20 + 21 = -1 - 17 = -18

+685.1

+3

-5 = +16

2.83575

7.0 0.16690

9.70568

1.21182

7.9709

corr. $\{ \alpha = -0.1$ $\delta = +0.8$

7.9709

7.9709

7.9709

7.9709

7.9709

7.9709

10532

Standard Coordinates.

25

Cape No. 783 mg 5.8

Cape No. 795 mg 6.5

Cape No. 804 mg 5.1

0 5 23 07.19
 07.24
 07.17

0 5 -29 38.91
 38.96
 38.91

0 5 33 32.34
 32.37
 32.35

Mean 0 5 23 07.20
 P.M.C. +59.05

0 5 29 38.93
 +60.24

0 5 33 32.35
 +59.45

0 5 24 06.25

0 5 30 39.17

0 5 34 31.80

0 5 29 33.60

0 5 29 33.60

0 5 29 33.60

0 5 -05 27.35

+01 55.57

+4 58.20

0 5 -32 27.32

+65.57

+298.18

2.51499m

1.81671

2.47448

9.95698

9.94750

9.95421

0.97921m

0.27145

0.93593

-9.5326

+1.8683

+8.6284

-00.56

+0002

+0026

12.4618

23.8685

30.6310

12.9592

23.9220

31.2932

+4994

+0535

-3378

25 04 09.8

27 35 50.07

25 50 27.57

10.2

49.03

27.45

10.7

50.16

27.99

25 04 10.2

27 35 49.75

25 50 27.67

+50.4

+41.65

+36.07

25 05 00.6

27 36 31.40

25 51 03.74

26 43 49.6

26 43 49.6

26 43 49.6

-1 38 49.0

+52 41.8

-52 45.9

-5930.6

+3162.0

-3166.1

377310m

3.49996

3.500052m

1.10425m

0.83111

0.83167m

9.67032

9.71848

9.68531

1.95842

054290

1.87186

86821

7.3148

8.6106

-12.7129

+6.77814

-6.78686

+0.0481

+00206

+04080

5.3352

24.7802

11.2539

5.7597

24.2188

11.3034

+4245

-5614

+0495

-12.7129

+6.77814

-6.78686

+0.0481

+00206

+04080

5.3352

24.7802

11.2539

5.7597

24.2188

11.3034

+4245

-5614

+0495

10532

Standard Coordinates.

25

Cape No. 783 mg 5.8

Cape No. 795 mg 6.5

Cape No. 804 mg 5.1

C 05 23 07.19
 4 07.24
 8 07.17

05 29 38.91
 38.96
 38.91

05 33 32.34
 32.37
 32.35

Mean 05 23 07.20
 Pres +59.05

05 29 38.93
 +60.24

05 33 32.35
 +59.45

A 05 29 33.60

05 29 33.60

05 29 33.60

A-A -05 27.35

+01 557

+ 4 58.20

Sm(A-A) -327.32

+65.57

+298.28

log u 2.51499m

1.81671

2.47448

log S 9.95498

9.94750

9.95421

log S₀ 0.97921m

0.27145

0.93593

S₁ -9.5326

+1.8083

+8.6284

S₂ -0.056

+0.002

+0.026

S 12.4619

23.8685

30.1310

X 12.9592

23.9220

31.2932

X-S +.4974

+0.535

-.3378

C 25 04 09.8

27 35 50.07

25 50 27.57

E 10.2

49.03

27.45

4 10.7

50.16

27.99

mean 25 04 10.2

27 35 49.75

25 50 27.67

Pres +50.4

+41.65

+36.07

D 26 43 49.6

26 43 49.6

26 43 49.6

D-A -1 38 49.0

+52 41.8

- 52 45.9

Sm(D-A) -5930.6

+3162.0

-3166.1

log u 3.77310m

3.49996

3.500052m

log S₀ 1.10425m

0.83111

0.83167m

log tan δ 9.67132

9.71848

9.68531

log S₂ 1.95842

0.54290

1.87186

log u 8.6821

7.3148

8.6106

log S₀ -1.29129

+6.77814

-6.78686

S₁ -0.0481

+0.0206

-0.04080

S 5.3352

24.7802

11.2539

X 5.7597

24.2188

11.3034

X-S +.4245

-.5614

+0.0495

log S₀ -1.29129

+6.77814

-6.78686

S₁ -0.0481

+0.0206

-0.04080

S 5.3352

24.7802

11.2539

X 5.7597

24.2188

11.3034

X-S +.4245

-.5614

+0.0495

10532

Moon Center

26

	x	$y - x_0$	$(x - x_0)^2$	$(x - x_0 + y - y_0)^2$	$O - C$
1	24 0 0 0 0	-0.6 5 6 0	0.4 3 0 9	3.3 9 5 8	+ 69
2	23 0 0 0 0	-1.6 5 6 0	2.7 4 2 3	3.3 9 6 5	+ 76
3	22.9 5 7 7	-1.6 9 8 3	2.8 8 4 2	3.3 9 9 7	+ 108
4	22.8 1 5 0	-1.8 4 1 0	3.3 8 9 3	3.3 8 9 3	+ 4
5	22.8 3 7 9	-1.8 1 8 1	3.3 0 5 5	3.3 8 5 0	- 39
6	23 0 0 0 0	-1.6 5 6 0	2.7 4 2 3	3.3 9 6 2	+ 73
7	23.3 3 2 4	-1.3 2 3 6	1.7 5 1 9	3.3 9 5 4	+ 65
8	24.0 0 0 0	-0.6 5 6 0	0.4 3 0 9	3.3 9 1 0	+ 21

$$R^2 = 3.3889$$

$$av: 59$$

	y	$y - y_0$	$(y - y_0)^2$	
1	14.9 9 6 1	-1.7 2 1 9	2.9 6 4 9	201°
2	15.9 0 9 2	-0.8 0 8 8	0.6 5 4 2	244°
3	16.0 0 0 0	-0.7 1 8 0	0.5 1 5 5	247°
4	16.7 1 8 0	0.0 0 0 0	0.0 0 0 0	270°
5	17.0 0 0 0	+0.2 8 2 0	0.1 7 9 5	279°
6	17.5 2 6 6	+0.8 0 8 6	0.6 5 3 9	296°
7	18.0 0 0 0	+1.2 8 2 0	1.6 4 3 5	314°
8	18.4 3 8 5	+1.7 2 0 5	2.9 6 0 1	339°

$$Range \quad 138^\circ$$

Approx. Center

$$x = 23 \quad y = 15.9092$$

$$17.5266$$

$$33.4358$$

$$y_0 = 16.7179$$

$$Corr R = 1.8409$$

$$x_{min} = 22.8150$$

$$y_0 = 24.6559$$

$$x_0 = 24.6560$$

$$y_0 = 16.7180$$

10532

Moon Center

	X	$Y - X_0$	$(X - X_0)^2$	$(Y - Y_0)^2$	$C - C_0$
1	24 0 0 0 0	-0.6560	0.4309	3.3958	+ 69
2	23 0 0 0 0	-1.6560	2.7423	3.3965	+ 76
3	22 9 5 7 7	-1.6983	2.8842	3.3997	+ 108
4	22 8 1 5 0	-1.8410	3.3893	3.3893	+ 4
5	22 8 3 7 9	-1.8181	3.3055	3.3850	- 39
6	23 0 0 0 0	-1.6560	2.7423	3.3962	+ 73
7	23 3 3 2 4	-1.3236	1.7519	3.3954	+ 65
8	24 0 0 0 0	-0.6560	0.4309	3.3910	+ 21

av. 57

 $R^2 = 3.3889$

	$Y - Y_0$	$(Y - Y_0)^2$	
1	14 9 9 6 1	-1.7219	29649
2	15 9 0 9 2	-0.8088	0.6542
3	16 0 0 0 0	-0.7180	0.5155
4	16 7 1 8 0	0.0000	0.0000
5	17 0 0 0 0	+0.2820	0.1795
6	17 5 2 6 6	+0.8086	0.6539
7	18 0 0 0 0	+1.2820	1.6435
8	18 4 3 8 5	+1.7205	2.9601

Range 138

Moon Center

$$\begin{aligned}
 X = 22 & \quad 159192 \\
 & \quad 175266 \\
 & \quad 334358 \\
 Y_0 & \quad 167179
 \end{aligned}$$

$$C_m R = 18409$$

$$X_{mm} = 228150$$

$$Y_0 = 246559$$

$$X_0 = 246560$$

$$Y_0 = 167180$$

Normal Equations

$$\begin{array}{r}
 1 \quad + \quad 1.13 \\
 2 \quad + \quad 1.34 \\
 3 \quad + \quad 1.22 \\
 4 \quad + \quad 0.00 \\
 5 \quad - \quad 0.51 \\
 6 \quad - \quad 1.35 \\
 7 \quad - \quad 1.69 \\
 8 \quad - \quad 1.15 \\
 \hline
 + \quad 3.69 \\
 - \quad 4.70 \\
 \hline
 - \quad 1.01
 \end{array}$$

$$\begin{array}{r}
 - \quad 45.6 \\
 - \quad 126.0 \\
 - \quad 183.5 \\
 - \quad 7.3 \\
 + \quad 71.0 \\
 - \quad 121.0 \\
 - \quad 86.0 \\
 - \quad 14.0 \\
 \hline
 + \quad 71.0 \\
 - \quad 583.4 \\
 \hline
 - \quad 512.4
 \end{array}$$

$$\begin{array}{r}
 - \quad 119.0 \\
 - \quad 61.5 \\
 - \quad 79.0 \\
 - \quad 00.0 \\
 - \quad 10.9 \\
 + \quad 59.0 \\
 + \quad 83.2 \\
 + \quad 36.1 \\
 \hline
 + \quad 178.3 \\
 - \quad 270.4 \\
 \hline
 - \quad 92.1
 \end{array}$$

$-a$	$-b$	$+15$	$+ \Delta C$
- 6	+ 3	+ 12 ^v	
- 15	+ 2	+ 2 ^v	
- 15	+ 1	+ 1 ^v	
- 16	+ 0	- 1 ^v	
- 16	- 1	- 2 ^v	
- 15	- 2	- 2 ^v	
- 12	- 2	+ 1 ^v	
- 6	- 3	+ 6 ^v	

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Conditional Equations.

27

								0-e	corr
1	-0.66	-1.72	=	+69	+20	+22	=	+42	+ 27 + 39
2	-1.66	-0.81	=	+76	+49	+10	=	+59	+ 17 + 19
3	-1.70	-0.72	=	+108	+50	+9	=	+59	+ 49 + 50
4	-1.84	-0.00	=	+4	+55	+0	=	+55	- 51 - 52
5	-1.82	+0.28	=	-39	+54	-4	=	+50	- 89 - 91
6	-1.66	+0.81	=	+73	+49	-10	=	+29	+ 34 + 32
7	-1.32	+1.28	=	+65	+39	-16	=	+23	+ 42 + 43
8	-0.66	+1.72	=	+21	+20	-22	=	-2	+ 23 + 29
-11.32 + 0.84									av. 41

$$17.68 - 1.01 = -512.4 - 11.32$$

$$-1.01 + 9.47 = -92.1 + 0.84$$

$$+1.01 - 0.06 = -29.5 + 0.65$$

$$+9.41 = -121.6 + 1.49 = -12.9 + 0.16$$

$$17.68 = -512.4 - 13 = -525.4$$

$$a = -29.7 - 0.63$$

arc 138

$$\frac{D}{n} = 0.11$$

$$\frac{\Sigma K}{n} = +6.5$$

$$\frac{6.5}{.11} = +59$$

$$\Delta R = +0.7$$

$$\text{True } \Delta R = +0.9$$

$$-2R = -3.68 \quad -2R \text{ Corr} = +0.73 +15$$

$$\Delta t = +0.12$$

$$\Delta \delta = +0.1$$

$$\Delta a = -0.46$$

$$\Delta \alpha = -0.02$$

-9

1
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3
4
5
6
7
8

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Conditional Equations.

27

[illegible]

$$17.68 - 1.01 = -512.4$$

$$-1.01 + 9.47 = -92.1$$

$$+ 1.01 - 0.06 = - 29.5$$

$$+ 9.41 = - 121.6$$

$$h_2 = 12.9$$

$$17.68 = -512.4 - 13 = -525.4$$

$$a = -29.7$$

$$\frac{D}{B} = 0.11$$

$$\frac{\sum x}{n} = 6,5$$

$$\frac{6.8}{11} = +59$$

$\Delta R = 0,7$

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Moss's Mean Position

28

$$X_0 \quad 24.6560''$$

$$-15''$$

$$24.6545''$$

$$Y_0 \quad 16.7180''$$

$$-6''$$

$$16.7174''$$

From Plate Constants

$$X \quad 24.6798''$$

$$22$$

$$\Sigma \quad +2.6798''$$

$$Y \quad 16.9024''$$

$$18$$

$$\Sigma \quad -1.0926''$$

$$\log S \quad 0.42870''$$

$$\log \cos \delta_1 \quad 9.95146''$$

$$8.50724''$$

$$\log \sin(\alpha - A) \quad 1.96940''$$

$$(\alpha - A) \quad +93.20''$$

$$+0133.20''$$

$$A \quad 052933.68''$$

$$\alpha_0 \quad 053106.80''$$

$$\text{Red} \quad +01.812$$

$$\alpha' \quad 053108.61''$$

$$\log \tan \delta \quad 9.6993''$$

$$\log S_1 \quad 0.8562$$

$$7.0534$$

$$\log \eta_1 \quad 7.6089''$$

$$\eta_1 \quad +0.0041''$$

$$\eta_0 \quad -1.0967''$$

$$\log \eta_0 \quad 0.04009''$$

$$7.33115''$$

$$\log \tan \delta - A \quad 2.70894''$$

$$\delta - A \quad -511.61''$$

$$-08.31.6$$

$$\delta + 264849.6''$$

$$\delta_0 \quad 26-3518.0''$$

$$\text{Red} \quad +08.2$$

$$\delta' \quad 263526.2$$

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Mean Mean Position

28

$$X_0 \quad 24.65.10''$$

$$-15''$$

$$24.65.45''$$

$$Y_0 \quad 16.71.80''$$

$$-6''$$

$$16.71.74''$$

From Plate Constants

$$X \quad 24.6798$$

$$22$$

$$S \quad +2.6798$$

$$Y \quad 16.9124$$

$$18$$

$$-1.0926$$

$$\log S \quad 0.42870$$

$$\log \cos \delta \quad 9.95146$$

$$8.50724$$

$$\log \sin(X-A) \quad 1.96940$$

$$\log \tan \delta \quad 9.6993$$

$$\log S_1 \quad 0.8562$$

$$7.0534$$

$$\log \eta \quad 7.6089$$

$$(X-A) \quad -9.320$$

$$+01.33.20$$

$$A \quad 05.29.33.61$$

$$\alpha_0 \quad 05.31.06.80$$

$$\text{Red} \quad +01.81$$

$$\alpha' \quad 05.31.08.61$$

$$\eta_1 + 0.0041$$

$$\eta_0 - 1.0967$$

$$\log \eta_0 \quad 0.03009$$

$$7.33115$$

$$\log \eta_1 \quad 2.70894$$

$$\delta - \delta_0 \quad -51.161$$

$$-08.31.6$$

$$\delta + 26.43.49.6$$

$$\delta_0 \quad 26.33.18.0$$

$$\text{Red} \quad -08.2$$

$$\delta' \quad 26.35.26.2$$

$$\begin{array}{r}
 1 \quad 05 \quad 27 \quad 17.43 \\
 05 \quad 27 \quad 15.57 \\
 \hline
 + 1.86
 \end{array}$$

$$\begin{array}{r}
 2 \quad 05 \quad 32 \quad 39.19 \\
 2 \quad 05 \quad 32 \quad 37.43 \\
 \hline
 + 1.76
 \end{array}$$

$$\begin{array}{r}
 3 \quad 05 \quad 39 \quad 25.79 \\
 05 \quad 39 \quad 23.46 \\
 \hline
 + 2.33
 \end{array}$$

$$\begin{array}{r}
 32 \quad 08 \quad 01.98 \\
 32 \quad 07 \quad 51.48 \\
 \hline
 + 10.45
 \end{array}$$

$$\begin{array}{r}
 21 \quad 05 \quad 38.37 \\
 21 \quad 05 \quad 32.05 \\
 \hline
 + 6.32
 \end{array}$$

$$\begin{array}{r}
 49 \quad 49 \quad 42.53 \\
 49 \quad 47 \quad 26.62 \\
 \hline
 + 15.91
 \end{array}$$

Owing
(3)

51

46

41

36

31

26

21

16

11

6

1

0

-1

-2

-3

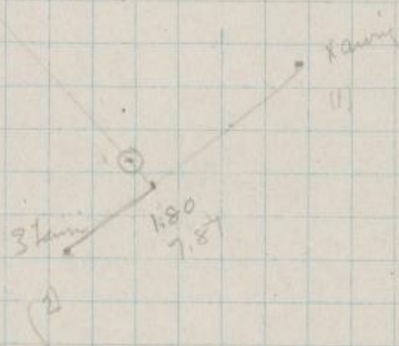
-4

-5

-6

$$\begin{array}{r}
 10.45 \\
 6.32 \\
 \hline
 + 4.13
 \end{array}$$

$$\begin{array}{r}
 1.82 \\
 8.27
 \end{array}$$



46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0 -2 -4 -6 -8 -10 -12 -14 -16 -18 -20 -22 -24 -26 -28 -30 -32 -34 -36 -38 -40 -42 -44 -46

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Reduction to Apparent Place

29

$H + \alpha$	24	09.6
H	18	38.5
α	05	31.1
G	21	53.7
$G + \alpha$	27	24.8

2° 24' 51" 12.0

S_0 26 35.3

$\log \cos S_0$ 9.9515
 $\log i$ 0.9057
 $\log (i)$ 0.8572

$\log \cos (G + \alpha)$ 9.7970
 $\log g$ 1.0494
 $\log \sin (G + \alpha)$ 9.8917
 $\log \tan S_0$ 9.6994
 $\log h$ 8.8239

$\log \sin S_0$ 9.6509
 $\cos (H + \alpha)$ 9.9996
 $\log h$ 1.2746
 $\sin (H + \alpha)$ 8.6220
 $\sec S_0$ 0.0485
 $\log h$ 8.8239

$\log (g')$ 0.8464
 $\log (g)$ 9.4644

$\log h'$ 0.9251
 $\log h$ 8.7690

g +1.465
 g +0.291
 h +0.059
 Red +1.815

g' 7.021
 h' 8.416
 i -7.198
 Red +8.239

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Reduction to Apparent Place

29

$H + \alpha$ 24 09.6
 H 18 38.5
 α 05 31.1
 $G - G$ 21 53.7
 $G + \alpha$ 27 24.8

$2^{\circ} 24'$
 $51^{\circ} 12'$

S_0 26 35.3

$\log \cos S_0$ 9.9515
 $\log i$ 0.9057
 $\log (i)$ 0.8572

$\log \cos (G + \alpha)$ 9.7986
 $\log g$ 1.0494
 $\log \sin (G + \alpha)$ 9.8917
 $\log \tan S_0$ 9.6994
 8.8239

$\log \sin S_0$ 9.6508
 $\cos (H + \alpha)$ 9.9998
 $\log h$ 1.2746
 $\sin (H + \alpha)$ 8.6222
 $\sec S_0$ 0.0485
 8.8239

$\log (g')$ 0.8464
 $\log (g)$ 9.4644

$\log L' 0.9251$
 $\log L 8.7690$

$2 + 1.465$
 $2 + 0.291$
 $h + 0.059$
 $\text{Red} + 1.815$

$g' 7.026$
 $L' 8.418$
 $L - 7.198$
 $\text{Red} + 8.239$

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Lunar Parallax

30

α 05 31 08.61^v
 θ 07 03 27.0^v
 $\theta - \alpha$ + 01 32 18.39^v
 $=$ + 23° 04' 35.85^v
 $\frac{1}{2}(\alpha - \alpha')$ 8 49.14^v
 $\alpha' - \frac{1}{2}(\alpha - \alpha')$ 22 55 46.71^v

π 54' 16"^v
 9.86913
 $\log \sin \pi$ 8.19824^v
 $\sin(\theta - \alpha)$ 9.59324^v
 $\sec \delta$ 0.04257^v
 $\sin(\alpha - \alpha')$ 7.71018

9.95727
 $\log \frac{1}{2}(\alpha - \alpha')$ 0.00000^v
 $\sin(\theta - \alpha) - \frac{1}{2}(\alpha - \alpha')$ 0.03575^v
 $\log \tan \gamma$ 9.99302^v

$\alpha - \alpha'$ 17' 38"28^v
 $= + 1^m 10.55$

γ 44. 32 21.6
 δ 26 35 26.2^v
 $\gamma - \delta$ 17 56 55.4^v

9.82640
 $\log \sin \pi$ 8.19824
 $\sin(\gamma - \delta)$ 9.48878
 $\csc \gamma$ 0.15403
 $\sin(\delta - \delta')$ 7.66745

$(\delta - \delta') + 15' - 59.1$

α 05 32 19.16^v
 $\gamma - \alpha$ 05 32 18.03^v
 $O - C$ + 1.13^v

$\delta + 26 51 25.3$
 $\gamma - \delta + 26 51 26.4$ ^v

$\text{curr.} - 0.01$
 $2^{\text{nd}} \text{ Corr.} - 0.02$
 α 05 32 19.14

$O - C - 1.1$

$\delta - C + 1.11$

$\text{curr.} + 0.8$
 $2^{\text{nd}} \text{ order refra.} 0.0$
 $2^{\text{nd}} \text{ Corr.} + 0.1$
 $\delta + 26 51 25.4$

$O - C - 1.0$

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Lunar Parallax

30

α 05 31 08.61
 θ 07 03 27.0
 $\theta - \alpha$ 01 32 18.39
 δ 23° 04' 35.85
 $\frac{1}{2}(\alpha - \alpha')$ 8 49.14
 $\frac{1}{2}(\alpha - \alpha'')$ 22 55 46.71

π 54' 16"
 9.86913
 $\log \sin \pi$ 8.19824
 $\log \sin(\theta - \alpha)$ 9.59324
 $\log \sin \delta$ 9.004957
 $\sin(\theta - \alpha)$ 7.71018

9.95727
 $\log \sin \alpha$ 0.00000
 $\log \sin \alpha'$ 0.13575
 $\log \tan \gamma$ 9.99302

$\alpha - \alpha'$ 17' 38"28

$\gamma + 1''$ 10.555

γ 44 33 21.6

δ 26 35 26.2

$\gamma - \delta$ 17 56 55.4

9.82640
 $\log \sin \pi$ 8.19824
 $\sin(\gamma - \delta)$ 9.48878
 $\cos \gamma$ 0.15403
 $\sin(\delta - \delta')$ 7.66745

$(\delta - \delta') + 15' = 59.1$

α 05 32 19.16

$\alpha - \alpha'$ 05 32 18.03

$\theta - \theta'$ +1.13

δ +26 51 25.3

curr. -0.01

2nd Corr -0.02

$\alpha - \alpha'$ +26 51 26.4

α 05 32 19.14

$\theta - \theta'$ -1.1

$\theta - \theta'$ +1.11

curr. +0.8

2nd order approx 0.0

2nd Corr +0.1

δ +26 51 25.4

$\theta - \theta'$ -1.1

