

KG
11366
v. 1010

CLVIII

158

Plate	Date	Page
11208	Sept. 19 '16	1
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11218	Sept. 20 '16	21

1
1
1
2
26
28
3
28
12
L
35
15
2
28
16
3
26
16

11208

Irr

Star Measures Tycho.

1

L	19097	16420	17563	38565
188	10951	14575	13658	12475
10.4	49	75	64	69
	97	26	65	65
	<u>18.8147</u>	<u>18.8154</u>	<u>10.3903</u>	<u>10.3907</u>

2	18157	17042	19501	18831
267	11431	13785	18662	9690
281	31	79	64	90
	61	44	01	31
	<u>26.6728</u>	<u>26.6730</u>	<u>28.0838</u>	<u>28.0859</u>

3	17350	16580	18971	17183
286	11212	12730	16757	9402
12.2	14	30	53	02
	50	82	71	83
	<u>28.6137</u>	<u>28.6149</u>	<u>12.2216</u>	<u>12.2219</u>

mean

L	18305	17226
35	18256	7280
15.4	56	80
	09	32
	<u>15.0049</u>	<u>15.0048</u>

2	17880	16755
25.9	8703	15925
16.0	01	27
	80	57
	<u>25.9178</u>	<u>25.9169</u>

3	16418	16280
26.1	15990	6707
16.6	92	07
	14	76
	<u>26.0427</u>	<u>26.0431</u>

11208

Ivo

Star Measures

Tycho

1

L	19097	16420	17563	18568
188	10951	14575	13658	12475
164	49	75	64	69
	97	26	65	65
	<u>188147</u>	<u>188154</u>	<u>103903</u>	<u>103907</u>

2	18157	17042	19501	18831
267	11431	13785	18262	9690
281	31	79	64	90
	61	44	01	31
	<u>266728</u>	<u>266730</u>	<u>280838</u>	<u>280859</u>

3	17350	16580	18971	17183
286	11212	12730	16757	9402
122	14	30	53	02
	50	82	71	83
	<u>286137</u>	<u>286149</u>	<u>122216</u>	<u>122219</u>

mean

1	18305	17236
15	18256	7250
574	56	80
	04	32
	<u>180049</u>	<u>150048</u>

2	17880	16755
259	8703	15925
160	01	27
	80	57
	<u>259178</u>	<u>259169</u>

3	16418	16280
261	15990	6767
166	92	07
	14	76
	<u>260427</u>	<u>260431</u>

11208

Moon Mean

2

4	16120	17868
260+	16012714	7797975-
17	161	711
	18	64
	<u>260106</u>	<u>260111</u>

5

26

17.1

17518	18541
16970	9085
70	85
18	37
<u>17.0548</u>	<u>17.0548</u>

6	16830	16108
253	12201	10739
18	01	39
	32	08
	<u>25.4629</u>	<u>25.4631</u>

7

250

18.3

18142	17985
14985	11138
85	38
42	89
<u>18.3157</u>	<u>18.3149</u>

8	17776	17347
247	1069089	14425728
184	88	311
	72	45
	<u>24.7090</u>	<u>24.7084</u>

18220	17750
13942739	12016
36	16
16	50
<u>18.4279</u>	<u>18.4266</u>

11208

Mean Mean

2

4	16120	17868
260	160127.4	77979.75
17	161	711
	18	64
	<u>26.0106</u>	<u>26.0111</u>

5
26
17.1

175.18	185.41
169.70	908.5
70	85
18	37
<u>17.0548</u>	<u>17.0548</u>

6	16830	16208
255	12201	10739
18	01	39
	32	08
	<u>25.4629</u>	<u>25.4631</u>

2
250
183

18142	17985
14985	11138
85	38
42	89
<u>183157</u>	<u>183149</u>

8	17776	17347
247	10690.89	14425.28
184	88	31
	72	45
	<u>24.7090</u>	<u>24.7084</u>

18220	17750
13942.39	12016
36	16
16	50
<u>184279</u>	<u>184266</u>

11208

Times etc

3

Date Sept. 19 '16

Exp. & Stars	04	40		04	52
" & Moon	04	46	23.5	04	46 23.8
Clock fast		09	47.3		

H. Sid. Time	04	36	36.35	✓	$\odot = -2^h 6^m$
H. Long	04	44	31.05		
S. Sid. Time	09	21	07.40		
Sid. Time MN	11	52	13.81		
Interval	21	28	53.59		
Reduction		03	31.15		
G. MT	21	25	22.44	✓	21.4229

From Naut. Almanac			RA		Decl
Moon 21 ^h	06	41	52.07	+24	39 46.0
Motion 1 ^m			2.1469		-46.72
Motion 25 ^m			54.47	-01	58.5
Tabular Place	06	42	46.54	+24	37 47.5

Moon's Age 22^d

934" = 13.4

$$\begin{array}{r} a = -5.051 \\ + 24 \\ \hline - 48.11 \end{array}$$

Parallax	54	16.32
Semi diam	14	49.0
R		889.0
Aug.		12.1
Dist 5		-0.8
R		900.3
R		1.9299
1+a/R		-9.28
R		1.8371
R ²		3.8750

11208

Times etc

3

Date Sept. 19 '16

Exp & Stars	04	40		04	52
" % Moon	04	46	23.5	04	46 23.8
Clock fast		09	47.3		

H. Sid Time	04	36	36.35	$\Delta = -2^h 6^m$
71 Long	04	44	31.05	
S Sid Time	09	21	07.40	
Sid Time MN	11	52	13.81	
Interval	21	28	53.59	
Reduction		03	31.15	
G MT	21	25	22.44	21.4229

From Hunt. Columns	RA	Decl
Moon 21 ^h 06 41	52.27 +24	39 46.0
Moon 1 ^m	2.1469	-46.72
Moon 25 ^m 374	54.47 - 01	58.5
Tabular Place 06 42	46.54 +24	37 47.5

moon age 22^d

$$934'' = 13.4$$

$$a = -5.051$$

$$+24$$

$$-481.1$$

Parellax	54	16.32
Semi diam	14	49.0
R		889.0
Cing.		12.1
Err 5		-0.8
R		900.3
R		1.9299
0+a/R		-9.28
R		1.8371
R2		3.3750

11208

Plate Center - Constants

4

x	y								
18.8150	10.3905	06	41	0458	23	27	30.4		
26.6729	28.0849	06	45	49.09	25	51	49.2		
28.6143	12.2218	06	46	54.10	23	42	07.3		
3174.1022	3150.6972	320	13	47.77	373	1	26.9		
24.7007	10.8991	06	44	35.92	24	20	29.0		
22	18	-	01	23.72	+	08	33.6		
-2.7007	+1.1009								
31	466.5								
-83.72									

Plate Center { A=06 43 12.20
B.+24 29 02.6

$$\begin{aligned}
 x-s &+500x &+29y &+5.1x &-15607 \\
 +5803 &+9407 = 15210 &+301 = 15511 &+96 = 15607 \\
 +1320 &+13336 = 14656 &+814 = 15470 &+136 = 15606 \\
 +0800 &+14307 = 15107 &+354 = 15461 &+146 = 15607 \\
 242052 &+12103 &+483 &+123 = 239154
 \end{aligned}$$

$$\begin{aligned}
 y-y &+500y &-30.4x &+7.5y &-7692 \\
 +2991 &+5195 = 8186 &-572 = 7614 &+78 = 7692 \\
 -15749 &+14042 = 8293 &-811 = 7482 &+210 = 7692 \\
 +12359 &+6111 = 8470 &-880 = 7600 &+92 = 7692 \\
 16.6604 &+8330 &-736 &+125 = 16.6631
 \end{aligned}$$

$$\begin{aligned}
 \text{Zatler } a &= -1.5 & l &= -1.5 & a-l &= 0 & b+d &+1.2 \\
 &-505.1 & &-507.5 & &+2.4 & &+1.4 \\
 b-c &-503.6 & &-506.0 & & & &+0.2
 \end{aligned}$$

11218

Plate Center - Constants

4

x	y								
18 81 50	11.39 05	06	41	0458	23	27	30.4		
26 17 29	28.08 49	06	45	49.19	25	51	49.2		
28.61 43	12 22 18	06	46	54.10	23	42	17.3		
3174 10 22	3150.69 72	3128	13	47.77	3173	1	26.9		
24 70 07	16.89 91	06	44	35.92	24	20	29.0		
22	18	-	01	23.72		+ 08	33.6		
- 2.70 07	+1.10 09								
31	466.5								
-83.72									

Plate Center { A-06 43 12.20
R.+24 29 02.6

$$\begin{aligned}
 X-S & \quad +500X & +29y & +5.1x & -156.07 \\
 +5803 & +9+07 = 15210 & +301 & -15511 & +96 & -15607 \\
 +1321 & +13336 = 14656 & +814 & -15470 & +136 & -15606 \\
 +1800 & +14307 = 15107 & +354 & -15461 & +146 & -15607 \\
 242052 & +12103 & +483 & +123 & = 239154
 \end{aligned}$$

$$\begin{aligned}
 Y-y & \quad +500y & -30.4x & +7.5y & -769 \\
 +2991 & +5195 = 8186 & -572 & -7614 & +75 & -7692 \\
 -5749 & +14042 = 8293 & -811 & -7483 & +210 & -7692 \\
 +2354 & +6111 = 8470 & -870 & -7600 & +92 & -7692 \\
 16.6604 & +8330 & -736 & +125 & = 16.6631
 \end{aligned}$$

$$\begin{aligned}
 \text{Fathes} \quad a &= -1.5 & l &= -1.5 & a-l &= 0 & b+d &+1.2 \\
 &-570.1 & &-517.5 & &+24 & &-+1.
 \end{aligned}$$

$$\begin{array}{rcl}
 S & & \eta \\
 -3.76 & -7.91 \\
 -4.54 & +10.64 \\
 +6.53 & -6.03 \\
 m = +1.91 & -1.34
 \end{array}$$

$$\begin{array}{rcl}
 \Delta S & -2S & +.3\eta & +3 \\
 -8 + 7 & = & -1 - 2 & = -3 \\
 -15 + 9 & = & -6 + 3 & = -3 \\
 +12 - 13 & = & -1 - 2 & = -3 \\
 & -4 & -0 & \underline{-1}
 \end{array}$$

$$\begin{array}{rcl}
 \Delta \eta & -3\eta & +.3\eta & +.2S & -5 \\
 -15 + 24 & = & +9 - 2 & = +7 - 1 & = +6 \\
 +35 - 32 & = & +3 + 3 & = +6 - 1 & = +5 \\
 -13 + 18 & = & +6 - 2 & = +4 + 1 & = +5 \\
 & +4 & & +0 & = +4 \\
 & & & & \underline{-1}
 \end{array}$$

11208

Standard Coordinates

Cafe no 9.64 m 65 Cafe no 9.82 m 6.9 Cafe no 9.90 m 5.8

C 06 40 06.27 06 44 49.74 06 45 55.73

q 06.29 49.81 55.75

E 06.29 49.77 55.73

M 06 40 06.28 06 44 49.77 06 45 55.74

Pric +58.30 +59.32 +58.36

A 06 41 04.58 06 45 49.09 06 46 54.10

A 06 43 12.20 06 43 12.20 06 43 12.20

A-A -0.2 7.62 +0.2 36.89 +0.3 41.90

Sin " -127.62 +156.89 +221.89

Log " 2.10592^m 2.19559⁺ 2.34614⁻" Cass 9.96254⁻ 9.95416⁻ 9.96173⁻" S₀ 0.57570^m 0.65699⁻ 0.81511S₀ -3.7645⁻ +4.5393⁻ +6.5330⁻S₁ -0.008⁻ +0.0016 +0.0013

S 1.82347 26.5409 28.5343

X -18.8150 26.6729 28.6143

X-S +.5803 +.1320 +.0800

C +23 28 26.7 +25 52 52.3 +23 43 11.8

C 27.0 52.2 43 12.1

E 27.1 52.2 43 11.6

M +23 28 26.9 +25 52 52.2 +23 43 11.8

Pric -56.5 -01 03.0 -01 04.5

S +23 27 30.4 +25 51 49.2 +23 42 7.3

D +24 29 02.6 24 29 02.6 24 29 02.6

S-B -0.1 01 32.2 +0.1 22 46.6 - 46 55.3

S-B -3692.6⁺ +4967.5⁺ -2815.5⁻" " 3.56733^m 3.69614⁻ 3.44955^m" S₀ 0.89848^m 1.02729 0.78070^mLog S 9.63744⁻ 9.68555⁻ 9.64247⁻" S₂ 1.1514⁻ 1.3139⁻ 1.6302⁻" n₁ 7.8422⁻ 8.0528⁻ 8.3261⁻T₀ -7.9155⁻ +10.6485⁻ -6.0353⁻T₁ +0.0069⁻ +0.0113⁻ +0.0212⁻

T 10.0914 28.6598 11.9859

Y 10.3985 28.0849 12.2218

Y-n +.2991 - .5749 - .2359

11208

Standard Coordinates

5°

Cafe no 964 mg 65 Cafe no 982 mg 69 Cafe no 990 mg 58

C 06 40 06.27 06 44 49.74 06 45 55.73

G 06.29 49.81 55.75

E 06.29 49.77 55.73

M 06 40 06.28 06 44 49.77 06 45 55.74

Puc +58.30 +59.32 +58.36

A 16 41 04.58 06 45 49.09 06 46 54.10

A 06 43 12.20 06 43 12.20 06 43 12.20

A-A -0.2 7.62 +0.2 36.89 +0.3 41.90

Sun -127.62 +156.89 +221.89

Log 2.10592m 219559 2.34614

" Cos 9.96254 9.95416 9.96173

" S₀ 0.57570n 0.65699 0.81511S₀ -37.645 -45393 +6.5330S₁ -0008 +0.0076 +0.0013

S 182347 265409 285343

X 18.8150 26.6729 28.6143

X-S -5803 -1320 -0800

C +23 28 26.7 +25 52 52.3 +23 43 11.8

G 27.0 52.2 43 12.2

E 27.1 52.2 43 11.6

M +23 28 26.9 +25 52 52.2 +23 43 11.8

Puc -56.5 -01 03.0 -01 04.5

S +23 27 30.4 +25 51 49.2 +23 42 7.3

E +24 29 02.6 24 29 02.6 24 29 02.6

SE +01 01 32.2 +01 22 46.6 - 46 55.3

Land -3642.6 +4964.5 -2815.5

" 3.56733m 3.69614 3.44955m

" 0.89848m 1.02729 0.78070m

Log S 9.63744 9.68555 9.64247

S₂ 1.1514 1.3139 1.63025

" 7.8422 8.0528 8.3261

Z₀ -7.9155 +10.4485 -613.53Z₁ +0.0069 +0.0113 +0.0212Z₂ 10.0914 28.6598 11.9859

Y 11.3905 28.0849 12.2218

Y-Y +2991 +5749 +2359

11208

Moais Center

6

	X	X - X ₀	ΔX				
1	25.0000	+0.7940	+2	0.6307	3.3709	-46	
2	25.9174	+1.7114	+1	2.9292	33688	-62	
3	26.0429	+1.8369	+0	3.3742	3.3742	-8	
4	26.0109	+1.8049	-0	3.2576	33732	-18	
5	26.0000	+1.7940	-0	3.2184	33742	-8	
6	25.4630	+1.2570	-1	1.5797	33753	+3	
7	25.0000	+0.7940	-2	0.6301	33701	-49	
8	24.7087	+0.5027	-2	0.2525	33755	+5	
					3.3750		

	Y	Y - Y ₀	ΔY		
1	15.0048	-1.6552	0	2.7397	154° ✓
2	16.0000	-0.6600	0	0.4356	111° ✓
3	16.6600	-0.0000	0	0.0000	90° ✓
4	17.0000	+0.3400	0	0.1156	79° ✓
5	17.0548	+0.3948	0	0.1558	78° ✓
6	18.0000	+1.3400	0	1.7956	43° ✓
7	18.3153	+1.6553	0	2.7400	26° ✓
8	18.4272	+1.7672	0	3.1230	16° ✓

Range 139°

Approx. Center -

Y = 25 Y = 15.0048
 18.3153
 33.3201

Y₀ 16.6600
 Core R 1.8371
 Y max. 26.0429
 X₀ 24.2058

Moais Center { Y₀ 24.2060
 Y₀ 16.6600

11208

Means Center

6

	X	X - X ₀	ΔY				
1	25.0000	+0.7940	+2	0.6307	3.3709	-	46
2	25.9174	+1.7114	+1	2.9292	3.3688	-	62
3	26.0429	+1.8369	+0	3.3742	3.3742	-	8
4	26.0109	+1.8049	-0	3.2576	3.3732	-	18
5	26.0000	+1.7940	-0	3.2184	3.3742	-	8
6	25.4630	+1.2570	-1	1.5797	3.3753	+	3
7	25.0000	+0.7940	-2	0.6301	3.3701	-	49
8	24.7087	+0.5027	-2	0.2525	3.3755	+	5
					3.3750		

	Y	Y - Y ₀	ΔY		
1	15.0048	-1.6552	0	2.7397	155°
2	16.0000	-0.6600	0	1.4356	111°
3	16.6600	-0.0000	0	0.0000	90°
4	17.0000	+0.3400	0	0.1156	79°
5	17.1548	+0.3948	0	0.1558	78°
6	18.0000	+1.3400	0	1.7956	43°
7	18.3153	+1.6553	0	2.7400	26°
8	18.4272	+1.7672	0	3.1230	16°

Range 139°

Approx. Center -

Y - 25°	15.0048
	18.3153
	33.3201
Y ₀	16.6600
Center	1.8371
Y max.	26.0429
X ₀	24.2058

Means Center { X₀ 24.2060
Y₀ 16.6600

Journal

11 - 130
 2 - 113
 3 000
 4 + 0.61
 5 + 0.70
 6 + 1.69
 7 + 1.30
 8 + 0.89

 + 5.19

 - 2.43

 + 2.76

- 36.4
 - 106.0
 - 14.7
 - 32.4
 - 14.6
 + 3.8
 - 38.6
 + 2.5

 + + 6.3

 - 242.7

 - 236.4

+ 76.0
 + 40.8
 + 0.0
 - 6.1
 - 3.1
 + 4.5
 - 80.8
 + 8.8

 + 130.1

 - 90.0

 + 40.1

- 37
 - a - b + AC
 + 18 - 8 - 27[✓]
 + 39 - 3 - 1[✓]
 + 42 - 0 + 5[✓]
 + 41 + 2 + 6[✓]
 + 41 + 1 + 5[✓]
 + 29 + 7 - 1[✓]
 + 18 + 8 - 11[✓]
 + 11 + 9 - 17[✓]

11208

Conditional Equations

7
0 - e corr

1 + 0.79	-1.65	= -46	-1.3	-18	= -26	-20	-47
2 + 1.71	-0.66	= -62	-28	-5	= -33	-29	-30
3 + 1.84	-0.00	= -8	-30	0	= -30	+24	+29
4 + 1.80	+0.34	= -18	-29	+3	= -26	+8	+14
5 + 1.74	+0.34	= -8	-29	+3	= -26	+18	+23
6 + 1.26	+1.34	= +3	-20	+10	= -10	+13	+12
7 + 0.79	+1.65	= -49	-13	+12	= -1	-48	-59
8 + 0.50	+1.77	= +5	-8	+13	= +5	0	-17
+10.48	+3.18			+63		-97	

or 20

$$+15.87 + 2.76 = -236.4 + 10.48$$

$$+ 2.76 + 11.10 = +40.1 + 3.18$$

$$+ 2.76 + 0.48 = -41.1 + 1.83$$

$$+10.62 = +81.2 + 1.354 = +7.6 + 0.13$$

$$+15.87 = -236.4 - 20.9 = -257.3 \quad a = -16.2 + 0.64$$

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

$$\frac{\Sigma K}{n} = -4.2$$

$$\frac{-4.2}{1.1} = -3.5$$

$$AR = -0.4$$

$$Corr = +0.5$$

$$True AR = -0.9$$

$$-2R = -3.67 \quad -2R_{corr} = -1.83 \quad -3.7$$

$$\Delta b = -0.24 \quad \Delta S = -0.1$$

$$\Delta a = -1.17-23 \quad \Delta \alpha = -0.04$$

$$+0.37$$

11208

Conditional Equations

0 - e

1 + 1.797	-1.15	= -46 - 13	-18 = -26	-20
2 + 1.71	-0.66	= -62 - 28	-5 = -33	-29
3 + 1.84	-0.10	= -8 - 30	0 = -30	+24
4 + 1.80	+0.34	= -18 - 29	+3 = -26	+8
5 + 1.74	+0.39	= -8 - 29	+3 = -26	+18
6 + 1.26	+1.34	= +3 - 20	+10 = -10	+13
7 + 0.74	+1.65	= -49 - 13	+12 = -1	-48
8 + 0.50	+1.77	= +5 - 8	+13 = +5	0

$$+63 - 47 =$$

$$\text{or } 20$$

$$+15.87 + 2.76 = -236.4$$

$$+ 2.76 + 11.10 = +40.1$$

$$+ 2.76 + 0.48 = -46.1$$

$$+10.62 = +81.2$$

$$f = +7.6$$

$$+15.87 = -236.4 - 20.9 = -257.3 \quad a = -76.2$$

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

$$\frac{\Sigma v}{n} = -4.2$$

$$\frac{-4.2}{.11} = -35$$

$$\Delta R = -0.4$$

11208

Moon's Mean Position.

8

$$\begin{array}{r} \lambda_0 \quad 24.2060 \\ \quad \quad - 8 \\ \hline 24.2052 \end{array}$$

$$\begin{array}{r} \gamma_0 \quad 16.6600 \\ \quad \quad + 4 \\ \hline 16.6604 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 23.9154 \\ 22 \\ \hline \Sigma \quad + 1.9154 \end{array}$$

$$\begin{array}{r} 16.6631 \\ 18 \\ \hline n_1 + n_0 - 1.3369 \end{array}$$

$$\begin{array}{r} \log S \quad 0.28226^{\vee} \\ \log \cos \delta_0 \quad 9.95967^{\vee} \\ \quad 8.50724 \\ \log \sin \alpha - A \quad 1.81535^{\vee} \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.65467^{\vee} \\ \log S_2 \quad 0.5645^{\vee} \\ \quad 7.0534^{\vee} \\ \log n_1 \quad 7.2726^{\vee} \end{array}$$

$$\begin{array}{r} \alpha - A \quad 65.36 \\ \quad 01 \quad 05.36 \end{array}$$

$$\begin{array}{r} n_1 + 0.0019 \\ n_0 - 1.3388 \end{array}$$

$$A \quad 06 \quad 43 \quad 12.20$$

$$\begin{array}{r} \log n_0 \quad 0.12672^{\vee} \\ \quad 7.33115^{\vee} \end{array}$$

$$\alpha_0 \quad 06 \quad 44 \quad 17.56^{\vee}$$

$$\log \tan \delta - \alpha \quad 2.79357^{\vee}$$

$$\text{Red} \quad + 3.41^{\vee}$$

$$\delta - \alpha \quad -62.456^{\vee}$$

$$\alpha' \quad 06 \quad 44 \quad 20.97^{\vee}$$

$$\begin{array}{r} -10 \quad 24.5^{\vee} \\ \delta + 24 \quad 29 \quad 02.6 \end{array}$$

$$\delta_0 + 24 \quad 18 \quad 38.1^{\vee}$$

$$\text{Red} \quad + 0.4^{\vee}$$

$$\delta' + 24 \quad 18 \quad 38.5^{\vee}$$

11208

Mean Mean Position.

8

$$\begin{array}{r} \lambda_0 \quad 24.2060 \\ \quad \quad - 8 \\ \hline 24.2052 \end{array}$$

$$\begin{array}{r} 40 \quad 16.6600 \\ \quad \quad + 4 \\ \hline 16.6604 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 23.9154 \\ 22 \\ \hline \Sigma \quad + 1.9154 \end{array}$$

$$\begin{array}{r} 16.6631 \\ 18 \\ \hline - 1.3369 \end{array}$$

$$\begin{array}{r} \log S \quad 0.28226 \\ \log \cos \delta_0 \quad 9.95967 \\ \quad \quad 8.50724 \\ \log \sin \alpha - A \quad 1.81535 \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.65467 \\ \log S_2 \quad 0.5645 \\ \quad \quad 7.0534 \\ \log n_1 \quad 7.2726 \end{array}$$

$$\begin{array}{r} \alpha - A \quad 65.36 \\ \quad \quad 61 \quad 15.36 \end{array}$$

$$\begin{array}{r} n_1 + 0.0019 \\ n_0 - 1.3388 \end{array}$$

$$A \quad 06 \quad 43 \quad 12.20$$

$$\begin{array}{r} \log n_0 \quad 0.12672 \\ \quad \quad 7.33115 \end{array}$$

$$x_0 \quad 06 \quad 44 \quad 17.56$$

$$\log \tan \delta - x \quad 2.79557$$

$$\text{Red} \quad + 3.41$$

$$\delta - \delta_0 \quad - 6.2456$$

$$\alpha' \quad 06 \quad 44 \quad 20.97$$

$$\begin{array}{r} -10 \quad 24.5 \\ \delta + 24 \quad 29 \quad 02.6 \end{array}$$

$$\delta_0 + 24 \quad 18 \quad 38.1$$

$$\text{Red} \quad + 0.4$$

$$\begin{array}{r} \delta + 24 \quad 18 \quad 38.5 \end{array}$$

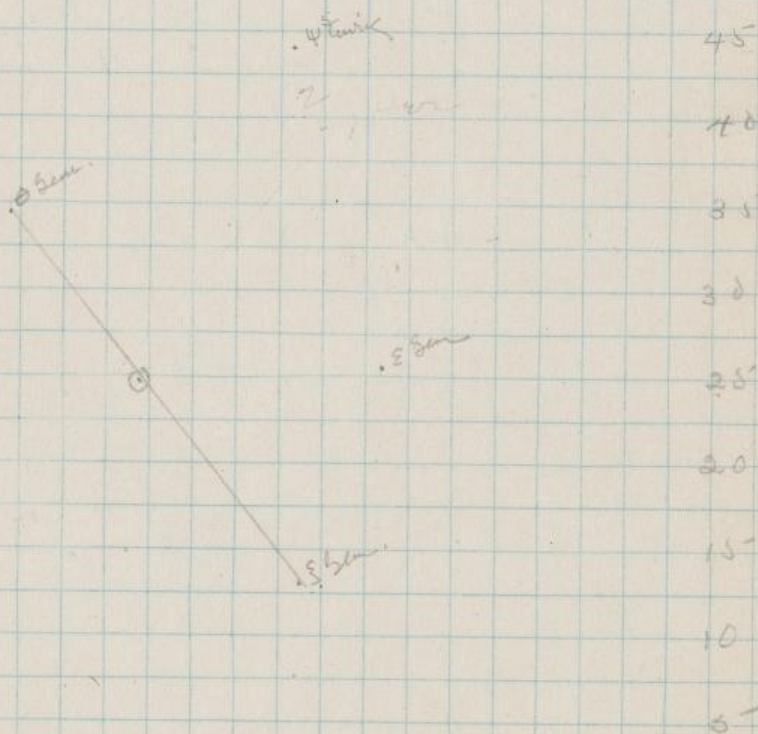
$$\begin{array}{r}
 06 \quad 440 \quad 37.701 \\
 \text{Sun} \quad 06 \quad 40 \quad 34.528 \\
 + 3.173
 \end{array}$$

$$\begin{array}{r}
 18.34 \\
 12 \quad 59 \quad 13.76 \\
 + 4.58
 \end{array}$$

$$\begin{array}{r}
 06 \quad 47 \quad 18.969 \\
 06 \quad 47 \quad 15.287 \\
 + 3.682
 \end{array}$$

$$\begin{array}{r}
 46.02 \\
 34 \quad 03 \quad 49.17 \\
 - 3.15
 \end{array}$$

$$\begin{array}{r}
 3.682 \\
 3.173 \\
 \hline
 0.509
 \end{array}$$



56 54 52 50 48 46 44 42 40 38 36 34 32 64

11208

Reduction to Apparent Place.

9

$H + \alpha$	13	01.2	795° 18'	δ_0	24"	18.7
--------------	----	------	----------	------------	-----	------

H	06	16.9
-----	----	------

α	06	44.3
----------	----	------

G	23	10.3
-----	----	------

$G + \alpha$	29	54.6	88	39'
--------------	----	------	----	-----

$\log \cos \delta_0$	9.9597
----------------------	--------

$\log i'$	0.9099
-----------	--------

$\log (1)$	0.8696
------------	--------

$\log \cos G + \alpha$	8.3722
------------------------	--------

$\log g$	1.3223
----------	--------

" $\sin G + \alpha$	9.9999
---------------------	--------

" $\tan \delta_0$	9.6549
-------------------	--------

	8.8239
--	--------

$\log \sin \delta_0$	9.6146
----------------------	--------

$\cos H + \alpha$	9.9843 ^m
-------------------	---------------------

$\log h$	1.2739
----------	--------

" $\sin H + \alpha$	9.4214 ^m
---------------------	---------------------

$\sec \delta_0$	0.0403
-----------------	--------

	8.8239
--	--------

$\log g'$	9.6945
-----------	--------

g	9.8010
-----	--------

$\log h'$	0.8728 ^m
-----------	---------------------

h	9.5595 ^m
-----	---------------------

f	+3.143
-----	--------

g	+0.632
-----	--------

h	-0.363
-----	--------

Red	+3.412
-----	--------

g'	+0.495
------	--------

h'	-7.461
------	--------

i'	+7.406
------	--------

Red	+0.440
-----	--------

11208

Reduction to Apparent Place.

H + λ	23	01.2	345° 18'	δ_0	24"	18.7
---------------	----	------	----------	------------	-----	------

H	06	16.9
---	----	------

λ	16	44.3
-----------	----	------

G	23	10.3
---	----	------

G + λ	39	54.6	238	39'
---------------	----	------	-----	-----

$\log \cos \delta_0$	9.9597
----------------------	--------

$\log i$	0.9099
----------	--------

$\log III$	0.8696
------------	--------

$\gamma \cos G + \lambda$	8.3722
---------------------------	--------

$\log G$	1.3223
----------	--------

$\sin G + \lambda$	9.9999
--------------------	--------

$\tan \delta_0$	9.6549
-----------------	--------

	8.8239
--	--------

$\log \sin \delta_0$	9.4146
----------------------	--------

$\cos(H + \lambda)$	9.9843
---------------------	--------

$\log h$	1.2739
----------	--------

$\sin H + \lambda$	9.4214
--------------------	--------

$\sec \delta_0$	0.0403
-----------------	--------

	8.8239
--	--------

$\log g'$	9.6945
g	9.8010

$\log h'$	0.8128
h	9.5595

f	+3.143
-----	--------

g	+0.632
-----	--------

h	+0.363
-----	--------

Red	+3.412
-----	--------

g'	+10.495
------	---------

h'	-7.461
------	--------

i	+7.406
-----	--------

Red	+0.440
-----	--------

11208

Lunar Parallax.

10

α'	06	44	20.97 $^{\circ}$
θ	04	36	36.35 $^{\circ}$
$\theta - \alpha'$	-02	07	44.62 $^{\circ}$
"	-31	56	09.30 $^{\circ}$
$\frac{1}{2}(\theta - \alpha')$	-	11	40.92 $^{\circ}$
$(\theta - \alpha') - \frac{1}{2}(\theta - \alpha')$	-31 $^{\circ}$	44	28.38 $^{\circ}$

	9.95727
$\log \cos \frac{1}{2}(\theta - \alpha')$	0.00000
$\sec(\theta - \alpha') - \frac{1}{2}$	0.07036 $^{\circ}$
$\log \tan \gamma$	0.02763

γ	46	49	16.8 $^{\circ}$
δ'	24	18	38.5 $^{\circ}$
$\gamma - \delta'$	22	30	38.3

	9.82641
$\log \sin \pi$	8.19828 $^{\circ}$
$\sin \gamma - \delta'$	9.58303 $^{\circ}$
$\cos \gamma$	0.13714 $^{\circ}$
$\sin(\delta - \delta')$	7.74485 $^{\circ}$

$(\delta - \delta')$	19	16.2 $^{\circ}$
----------------------	----	-----------------

δ	24	37	44.7°
$\epsilon\delta$	24	37	47.5°
$\delta - \epsilon$	-	-	2.8°

Curv.	0
2nd ord. ref.	+0.0

2nd. Corr.	-0.1
------------	------

$\delta =$	+24	37	44.6
	-		2.9

π	54	16.32 $^{\circ}$
-------	----	------------------

	9.86913
$\log \sin \pi$	8.19828 $^{\circ}$
" $\sin(\theta - \alpha')$	9.72343 $^{\circ}$
" $\sec \theta$	0.04143 $^{\circ}$
$\sin \theta - \alpha'$	7.83227 $^{\circ}$

$\alpha - \alpha''$	-23	21.84
=	-01	33.45 $^{\circ}$

α	06	42	47.52 $^{\circ}$
----------	----	----	------------------

$\epsilon \alpha$	06	42	46.54 $^{\circ}$
$\alpha - \epsilon$			+0.98 $^{\circ}$

Curv.	0
-------	---

2nd. Corr.	-0.04
$\alpha =$	06 42 47.48

$\alpha - \epsilon$	+0.94
---------------------	-------

11218

Lunar Parallax

10

α'	06	4	20.97
θ	04	36	36.35
$\theta - \alpha'$	-02	07	44.62
"	-31	56	09.30
$\frac{1}{2} \theta - \frac{1}{2} \alpha'$	11	41.92	
$\frac{1}{2} (\theta - \alpha')$	-31	44	28.38

	9.95727
$\log \cos \frac{1}{2} \alpha'$	0.00000
$\sec \frac{1}{2} (\theta - \alpha')$	0.07036
$\log \tan \gamma$	0.02763

γ	46	49	16.8
δ'	24	18	38.5
$\gamma - \delta'$	22	30	38.3

	9.82641
$\log \sin \pi$	8.19828
$\sin \gamma - \delta'$	9.58303
$\cos \gamma$	0.13714
$\sin (\gamma - \delta')$	7.74485

$\theta - \delta'$	19	16.2
--------------------	----	------

δ	24	37	44.7
$\epsilon \text{ph } \delta$	24	37	47.5
$\delta - \epsilon$	-	2.8	

2nd rd w. +0.0

2nd Corr -0.1

$\delta - \epsilon$	+24	37	44.6
	-	2.9	

π	54	16.32
-------	----	-------

	9.86913
$\log \sin \pi$	8.19828
$\sin (\theta - \alpha')$	9.72343
$\sec \epsilon \text{ph } \delta$	0.04148
$\sin \gamma - \alpha'$	7.83227

$\gamma - \alpha'$	-23	21.84
	= -01	33.45

α	16	42	47.52
$\epsilon \text{ph } \alpha$	06	42	46.54
$\alpha - \epsilon$	-	0.98	

2nd Corr	-0.04
$\alpha - \epsilon$	06 42 47.48
$\alpha - \epsilon$	+0.94

1
18
10
2
26
28
3
28
12
1
25
14.8
3
25
15
3
26
15

11217

Star Measures

11

L 18347 19556
 188 9682 18220
 104 82 20
 47 54
18.8665 18.8665

19022 18910
 14716 14 13210
 12 1412
 22 08
10.4308 10.4303

2 18482 19535
 267 10818 17 17210
 281 16 1412
 82 37
26.7665 26.7676

18925 19986
 17841 11063 67
 41 71
 8929 86
28.1084 28.1081

3 17676 17725
 287 10976 78 14421 25
 123 80 28
 78 25
28.6699 28.6700

18100 18200
 15703 07 10600
 11 00
 04 00
12.2394 12.2400

Moon Measures.

L 18532
 15 10623 14
 148 89
 80

18260
 18532 16178
 10623 26 78
 29 64
 30
14.7904 14.7916

3 18090 16792
 257 11061 13840 37
 15.0 61 34
 88 96
25.7028 25.7044

3
 26
 152

19516 17569
 17488 9598 95
 8084 92
 14 69
15.2032 15.2026

1
L
18
10
2
24
28
28
12
25
148
25
15
26
15

11217

Star Measures

11

L 18347 19556
 188 9082 18220
 104 82 20
 49 54
188665 188665

19022 18910
 14716 13210
 12 1412
 22 08
104308 104303

18482 19535
 267 10818 17210
 281 16 1412
 82 37
267665 267676

18925 19986
 17841 11063
 41 71
 8929 86
281084 281081

17676 17725
 287 10976 14421
 123 80 29
 78 25
286699 286700

18100 18200
 15703 10600
 11 00
 04 00
122394 122400

Moon Measures.

18260

18532
 25 10532
 148 21
 30

18532 16178
 10623 78
 29 64
 30
147904 147916

18090 16792
 257 11061 13840
 150 61 34
 88 96
257028 257044

19516 17569
 17488 9598
 8084 92
 14 69
152032 152020

46
36
16

5
26
16

6
26
17

7
26
18

8
26
18

11209

Moon Measures.

12

4	17919	16115
26.5	12313	11708
160	11	04
	17	17
	<u>26.5606</u>	<u>26.5590</u>

5	18487	17588
26.6	11786	14293
16.5	90	87
	89	84
	<u>26.6700</u>	<u>26.6704</u>

6	18848	16546
26.5	12552	12851
17.0	54	47
	46	48
	<u>26.6294</u>	<u>26.6302</u>

7	19014	18910
26	18652	92616
18.1	58	63
	10	08
	<u>18.0359</u>	<u>18.0354</u>

8	16550	17090
25.4	12277	11362
18.3	81	64
	56	92
	<u>25.4273</u>	<u>25.4272</u>

18280	18502
14714	12065
08	63
86	06
<u>183570</u>	<u>18.3559</u>

11209

Main Measures.

4	17919	16115
215	12313,2	11708
160	11	04
	17	17
	<u>26560.6</u>	<u>26559.0</u>

5	18487	17588
266	1178688	1429390
115	90	87
	89	84
	<u>26670.0</u>	<u>26670.4</u>

6	18848	16546
215	1255253	1285149
171	54	47
	46	48
	<u>26629.4</u>	<u>26630.2</u>

7		19614	18910
26		1865255	926162
181		58	63
		10	08
		<u>180359</u>	<u>181854</u>

8	16582	17090
254	1227779	1136263
183	81	64
	56	92
	<u>254273</u>	<u>254272</u>

	18280	18502
	1471411	1206564
	08	63
	86	06
	<u>182570</u>	<u>183559</u>

11209.

Times Etc.

Date Sept. 19 '16.

Exp. & Stars	04	54		05	06	
" " Moon	04	59	53.0	04	59	53.2
Clock fast		09	47.3			

N. Sid. Time	04	50	05.8	$\theta = -1^h 43^m$
N. Long.	04	44	31.05	
S. Sid. Time	09	34	36.85	
S. Sid. Time M.N.	11	52	13.81	
Interval	21	42	23.04	
Reduction		03	33.36	
S. M.T.	21	38	49.68	21.647133

From Naut. Almanac	P.A.		Decl.	
Moon 21 ^h	06	41	52.07	+24 39 46.0
Motion 1 ^m			2.1466	-4.684
" 38.828		+01	23.35	13 01.9
Tabular Place	06	43	15.42	+24 36 44.1

Moon's Age. 22^d

934' = 13.85

-505.4
 a. +24
 -481.4

Parallax	54	16.23
Semi diam	14	48.9
R		888.9
Orig		12.6
Inv. 4		-0.6
R		900.9
R		1.9312
(1+a)R		-930
R		1.8382
R2		3.3789

1209.

Times Etc.

13

Date Sept. 19 '16

Exp & Stars	04	54		05	06	
Moon	04	59	53.0	04	59	53.2
Clock fast		09	47.3			

R1 Sid June	04	50	058			
R1 Long	04	44	31.05			
S Sid June	09	34	36.85			
S Sid June M.N	11	52	13.81			
Interval	21	42	23.04			
Reduction		03	33.36			
S M.T.	21	38	49.68			
				21.6	47.133	

From Naut Almanac			RA		Decl.
Moon 21 ^h	06	41	52.07	+24	39 46.0
Motion 1 ^m			2.1466		-4.684
" 38.828		+01	23.35		13 01.9
Tabular Place	06	43	15.42	+24	36 44.1

Transage. 22^d

934' 13.85"

-515.4
 a. +24
 -481.4

Parallax	54	16.23
Sun diam	14	43.9
R		888.9
ang		12.6
Inv		-1.6
R		900.9
R		1.9312
(1+R)/R		-930
R		1.8382
R2		3.3789

11209

Plate Constants.

14

X	18.8665	26.7670	28.6699
S	-18.2349	26.5409	28.5343
X-S	+63.18	+22.61	+135.6

y	10.4306	28.1082	12.2397
z	10.0914	28.6598	11.9859
y-z	+33.92	-1.5516	+2.2538

X-S	+500X	+3.75	+5.4X	-15892
+6318	+9433 = 15751	+39 = 15790	+102 = 15892	
+2261	+13383 = 15644	+104 = 15748	+144 = 15892	
+1356	+14335 = 15691	+45 = 15736	+155 = 15891	
24.8304	+12415	+61	+134 = 245022	

y-z	+500y	-6.3X	+6.75	-8558
+3392	+5215 = 8607	-719 = 8488	+70 = 8558	
-5516	+14054 = 8538	-168 = 8370	+188 = 8558	
+2538	+6120 = 8658	-181 = 8477	+82 = 8559	
16.6192	+8310	-156	+111 = 16.5899	

Tables a = -1	e = -1.0	a-b = 0	b+d = +0.3
-505.4	= -506.7	= +1.3	= +3.0
b-c	-507.7	-505.7	+2.7

1209

Plate Constants.

14

X	188665	26.7670	28.6699
Y	182349	26.5409	28.5343
X-S	+6318	+2261	+1356

Y	10.4306	28.1182	12.2397
Y	11.1914	28.6598	11.9859
Y-7	+3392	-5516	+2538

-S	+500X	+3.75	+5.41	-15892
6318	+9433	= 15751	+39	= 15790
2261	+13383	= 15644	+104	= 15748
1356	+14335	= 15691	+45	= 15736
248304	+12415	+61	+134	= 245722

-Y	+500X	-63X	+1.05	-3558
3392	+5215	= 8607	-119	= 8488
5516	+14054	= 8538	-168	= 8370
2538	+6120	= 8658	-181	= 8477
166192	+8310	-156	+111	= 165899

factor a = -1	e = -1.0	a-b = 0	b+d = +0.3
-505.4	-516.7	+1.3	+3.0

1/209

Moore's Center

15⁺
0-C

1	25.0000	+0.1680	+1.00282	3.3698	-91
2	25.7034	+0.8714	+1.07595	3.3807	+18
3	26.0000	+1.1680	+1.13644	3.3707	-82
4	26.5598	+1.7278	+0.29853	3.3685	-104
5	X 26.6702	+1.8382	+0.33789	3.3789	-00
6	26.6298	+1.7978	-0.32321	3.3773	-16
7	26.0000	+1.1680	-1.13640	3.3708	-81
8	25.4272	+0.5952	-1.03541	3.3730	-59

 $R^2 = 3.3789$

1	14.7910	-1.8280	0	3.3416	1.75 ⁰ ✓
2	15.0000	-1.6190	0	2.6212	1.52 ⁰ ✓
3	15.2029	-1.4161	0	2.0054	1.40 ⁰ ✓
4	16.0000	-0.6190	0	0.3832	1.10 ⁰ ✓
5	16.6190	0.0000	0	1.0000	90 ⁰ ✓
6	17.0000	+0.3810	0	0.1452	78 ⁰ ✓
7	18.0356	+1.4166	0	2.0068	40 ⁰ ✓
8	18.3565	+1.4375	0	3.0189	19 ⁰ ✓

Range 1.56

approx. Center

$$X = 26 \quad Y = 15.2029$$

$$18.1356$$

$$33.2385$$

$$Y_0 = 16.6190$$

$$X_{max} = 26.6702$$

$$Com R = 1.8382$$

$$X_0 = 24.8320$$

$$\left. \begin{array}{l} \text{Moore's Center} \\ X_0 = 24.8320 \\ Y_0 = 16.6190 \end{array} \right\}$$

11209

Modus Center

0-C 15-

1	25.7000	+0.1680	+1.00282	3.3698	-91
2	25.7134	+0.8714	+1.07595	3.3807	+18
3	26.0000	+1.1680	+1.13644	3.3707	-82
4	26.5698	+1.7278	+0.29853	3.3685	-104
5	26.6702	+1.8382	+0.33789	3.3789	-00
6	26.6298	+1.7978	-0.32321	3.3773	-16
7	26.0000	+1.1681	-1.13640	3.3708	-81
8	25.4272	+0.5952	-1.13541	3.3730	-59
				R^2 3.3789	

1	14.7910	-1.8280	0.33416	175°
2	15.0000	-1.6190	0.26212	152°
3	15.2029	-1.4163	0.20054	140°
4	16.0100	-0.6192	0.3832	210
5	16.6191	0.0000	1.00000	90
6	17.0000	+0.3810	0.1452	76
7	18.1356	+1.4166	2.0068	40
8	18.3565	+1.7375	3.0189	19

approx. Center

$$\begin{aligned}
 X &= 26 & Y &= 15.2029 \\
 & & & 18.1356 \\
 & & & 33.2385 \\
 Y_0 & & & 16.6192
 \end{aligned}$$

$$\begin{aligned}
 X_{max} &= 26.6702 \\
 Com R &= 1.8382 \\
 X_0 &= 24.8320
 \end{aligned}$$

$$\begin{aligned}
 \text{Modus Center} & \left\{ \begin{array}{l} X_0 = 24.8320 \\ Y_0 = 16.6192 \end{array} \right.
 \end{aligned}$$

Normals.

$$\begin{array}{r}
 1 \quad - 0.31 \\
 2 \quad - 1.41 \\
 3 \quad - 1.66 \\
 4 \quad - 1.07 \\
 5 \quad + 0.00 \\
 6 \quad + 0.68 \\
 7 \quad + 1.66 \\
 8 \quad + 1.03 \\
 \hline
 \quad + 3.37 \\
 \quad - 4.45 \\
 \hline
 - 1.08
 \end{array}$$

$$\begin{array}{r}
 - 17.0 \\
 + 15.7 \\
 - 95.8 \\
 - 180.0 \\
 - 000.0 \\
 - 28.8 \\
 - 94.8 \\
 - 34.8 \\
 \hline
 + 15.7 \\
 - 451.2 \\
 \hline
 - 435.5
 \end{array}$$

$$\begin{array}{r}
 + 166.8 \\
 - 29.2 \\
 + 116.2 \\
 + 64.5 \\
 - 0.0 \\
 - 6.1 \\
 - 115.4 \\
 - 102.7 \\
 \hline
 + 347.5 \\
 - 253.4 \\
 \hline
 + 94.1
 \end{array}$$

			- 15'
- a	- b	+ pc	
+ 2	+ 2	- 11	
+ 9	+ 2	- 4	
+ 11	+ 1	- 3	
+ 17	+ 1	+ 3	
+ 18	- 0	+ 3	
+ 18	- 0	+ 3	
+ 12	- 1	- 4	
+ 6	- 2	- 11	

11209

Conditional Equations

0-e 16

1	+0.17	-1.83	= -91	-5	-8	= -73	-78	-89
2	+0.87	-1.62	= +18	-28	-7	= -35	+53	+49
3	+1.17	-1.42	= -82	-37	-6	= -43	-39	-42
4	+1.73	-0.62	= -104	-55	-3	= -58	-46	-43
5	+1.84	+0.00	= -08	-59	+0	= -59	+59	+62
6	+1.80	+0.38	= -16	-58	+2	= -56	+40	+43
7	+1.17	+1.42	= -81	-37	+6	= -31	-50	-54
8	+0.59	+1.74	= -59	-19	+8	= -11	-48	-59
+9.33 -1.95						+152	-261	✓
						av	51	

$$13.47 - 1.08 = -435.5 \quad +9.33$$

$$-1.08 + 13.52 = +94.1 \quad -1.95$$

$$+1.08 - 0.09 = -34.84 \quad +0.75 \quad f = +4.4 - 0.09 \Delta$$

$$+13.43 = +59.26 - 1.20$$

$$+13.47 = -435.5 + 4.75 = -430.75 \quad a = -32.0 + 0.68 \Delta$$

$$\frac{p}{m} = +.17$$

$$\frac{\Sigma v}{n} = -13.6$$

$$\frac{-13.6}{.17} = -80 = c$$

$$AR = -1.0$$

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

$$\text{True } AR = -1.2$$

$$-2R = -3.86 \quad -2R_{\text{cover}} = -0.77 \quad -15.$$

$$Af = +0.07 + 1 \quad A\delta = +0.0$$

$$Aa = -0.52 - 10 \quad A\alpha = -0.02$$

137

11209

Conditional Equations

16

0-c

$$\begin{array}{rclclclclcl}
 1 & +0.17 & -1.83 & = & -91 & - & 5 & - & 8 & = & -73 & - & 78 \\
 2 & +0.87 & -1.62 & = & +18 & - & 28 & - & 7 & = & -35 & + & 53 \\
 3 & +1.17 & -1.42 & = & -82 & - & 37 & - & 6 & = & -43 & - & 39 \\
 4 & +1.73 & -0.62 & = & -104 & - & 55 & - & 3 & = & -58 & - & 46 \\
 5 & +1.24 & +0.00 & = & -01 & - & 59 & + & 0 & = & -59 & + & 59 \\
 6 & +1.80 & +0.38 & = & -16 & - & 58 & + & 2 & = & -56 & + & 40 \\
 7 & +1.17 & +1.42 & = & -81 & - & 37 & + & 6 & = & -31 & + & 50 \\
 8 & +0.59 & +1.74 & = & -59 & - & 19 & + & 8 & = & -11 & - & 48
 \end{array}$$

$$\begin{array}{rcl}
 & +152 & -261 \\
 & \text{av} & 51
 \end{array}$$

$$13.47 - 1.08 = -435.5$$

$$-1.08 + 13.52 = +94.1$$

$$+1.08 - 0.09 = -34.84$$

$$b = +4.4$$

$$+13.43 = +59.26$$

$$+13.47 = -435.5 + 4.75 = -430.75$$

$$a = -320$$

$$\frac{P}{L} = +1.7$$

$$\frac{EK}{n} = -13.6$$

$$\frac{-13.6}{1.7} = -8.0$$

$$AR = -1.0$$

11209

Mean Mean Position.

$$\begin{array}{r} X_0 \quad 24.8320 \\ \quad \quad -16 \\ \hline 24.8304 \end{array} \checkmark$$

$$\begin{array}{r} Y_0 \quad 16.6190 \\ \quad \quad +2 \\ \hline 16.6192 \end{array} \checkmark$$

From Plate Constants

$$\begin{array}{r} 24.5022 \\ 22 \\ \hline \Sigma \quad +2.5022 \end{array} \checkmark$$

$$\begin{array}{r} 16.5899 \\ 18 \\ \hline -1.4101 \end{array} \checkmark$$

$$\begin{array}{ll} \log S & 0.39832 \checkmark \\ \log \cos \delta_0 & 9.95971 \checkmark \\ & 8.50724 \checkmark \\ \log \sin \alpha - A & 1.93137 \checkmark \end{array}$$

$$\begin{array}{ll} \log \tan \delta & 9.6547 \checkmark \\ \log S_1^2 & 0.7966 \checkmark \\ & 7.0534 \checkmark \\ \log n_1 & 7.5047 \checkmark \end{array}$$

$$\begin{array}{ll} \alpha - A & 85.38 \\ & 01 \quad 25.38 \checkmark \end{array}$$

$$\begin{array}{ll} n_1 & +0.0032 \checkmark \\ n_0 & -1.4133 \checkmark \end{array}$$

$$A \quad 06 \quad 43 \quad 12.20 \checkmark$$

$$\log n_1 \quad 0.15023 \checkmark$$

$$X_0 \quad 06 \quad 44 \quad 37.58 \checkmark$$

$$7.33115 \checkmark$$

$$\text{Red} \quad +03.41 \checkmark$$

$$\tan(\delta - \delta_0) \quad 2.81908 \checkmark$$

$$\begin{array}{ll} (\delta - \delta_0) & -659.3 \checkmark \\ & -1059.3 \checkmark \end{array}$$

$$\alpha' \quad 06 \quad 44 \quad 40.99 \checkmark$$

$$B \quad +24 \quad 29 \quad 02.6 \checkmark$$

$$\delta_0 \quad +24 \quad 18.033 \checkmark$$

$$\text{Red} \quad +0.4$$

$$\delta' + 24^\circ \quad 18 \quad 43.7$$

11208

Marius Mean Position.

17

$$\begin{array}{r} X_0 \quad 24 \ 83 \ 20 \\ \quad \quad -16 \\ \hline 24 \ 83 \ 04 \end{array}$$

$$\begin{array}{r} Y_0 \quad 16 \ 6190 \\ \quad \quad +2 \\ \hline 16 \ 6192 \end{array}$$

from Plate Constants

$$\begin{array}{r} 24 \ 50 \ 22 \\ 22 \\ \hline S \quad +2 \ 50 \ 22 \end{array}$$

$$\begin{array}{r} 16 \ 58 \ 99 \\ 18 \\ \hline -1 \ 41 \ 01 \end{array}$$

$$\begin{array}{ll} \log S & 0 \ 39 \ 83 \ 2 \\ \log \cos \delta_0 & 9 \ 95 \ 97 \ 1 \\ & 8 \ 50 \ 12 \ 4 \\ \log \sin \alpha - A & 1 \ 93 \ 13 \ 7 \end{array}$$

$$\begin{array}{ll} \log \tan \delta & 9 \ 65 \ 47 \\ \log S_0 & 0 \ 79 \ 66 \\ & 7 \ 15 \ 34 \\ \log \eta & 7 \ 50 \ 47 \end{array}$$

$$\begin{array}{ll} \alpha - A & 85 \ 38 \\ & 01 \ 25 \ 38 \end{array}$$

$$\begin{array}{ll} \eta & +0 \ 00 \ 32 \\ \eta_0 & -1 \ 41 \ 33 \end{array}$$

$$A \quad 06 \ 43 \ 12 \ 20$$

$$\begin{array}{ll} \log \eta_0 & 0 \ 15 \ 02 \ 3 \\ & 7 \ 33 \ 11 \ 5 \end{array}$$

$$X_0 \quad 06 \ 44 \ 37 \ 58$$

$$\tan(\delta - \delta_0) \quad 2 \ 81 \ 90 \ 8$$

$$\text{Red} \quad +0 \ 34 \ 1$$

$$\begin{array}{ll} \delta - \delta_0 & -6 \ 59 \ 36 \\ & -10 \ 59 \ 3 \\ \approx & +24 \ 29 \ 02 \ 6 \end{array}$$

$$\alpha' \quad 06 \ 44 \ 40 \ 99$$

$$\delta_0 \quad +24 \ 18 \ 03 \ 3$$

$$\text{Red} \quad +0 \ 4$$

$$\delta' \quad 24^\circ \ 18 \ 03 \ 7$$

11219

Lunar Parallax.

19

α'	06	44	40.99 \checkmark
θ	04	50	05.8 \checkmark
$\theta - \alpha'$	-1	54	35.19 \checkmark
$=$	-28	38	47.85 \checkmark
$\frac{1}{2}(\alpha - \alpha')$	-	10	35.11
$\theta - \alpha' - \frac{1}{2}(\alpha - \alpha')$	-28	28	12.74 \checkmark

π	54	16.23 \checkmark
	9.86913	
$\log \sin \pi$	8.19827 \checkmark	
$\log \sin(\theta - \alpha')$	9.68070 \checkmark	
" $\sec \frac{1}{2} \pi$	0.04136 \checkmark	
$\sin \alpha - \alpha'$	7.78946 \checkmark	

	9.95727	
$\log \cos \frac{1}{2}(\alpha - \alpha')$	0.00	
$\log \sec(\theta - \alpha')$	0.05597 \checkmark	
$\log \tan \gamma$	0.01324 \checkmark	

$\alpha - \alpha' - 21$	10.23 \checkmark	
$=$	-01	24.68 \checkmark

γ	45	52	24.0 \checkmark
$\delta' + 24$	18	03.7 \checkmark	
$\gamma - \delta'$	21	34	20.3

	9.82640	
$\log \sin \pi$	8.19827 \checkmark	
$\sin(\gamma - \delta')$	9.56549 \checkmark	
$\log \sec \gamma$	0.14399 \checkmark	
$\sin(\delta - \delta')$	7.73413	

$\delta - \delta'$	18	38.3 \checkmark	
--------------------	----	-------------------	--

$\delta + 24$	36	42.0 \checkmark	
$\text{Exp } \delta + 24$	36	44.1 \checkmark	

$O - C$	-	2.1	
Corr.		0.0	
2nd ord. corr.		+0.0	
$\delta + 24$	36	42.0	
2nd. Corr.		+0.0	

$O - C =$	-	2.1	
-----------	---	-----	--

α	06	43	16.31 \checkmark
$\text{Exp } \alpha$	06	43	15.42 \checkmark
$O - C$			+0.89
Corr.			-0.00
2nd. Corr.			-0.02

α	06	43	16.29
$O - C$			+0.87

11209

Lunar Parallax.

19

α' 06 44 40.99
 θ 04 50 05.8
 $\theta - \alpha'$ -1 54 35.19
 $=$ -28 38 47.85
 $\frac{1}{2}(\alpha - \alpha')$ - 10 35.11
 $\theta - \alpha' - \frac{1}{2}(\alpha - \alpha')$ 28 28 12.74

π 54 16.23
 $\log \sin \pi$ 9.86413
 $\log \sin(\theta - \alpha')$ 8.19827
 $\log \sin(\theta - \alpha' - \frac{1}{2}(\alpha - \alpha'))$ 9.68070
 $\log \sec 54^\circ$ 0.04136
 $\sin \alpha - \alpha'$ 7789462

$\log \cos \frac{1}{2}(\alpha - \alpha')$ 9.95727
 $\log \sec \theta - \alpha'$ 0.05597
 $\log \tan \gamma$ 0.01324

$\gamma - \alpha' - 21$ 10.23
 $=$ -01 24.68

γ 45 52 24.0
 $\delta' - 24$ 18 03.8
 $\gamma - \delta'$ 21 34 20.3

$\log \sin \pi$ 9.82640
 $\log \sin(\gamma - \delta')$ 8.19827
 $\log \sec \gamma$ 9.56547
 $\log \sec \gamma$ 0.14399
 $\sin(\delta - \delta')$ 7.73413

$\delta - \delta'$ 18 38.3

$\delta + 24$ 36 42.0
 $\text{eph } \delta + 24$ 36 144.1
 $-$ 2.0
 $O - C$ - 2.1
 Circ. 0.0
 2nd ord. ref. + 0.0
 2nd Cor. + 0.0
 $O - C -$ - 2.1

α 06 43 1631
 $\text{eph } \alpha$ 06 43 15.42
 $-$ 0.07
 $O - C$ + 0.89
 Circ. 0.00
 2nd Cor. - 0.02
 α 06 43 1629
 $O - C$ + 0.87

1
10.
6.
25.
27.
31.
13.
21.
15.
22.
159
22
16

11218 242. Star Measures Tycho.

1	17330	17253	18036	18533
15.9	1818889	16408	15782.8	10798
6.2	90	08	82	98
	40	63	36	33
	<u>15.9150</u>	<u>15.9154</u>	<u>6.2254</u>	<u>6.2265</u>
3	16481	17058	16963	17321
25.4	14212	935250	13552	1073533
31.4	14	48	52	31
	87	68	71	31
	<u>25.2270</u>	<u>25.2284</u>	<u>27.3413</u>	<u>27.3405</u>
3	16300	18577	17852	18853
31.4	13141	11745	11770.71	1493639
13.6	41	45	72	42
	10	83	58	61
	<u>31.3162</u>	<u>31.3164</u>	<u>13.6085</u>	<u>13.6083</u>

Mean Measures.

1	18245	18645	18918	19315
21.2	1428488	12592	12375.78	15842
15.6	92	92	81	4443
	45	41	18	15
	<u>21.3957</u>	<u>21.3951</u>	<u>15.6540</u>	<u>15.6528</u>
2			18343	19091
22			8477.5	18832
15.6			93	32
			45	91
			<u>15.9750</u>	<u>15.9741</u>
3	16840	18555		
220	16634	8778		
16	3032	78		
	42	53		
	<u>220208</u>	<u>220225</u>		

11218 Dyr. Star Measures Tycho

L	17350	17253	18486	18533
19	1818889	16408	15782	10798
22	28	08	82	98
	48	63	36	33
	<u>159150</u>	<u>159154</u>	<u>62254</u>	<u>62265</u>

2	16481	17058	16963	17321
54	14212 ¹³	935250	13552	1073533
4	14	48	52	31
	87	68	71	31
	<u>252888</u>	<u>252284</u>	<u>273413</u>	<u>273405</u>

3	16300	18577	17852	18853
14	13141	11745	1177071	1493639
36	41	45	72	42
	10	83	58	61
	<u>313162</u>	<u>313164</u>	<u>136085</u>	<u>136083</u>

Mean Measures.

L	18245	18645	18978	19315
212	1428488	12592	1237578	15842
56	92	92	81	44
	45	41	18	15
	<u>213957</u>	<u>213951</u>	<u>156540</u>	<u>156528</u>

2			18343	19091
22			859795	18837
158+			93	32
			45	91
			<u>159750</u>	<u>159741</u>

2	16840	18555
220	16634	8778
16	3032	78
	42	53
	<u>220208</u>	<u>220225</u>

1/1
4
52
1
3
22
17
6
25
18
7
52
18
8
22
16
9
22
18

11218

Moon Measures

#	18828	18583
50.6	1248182	1491518
17.8	83	21
	26	81
	<u>22.6345</u>	<u>22.6887</u>

5	18152	16592
22.7	1138992	1332429
17.5	95	34
	50	90
	<u>22.6759</u>	<u>22.6789</u>

6	18630	17605
22.6	1295853	13283
18	48	83
	30	03
	<u>22.5677</u>	<u>22.5680</u>

I	18084	18810
22	989295	16991
15.8	98	91
	80	10
	<u>18.8189</u>	<u>18.8181</u>

8	18952	18537	18070	19994
22.3	1566056	1182428	1483432	1317267
16.3	52	32	30	62
	48	41	20	00
	<u>22.3295</u>	<u>22.3288</u>	<u>16.3182</u>	<u>16.3169</u>

9	16031	18048	19414	18528
22.4	1182322	1226566	1619091	1174849
18.3	21	67	92	50
	37	58	24	38
	<u>22.4211</u>	<u>22.4212</u>	<u>18.3226</u>	<u>18.3214</u>

11218

Mass Measures

#	18828	18583
22.6	1248182	1491518
17.0	83	21
	26	81
	<u>22.6345</u>	<u>22.6837</u>

5	18152	16592
22.7	1138992	1332429
17.5	95	34
	50	90
	<u>22.6758</u>	<u>22.6739</u>

6	18630	17605
22.6	1295853	13283
18	48	83
	30	03
	<u>22.5677</u>	<u>22.5680</u>

I	18084	18810
22	989295	16991
18.8	98	91
	80	10
	<u>18.8189</u>	<u>18.8181</u>

8	18952	18537	18049	19994
22.3	1566056	1182428	1483432	131726
16.3	52	32	30	62
	48	41	20	00
	<u>22.3295</u>	<u>22.3288</u>	<u>16.3182</u>	<u>16.3069</u>

9	16031	18048	19414	18528
22.4	1182322	1226566	1619041	117484
18.3	21	67	92	50
	37	58	24	38
	<u>22.4211</u>	<u>22.4212</u>	<u>18.3226</u>	<u>18.3214</u>

11218

Times etc

Date Sept. 20 '16

Exp. to Stern	04	36		04	48
" " Moon	04	41	53.5 ^v	04	41 53.7 ^v
Clock fast		09	49.6 ^v		

N. Sid. Time	04	32	04.0 ^v		
H. Long.	04	44	31.05 ⁻	$\odot = -3^h$	
S. Sid. Time	09	16	35.05 ⁻		
G. S. Time M.N.	11	56	10.36		
Interval	21	20	24.69		
Reduction		03	29.76		
G. M. T.	21	16	54.93		21.28 19.2 ^v

Green Waut. Alm.			R A		Decl.
Moon	07	32	27.59	+22	16 58.6
Motion 1 ^m			2.0668 ⁻		- 7.207 ⁻
16.9155 ^v			34.96 ⁻	- 02	01.9 ⁻
Sabular Place	7	33	02.55 ⁻	+22	14 56.7 ⁻

Moon's Age 23^d

934" = 11.6

$$\begin{array}{r} 2 - 503.3 \\ + 24.0 \\ \hline - 479.3 \end{array}$$

Parallax	54	11.3 ^v
Semi-Diam	14	47.5 ⁻
R		887.5 ⁻
Aug.		10.5 ⁻
Sun 5		- 0.8 ⁻
R		897.2 ⁻
R		1.9232 ⁻
(1+g)R		- 922 ⁻
R		1.8310 ⁻
R2		3.3526 ⁻

11218

Times etc.

Date Sept 20 '16

Exp to stars	04	36		04	48	
" " Moon	04	41	53.5	04	41	53.7
Clock fast		09	49.6			

H Sid Time	04	32	04.0			
H Going:	04	44	31.05		-3	43
S Sid Time	09	16	35.05			
S Sid Time M N	11	56	10.36			
Interval	21	28	24.69			
Reduction		03	29.76			
S MT	21	16	54.93		21	28.19.2

Learn Mount. (Ch.)				RA		Decl.
Moon	07	32	27.59	+22	16	58.6
Motion 1"			2.0668			-7.267
" 16.9153"	01		34.96		-02	01.9
Tabular Place	7	33	02.55	+22	14	56.7

Moon's age 23^d

$$934'' = 11.6$$

$$\begin{array}{r}
 Q = -503.3 \\
 +24.0 \\
 \hline
 -479.3
 \end{array}$$

Parallax	54	11.3
Semi-Diam	14	47.5
P		887.5
Aug		10.5
Inv		-0.8
R		897.2
R		1.9232
H + a/R		-9.22
P		1.8310
R2		3.3526

11218

Plate Center + Constants.

24

15.9152	6.2260	07	32	09.19	+20	20	49.5
22.2279	27.3409	07	35	56.86	+23	12	49.1
31.3163	13.6084	07	41	10.36	+21	19	35.3
372.4592	3147.1753	3122	49	1641	3164	53	13.9
24.1531	15.7251	07	36	25.47	21	37	44.6
12	18	-01	06.75	+	17		41.3
-2.1531	+2.2749						
31	466.5						

Plate Center } A 07 35 18.72
 B +2.1 55 25.9

$$\begin{array}{rclclcl}
 X-5 & +500X & & +101.45 & & +3.3X & -4958 \\
 -3684 & +7958 & = & 4274 & +631 & = & 4905 + 53 = 4958 \\
 -9001 & +11114 & = & 2113 & +2772 & = & 4885 + 73 = 4958 \\
 -1.2183 & +15658 & = & 3475 & +1380 & = & 4855 + 103 = 4958 \\
 20.8437 & +10422 & & +1764 & & +69 & = 21.5734
 \end{array}$$

$$\begin{array}{rclclcl}
 Y-71 & +500Y & & -102.4X & & +3.5Y & -5344 \\
 -3.837 & +3113 & = & 6950 & -1628 & = & 5322 + 22 = 5344 \\
 -.6147 & +13670 & = & 7523 & -2276 & = & 5247 + 96 = 5343 \\
 -.1698 & +6804 & = & 8502 & -3206 & = & 5296 + 48 = 5344 \\
 17.3961 & +8698 & & -2137 & & +61 & = 17.5239
 \end{array}$$

Labels

$$a = -2.0$$

$$= -503.3$$

$$l = -1.8$$

$$= -503.5$$

$$a-l = -0.2$$

$$= +0.2$$

$$b+d = +1.8$$

$$= +1.0$$

$$0-c = -501.3$$

$$-501.7$$

$$-0.8$$

11218

Plate Center - Constants.

24

15.9152	6.2260	07	32	09.19	+20	20	49.5
22.2277	27.3409	07	35	52.86	-23	12	49.1
31.3163	13.6084	07	41	11.36	+21	19	35.3
172.4592	3147.1753	3122	49	1641	3164	53	189
24.1531	15.7251	07	36	25.47	21	37	44.6
22	18	-01	06.75	+17			41.3
-2.1531	+2.2749						
31	4465						

Plate Center

$$\left\{ \begin{array}{l} A \quad 07 \quad 35 \quad 18.72 \\ R \quad +21 \quad 55 \quad 25.99 \end{array} \right.$$

$$\begin{array}{rclcl} X-S & +570X & +101.48 & +3.3X & -4958 \\ -3684 & +7958 & = & 4274+631 & = 4905+53 = 4958 \\ -9101 & +11114 & = & 2113+2772 & = 4885+73 = 4958 \\ -1.2183 & +15658 & = & 3475+11380 & = 4855+103 = 4958 \\ 20.8437 & +04228 & & +1768 & +69 = 21.5734 \end{array}$$

$$\begin{array}{rclcl} -71 & +500.9 & -112.4X & +3.58 & -5344 \\ 3837 & +3113 & = 6950 & -1628 & = 5322 + 22 = 5344 \\ 6147 & +13670 & = 7523 & -2276 & = 5247 + 96 = 5343 \\ 1648 & +6804 & = 8512 & -3206 & = 5296 + 48 = 5344 \\ 17.3961 & +8698 & & -2137 & +61 = 17.5289 \end{array}$$

Labels

$$\begin{array}{l} a = +2.0 \\ = -50.33 \end{array}$$

$$\begin{array}{l} e = -1.8 \\ = -513.5 \end{array}$$

$$\begin{array}{l} a-e = -0.2 \\ = +0.2 \end{array} \quad \begin{array}{l} l+d = + \\ = +7.0 \end{array}$$

Σ	η	$\Delta \Sigma$	-3.73	$-.2\eta$	$+4$
-571	-12.17	-26	$+21 = -5$	$+2 = -3$	
$+1.13$	$+9.95$	$+3$	$-4 = -1$	$-2 = -3$	
$+10.53$	-4.61	$+34$	$-39 = -5$	$+1 = -4$	
$M-0.42$	-0.48		$+1$	$+0 =$	$+5$
					<u><u>5</u></u>

$\Delta \eta$	-3.3η	$-.88$	$+10$
-54	$+40 =$	$-14 + 4 =$	-10
$+24$	$-33 =$	$-9 - 1 =$	-10
-16	$+15 =$	$-1 - 8 =$	-9
	$+1$	$+0 =$	$+11$
			<u><u>11</u></u>

$$\text{Corr } \alpha = +0.02$$

$$\delta = +0.6$$

11218			Standard			Coordinates			25
Cafe No 1068 mg 68			Cafe No. 1076 mg. 63			Cafe No. 1088 mg 7.5			
C	07	31	12.76	07	34	59.31	07	40	13.64
y			12.77			59.34			13.65
E			12.74			59.29			13.63
m	07	31	12.72	07	34	59.31	07	40	13.64
Pre			+56.47			+57.55			+56.72
A	07	32	09.19	09	35	5.686	07	41	10.36
A	07	35	18.72	07	35	18.72	07	35	18.72
A-A		-03	09.53		+	38.14		+05	51.64
Dim A-h			-189.52		+	38.14			+351.60
Arg "			2.27766m			1.558138			2.54605
" cos δ			9.97202			9.96334			9.96919
Arg S_0			0.75692m			0.05196			1.02248
S_0			-5.7137			+1.1275			+10.5312
S_1			-0.027			+0.003			+0.0034
S			16.2836			23.1278			32.5346
X			15.9152			22.2277			31.3163
X-S			-0.8684			-0.9001			-1.2183

C	20	22	56.0	23	14	58.9	21	21	52.0
y			56.1			59.2			51.9
E			55.5			58.7			51.4
Mean	20	22	55.9	23	14	58.9	21	21	51.8
Pre		-02	06.4		-02	09.8		-02	16.5
S	+20	20	49.5	+23	12	49.1	+21	19	35.3
S	+21	55	25.9	21	55	25.9	21	55	25.9
S-A	-1	34	36.4	+1	17	23.2	-	35	50.6
tan "			-56.77.9			+46.44.0			-21.50.7
Arg "			3.75419m			3.66689			3.33258m
" η_0			1.08534m			0.99804			0.66373m
stand			9.56919			9.63234			9.59153
" S_0^2			1.51384			0.10392			2.04496
" η_1			8.1364			6.7896			8.6899
η_0			-12.1714			+9.9550			-4.6103
η_1			+0.0137			+0.0006			+0.0489
η			5.8423			27.9556			13.4386
y			-6.2260			27.3409			13.6084
y= η			+0.3837			-0.6147			+0.1698

11218			Standard Coordinate			25'			
Cape no.	1068	mg 68	Cape no.	1076	mg. 63	Cape no.	1188	mg 7.5'	
C	07	31	12.76	07	34	59.31	07	40	13.64
4			12.77			59.34			13.65
E			12.74			59.24			13.63
M	07	31	12.72	07	34	59.31	07	40	13.64
Proc			+56.47			+57.55			+56.72
A	07	32	09.19	07	35	56.86	07	41	10.36
A	07	35	18.72	07	35	18.72	07	35	18.72
A-A		-03	09.53		+	38.14		+05	51.64
Sum X-h			-189.52		+	38.14			+351.60
47		2.27766m			1.58138			2.54605	
cos δ		9.97202			9.96334			9.96919	
47 S ₀		0.75692m			0.05196			1.02248	
S ₀		-5.7137			+1.1275			+10.5312	
S ₁		-0.027			+0.003			+0.0034	
S		16.2836			23.1278			32.5346	
X		15.9152			22.2277			31.3163	
X-S		-0.3684			-0.9001			-1.2183	

C	21	22	56.0	23	14	58.9	21	21	52.0
4			56.1			59.2			51.9
E			55.5			58.7			51.4
Mean	20	22	55.9	23	14	58.9	21	21	51.8
Proc		-02	06.4		-02	09.8		-12	16.5
S	+20	20	49.5	+23	12	49.1	+21	17	35.3
E	+21	55	25.9	21	55	25.9	21	55	25.9
Sum X-h	-1	34	36.4	+1	17	23.2		35	50.6
Sum			-56.789		+	40.446		-21	50.7
47		3.75419m			3.66689			3.33258m	
47 S ₀		1.08534m			0.99804			0.66373m	
cos δ		9.56919			9.63234			9.59153m	
S ₀		1.51384			0.10392			2.04496	
S ₁		8.1364			6.7896			8.6899	
X		-12.1714			+9.9550			-4.6103	
X ₁		+0.0137			+0.0006			+0.489	
X		15.8423			27.4556			13.4386	
4		6.2260			27.3409			13.6084	
4-7		+0.3837			-0.6147			+0.1698	

11218

Means Center.

26.

	X	X - X ₀				
1	21.3954	+0.5514	+3	0.3044	3.3414	-1.12
2	22.0000	+1.1560	+3	1.3370	3.3577	+51
3	22.0216	+1.1776	+3	1.3875	3.3866	-1.60
4	22.6341	+1.7901	+1	3.2048	3.3616	+90
5	22.6749	+1.8309	+0	3.3522	3.3522	-4
6	22.5678	+1.7238	-1	2.9711	3.3359	-1.67
7	22.0000	+1.1560	-3	1.3356	3.3591	+65
8	22.3292	+1.4852	+2	2.2064	3.3695	+1.69
9	22.4212	+1.5772	-2	2.4869	3.3444	-0.82
					3.3526	
1	15.6534	-1.7426	+1	3.0370	1.62 ^v	
2	15.9745	-1.4215	+0	2.0207	1.41 ^v	
3	16.0000	-1.3960	+0	1.9488	1.40 ^v	
4	17.0000	-0.3960	+0	0.1568	1.02 ^v	
5	17.3960	0.0000	+0	0.0000	90 ^v	
6	18.0000	+0.6040	-0	0.3648	71 ^v	
7	18.8185	+1.4225	-0	2.0235	39 ^v	
8	16.3175	-1.0785	-0	1.1631	126 ^v	
9	18.3220	+0.9260	-0	0.8575	59 ^v	

Approx. Center.

Range 123

$$\begin{aligned}
 X &= 22 & y &= 15.9745 \\
 & & & 18.8185 \\
 & & & 34.7930 \\
 & & y_0 &= 17.3965
 \end{aligned}$$

$$\begin{aligned}
 \text{Com R.} & 1.8310 \\
 X_{\text{max}} & 22.6749 \\
 Y_0 & 20.8439
 \end{aligned}$$

$$\begin{aligned}
 \text{Means Center} & \left\{ \begin{aligned} X_0 &= 20.8440 \\ Y_0 &= 17.3960 \end{aligned} \right.
 \end{aligned}$$

11218

Mass Center

26

	X	Y	Z	X ₁	Y ₁	Z ₁	X ₂	Y ₂	Z ₂	A-C
1	21.3954	+0.5574	+3	0.3144	3.3494	-	+42			
2	22.0000	+1.1560	+3	1.3370	3.3577	+	31			
3	22.0216	+1.1776	+3	1.8815	3.3606	-	140			
4	22.6341	+1.7901	+1	3.2048	3.3686	+	96			
5	22.6749	+1.8309	+0	3.3522	3.3812	-	4			
6	22.5778	+1.7288	-1	2.9711	3.3859	-	167			
7	22.0000	+1.1560	-3	1.3356	3.3591	+	45			
8	22.3292	+1.4852	+2	2.2864	3.3695	+	129			
9	25.4212	+1.5772	-2	2.5869	3.3444	-	182			
					3.3526					
1	15.6534	-1.7426	+1	3.1370	1.620					
2	15.9745	-1.4215	+0	2.0207	1.410					
3	16.0000	-1.2960	+0	1.9488	1.40					
4	17.0000	-0.3960	+0	0.1568	1.02					
5	17.3960	0.0000	+0	0.0000	90					
6	18.0000	+0.6040	-0	0.3648	71					
7	18.8185	+1.4225	-0	2.0230	39					
8	16.3175	-1.0785	-0	1.1631	Range 26					
9	18.3220	+0.9260	-0	0.8575	59					

Approx Center

Range 123

$$\begin{aligned}
 X &= 22 & Y &= 15.9745 \\
 & & & 18.8185 \\
 & & & 34.7930 \\
 & & Y_0 &= 17.3965
 \end{aligned}$$

$$\begin{aligned}
 \text{Cen R.} & 1.8310 \\
 X_{\text{max}} & 22.6749 \\
 Y_0 & 20.8439
 \end{aligned}$$

$$\begin{aligned}
 \text{Mass Center} & \left\{ \begin{aligned} X_0 &= 20.8440 \\ Y_0 &= 17.3960 \end{aligned} \right.
 \end{aligned}$$

Normals.

1	- 0.98
2	- 1.65
3	- 1.18
4	- 0.72
5	+ 0.00
6	+ 1.04
7	+ 1.64
8	- 1.61
9	+ 1.47
	+ 4.15
	- 6.14
	- 1.99

- 149.0
- 38.0
- 284.0
+ 153.0
- 7.2
- 301.2
- 18.5
+ 191.0
- 172.0
+ 344.0
- 969.9
- 625.9

+ 463
+ 42.6
+ 337.6
- 34.0
- 0.0
- 10.8
- 22.7
- 138.2
- 104.1
+ 843.2
- 309.8
+ 533.4

Normals.

1	- 0.96
2	- 1.65
3	- 1.65
4	- 0.71
5	+ 0.00
6	+ 1.01
7	+ 1.65
8	- 1.66
9	+ 1.45
	+ 4.11
	- 6.57
	- 2.46

- 61.6
+ 59.2
- 188.5
+ 160.8
- 7.2
- 288.0
+ 75.4
+ 250.0
- 128.0
+ 544.6
- 673.3
- 128.7

+ 195.0
- 72.4
+ 224.0
- 36.0
- 0.0
- 100.0
+ 192.3
- 183.0
- 76.2
+ 511.3
- 467.6
+ 43.7

- a	- b	+ $\Delta^{\circ}\text{C}$
+ 14	+ 8	- 16 ^h
+ 29	+ 7	- 2 ^h
+ 29	+ 7	- 2 ^h
+ 45	+ 2	+ 9 ^h
+ 46	- 0	+ 8 ^h
+ 43	- 3	+ 2 ^h
+ 29	- 7	- 16 ^h
+ 37	+ 5	+ 4 ^h
+ 39	- 5	- 4 ^h

11218

Conditional Equations.

27

o-e corr

1	+0.55	-1.74	= -1.12	-4	-4	= -8	-	104	-120
2	+1.16	-1.42	= +51	-7	-3	= -10	+	61	+59
3	+1.18	-1.40	= -160	-7	-3	= -10	-	150	-152
4	+1.79	-0.40	= +90	-12	-1	= -13	+	83	+112
5	+1.83	+0.00	= -4	-12	+0	= -12	+	8	+16
6	+1.72	+0.60	= -167	-11	+1	= -10	-	157	-155
7	+1.16	+1.42	= +65	-7	+3	= -4	+	69	+53
8	+1.48	-1.08	= +169	-10	-2	= -12	+	181	+185
9	+1.56	+0.93	= -82	-10	+2	= -8	-	74	-78
	+12.43	-3.09						+422	-485

av 113

$$18.58 - 2.46 = -128.7 + 12.43$$

$$-2.46 + 11.57 = +43.7 + -3.09$$

$$+2.46 - 0.32 = -16.8 + 1.65$$

$$+11.25 = +26.9 = -1.44 \quad b = +2.4 - 0.13$$

$$+18.58 = -128.7 + 5.9 = -122.8 \quad a = -6.6 + 0.65$$

$$\frac{p}{n} = .08$$

$$\frac{\Sigma v}{n} = -8$$

$$\frac{-8}{.08} = -100$$

$$\Delta R = -1.2$$

$$\text{Corr} = +0.5$$

$$\text{True } \Delta R = -1.7$$

$$-2R = -3.85 \quad -2R_{\text{Corr}} = -1.92 = -38$$

$$\Delta b = +0.25 + 5 \Delta \delta = +0.1$$

$$\Delta a = -1.25 - 25 \Delta \alpha = -0.04$$

$$+0.26$$

11218

Conditional Equations.

27

C-E

1	+1.55	-1.74	= -2.12	-4	-4	= -8	-11.4
2	+1.16	-1.42	= +5.1	-7	-3	= -10	+61
3	+1.18	-1.40	= -1.60	-7	-3	= -11	-15.0
4	+1.89	-1.40	= +4.0	-12	+1	= -13	+17.3
5	+1.83	+0.10	= -4	-12	+0	= -12	+8
6	+1.72	+0.60	= -1.68	-11	+1	= -10	-15.7
7	+1.16	+1.42	= +6.5	-7	+3	= -4	+6.9
8	+1.48	-1.08	= +1.68	-10	-2	= -12	+18.1
9	+1.58	+0.93	= -1.82	-10	+2	= -8	-7.4
							+422 - 488
							CV 113

$$18.58 + 2.46 = +28.74$$

$$-2.46 + 11.57 = +43.74$$

$$+2.46 - 0.32 = -16.834$$

$$+11.28 = +26.91$$

$$b = +2.4$$

$$+18.58 = -128.7 + 5.9 = -122.85 + a = +6.68$$

$$\frac{P}{\lambda} = .08$$

$$\frac{\Sigma V}{\lambda} = -9$$

$$\frac{-8}{.08} = -100$$

$$\Delta R = -1.2$$

11218

Moon's Mean Position.

28

$$\begin{array}{r} X_0 \quad 20.8440 \\ \quad \quad - 3 \\ \hline 20.8437 \end{array}$$

$$\begin{array}{r} 17.3960 \\ \quad \quad + 1 \\ \hline 17.3961 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 21.5734 \\ - 22 \\ \hline \end{array}$$

$$\begin{array}{r} 17.5239 \\ 18. \\ \hline \end{array}$$

$$-0.4266^{\circ}$$

$$-0.4761^{\circ}$$

$$\begin{array}{l} \log \xi_0 \quad 9.63002^{\circ} \\ \log \cos \delta_0 \quad 9.96758^{\circ} \\ \quad \quad 8.50724 \end{array}$$

$$\begin{array}{l} \log \tan \delta \quad 9.6031^{\circ} \\ \log S^2 \quad 9.2600 \\ \quad \quad 7.0534 \end{array}$$

$$\log \sin(x-A) \quad 1.15520^{\circ}$$

$$\log n_1 \quad 5.9165^{\circ}$$

$$\alpha - A \quad -14.30^{\circ}$$

$$n_1 \quad 0.0001$$

$$A - 07 \quad 35 \quad 18.72^{\circ} \quad n_0 \quad 0.4762$$

$$\alpha - 07 \quad 35 \quad 04.42^{\circ} \quad \log \eta_0 \quad 9.67779^{\circ}$$

$$7.33115^{\circ}$$

$$\text{Red.} \quad + 3.12^{\circ} \quad \log \tan(\delta - A) \quad 2.34664^{\circ}$$

$$\alpha - 07 \quad 35 \quad 07.54^{\circ} \quad \delta - \epsilon \quad -222.15^{\circ}$$

$$-03 \quad 42.1^{\circ}$$

$$\delta \quad 21 \quad 55 \quad 25.9^{\circ}$$

$$\delta_0 \quad 21 \quad 51 \quad 43.8^{\circ}$$

$$\text{Red} \quad - 2.9^{\circ}$$

$$\delta \quad 21 \quad 51 \quad 40.9^{\circ}$$

11218

Moss's Mean Position.

28

$$\begin{array}{r} X_0 \quad 208440 \\ \quad \quad -18 \\ \hline 208437 \end{array}$$

$$\begin{array}{r} 17.3960 \\ \quad \quad +21 \\ \hline 17.3961 \end{array}$$

Frame Plate Constants.

$$\begin{array}{r} 21.5734 \\ 22 \\ \hline \end{array}$$

$$-0.4266$$

$$\log S_0 \quad 9.63002m$$

$$\log C_0 S_0 \quad 9.96758$$

$$2.51724$$

$$\log \sin(X-A) \quad 1.15529m$$

$$X-A \quad -14.30$$

$$17.5239$$

$$18$$

$$-0.4761$$

$$\log \tan S \quad 9.6031$$

$$\log S^2 \quad 9.2600$$

$$7.0534$$

$$\log \lambda \quad 59.165$$

$$m \quad 0.0001$$

$$A \quad 07 \quad 35 \quad 18.72 \quad m \quad 0.4762$$

$$X \quad 07 \quad 35 \quad 04.42 \quad \log \lambda \quad 9.67779m$$

$$7.33115$$

$$Red. \quad + \quad 3.12 \quad \log \tan S \quad 2.34664m$$

$$X \quad 07 \quad 35 \quad 07.54 \quad S-A \quad -222.15$$

$$-03 \quad 42.5$$

$$S \quad 21 \quad 55 \quad 25.9$$

$$S_0 \quad 21 \quad 51 \quad 43.8$$

$$Red \quad - \quad 2.9$$

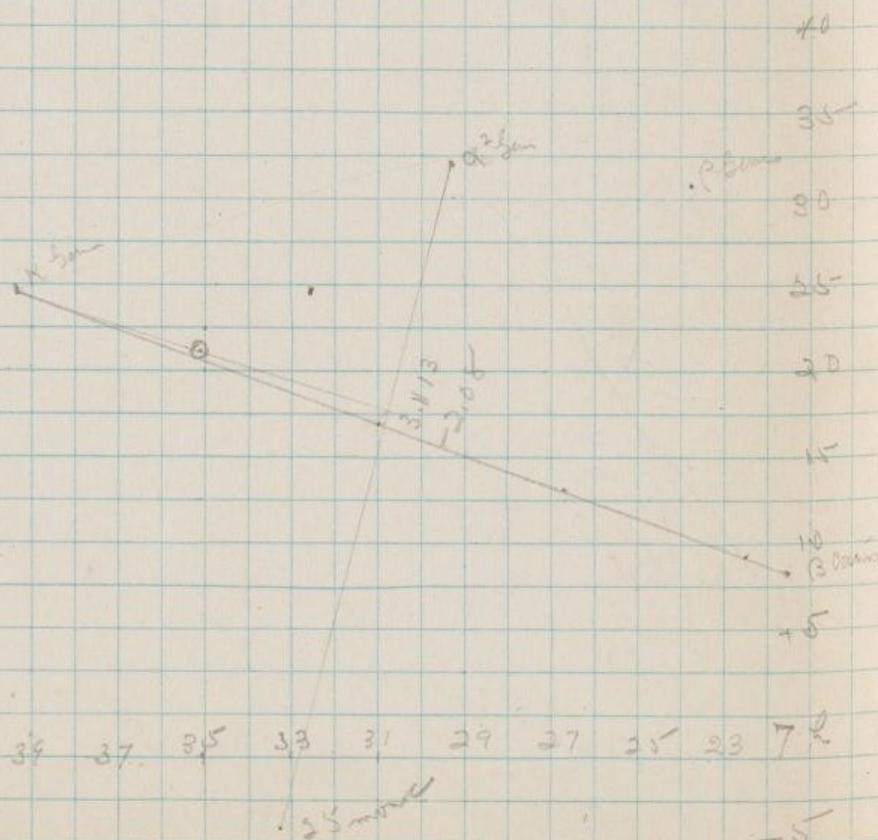
$$S \quad 21 \quad 51 \quad 40.9$$

$$\begin{array}{r}
 07 \quad 22 \quad 38.670 \\
 35 \text{ km} \quad 07 \quad 22 \quad 35.794 \\
 \hline
 + 2.876
 \end{array}$$

$$\begin{array}{r}
 25.813 \\
 34 \text{ km} \quad 07 \quad 39 \quad 22.749 \\
 \hline
 + 3.064
 \end{array}$$

$$\begin{array}{r}
 08 \quad 27 \quad 36.54 \\
 18 \quad 27 \quad 34.04 \\
 \hline
 + 2.50
 \end{array}$$

$$\begin{array}{r}
 34 \quad 35 \quad 57.39 \\
 + 34 \quad 36 \quad 01.18 \\
 \hline
 - 3.79
 \end{array}$$



11218

Reduction to Apparent Place.

29

$$H + \alpha \quad 13 \quad 43.5 \quad 205^\circ \quad 52.5 \quad \delta_0 \quad 21 \quad 51.7 \quad 45.1$$

$$H \quad 06 \quad 08.4 \checkmark$$

$$\alpha_0 \quad 07 \quad 35.1 \quad 04.1 \checkmark$$

$$Q \quad 23 \quad 10.3 \checkmark$$

$$Q + \alpha \quad 30 \quad 45.4 \quad 101^\circ \quad 21'$$

$$\log \cos \delta_0 \quad 9.9676 \checkmark$$

$$\log i \quad 0.9106 \checkmark$$

$$\log(i) \quad 0.8782$$

$$\log \cos(Q + \alpha) \quad 9.2940 \checkmark$$

$$\log g \quad 1.3250 \checkmark$$

$$\log \sin(Q + \alpha) \quad 9.9914 \checkmark$$

$$\log \tan \delta_0 \quad 9.6040 \checkmark$$

$$8.8239$$

$$\log \sin \delta_0 \quad 9.5710 \checkmark$$

$$\cos H + \alpha_0 \quad 9.9541 \checkmark$$

$$\log h \quad 1.2737 \checkmark$$

$$\log \sin(H + \alpha) \quad 9.6399 \checkmark$$

$$\sec \delta_0 \quad 0.0824 \checkmark$$

$$8.8239$$

$$\log g' \quad 0.6190 \checkmark$$

$$g \quad 9.7443 \checkmark$$

$$\log h' \quad 0.7988 \checkmark$$

$$h \quad 9.7699 \checkmark$$

$$Q \quad +3.155 \checkmark$$

$$g \quad +0.555 \checkmark$$

$$h \quad -0.589 \checkmark$$

$$\text{Red.} \quad +3.121 \checkmark$$

$$q' \quad -4.160 \checkmark$$

$$k' \quad -6.292 \checkmark$$

$$j \quad +7.555 \checkmark$$

$$\text{Red.} \quad -2.897 \checkmark$$

19218

Reduction to Apparent Place.

29

$$H + \alpha \quad 13 \quad 43.5 \quad 215^\circ \quad 52.5 \quad \delta_0 \quad 21 \quad 51.75 + 51$$

$$H \quad 06 \quad 08.4$$

$$\alpha_0 \quad 07 \quad 35.1 \quad 141.5$$

$$G \quad 23 \quad 10.3$$

$$G + \alpha \quad 30 \quad 45.4 \quad 111^\circ \quad 21'$$

$$\log \cos \delta_0 \quad 9.9676$$

$$\log i \quad 0.9106$$

$$\log(ii) \quad 0.8782$$

$$\log \cos(G + \alpha) \quad 9.2940^m$$

$$\log g \quad 1.3250^m$$

$$\log \sin(G + \alpha) \quad 9.9914^m$$

$$\log \tan \delta_0 \quad 9.6040$$

$$8.8239$$

$$\log \sin \delta_0 \quad 9.5740^m$$

$$\cos H + \alpha_0 \quad 9.9541^m$$

$$\log h \quad 1.2737$$

$$\log \sin(H + \alpha) \quad 9.6399^m$$

$$\sec \delta_0 \quad 0.0324$$

$$8.8239$$

$$\log g' \quad 0.6190^m$$

$$g \quad 9.7443$$

$$\log h' \quad 0.7988^m$$

$$h \quad 9.7699^m$$

$$g + 3.155$$

$$g + 6.555$$

$$h - 6.589$$

$$\text{Red.} + 3.121$$

$$g' - 4.160$$

$$h' - 6.292$$

$$j + 7.555$$

$$\text{Red.} - 2.897$$

11218

Lunar Parallax.

30

$$\begin{array}{rclcl}
 \alpha' & 07 & 35 & 07.54 & \checkmark \\
 \theta & 04 & 32 & 04.00 & \checkmark \\
 \theta - \alpha' & -03 & 03 & 03.54 & \checkmark \\
 = & -45 & 45 & 53.10 & \checkmark \\
 \frac{1}{2}(\alpha - \alpha') & & -15 & 30.97 & \checkmark \\
 (\theta - \alpha') - \frac{1}{2}(\alpha - \alpha') & 45 & 30 & 22.13 & \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 & 9.95727 & \\
 \log \cos \frac{1}{2}(\alpha - \alpha') & 0.0 & \\
 \sec \theta - \alpha' \frac{1}{2}'' & 0.15439 & \checkmark \\
 \log \tan X & 0.11166 & \checkmark
 \end{array}$$

$$\begin{array}{rclcl}
 Y & 52 & 17 & 09.2 & \checkmark \\
 \delta' & 21 & 51 & 40.9 & \checkmark \\
 Y - \delta' & 30 & 25 & 28.3 & \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 & 9.82640 & \checkmark \\
 \log \sin \Pi & 8.19761 & \checkmark \\
 \sin Y - \delta' & 9.70449 & \checkmark \\
 \operatorname{cosec} X & 0.10179 & \checkmark \\
 \sin(\delta - \delta') & 7.83029 & \checkmark
 \end{array}$$

$$(\delta - \delta') + 23 \quad 15.5 \quad \checkmark$$

$$\delta \quad 22 \quad 14 \quad 56.4 \quad \checkmark$$

$$\text{eph } \delta + 22 \quad 14 \quad 56.7 \quad \checkmark$$

$$\begin{array}{rcl}
 O-C & - & 0.3 \checkmark \\
 \text{curr} & & +0.6 \\
 \text{2nd ord. mfg.} & & +0.8
 \end{array}$$

$$\text{Lun. Corr.} \quad +0.1$$

$$\delta - +22 \quad 14 \quad 56.5 \checkmark$$

$$O-C \quad - \quad 0.2$$

$$\Pi \quad 54 \quad 11.3 \checkmark$$

$$\begin{array}{rcl}
 & 9.86913 & \\
 \log \sin \Pi & 8.19761 & \checkmark \\
 \sin(\theta - \alpha') & 9.85521 & \checkmark \\
 \sec \text{eph } \delta & 0.03359 & \checkmark \\
 \log \sin(\alpha - \alpha') & 7.95554 & \checkmark
 \end{array}$$

$$\alpha - \alpha' - 31 \quad 01.95 \checkmark$$

$$= -02^m \quad 4.13$$

$$\alpha \quad 07 \quad 33 \quad 03.41 \checkmark$$

$$\text{eph } \alpha \quad 07 \quad 33 \quad 02.55 \checkmark$$

$$\begin{array}{rcl}
 O-C & & +0.86 \checkmark \\
 \text{curr.} & & +0.02
 \end{array}$$

$$\text{Lun. Corr.} \quad -0.04$$

$$\alpha - 07 \quad 33 \quad 02.37 \checkmark$$

$$O-C = +0.82$$

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Lunar Parallax:

30

α'	07	35	07.54
θ	04	32	04.00
$\theta - \alpha'$	-03	03	03.54
$=$	-45	45	53.10
$\frac{1}{2}(\alpha - \alpha')$		-15	30.90
$= -\alpha' - \frac{1}{2}(\alpha - \alpha')$		30	22.30

	9.95727
$\log \cos \frac{1}{2}(\alpha - \alpha')$	0.0
$\sec \theta - \frac{1}{2}$	0.15439
$\log \tan \gamma$	0.11166

γ	52	17	09.2
δ'	21	51	40.9
$\gamma - \delta'$	30	25	28.3

	9.82640
$\log \sin \pi$	8.19761
$\sin \gamma - \delta'$	9.70449
$\operatorname{cosec} \gamma$	0.10179
$\sin(\delta - \delta')$	7.83029

$(\delta - \delta')$	7.23	15.5
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δ	22	14	56.4
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$\text{eph } \delta$	+22	14	56.7
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$\delta - \text{eph } \delta$	-		-0.3
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curr			+0.6
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$200 \text{ bis } \text{mf}$			+0.0
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Inr. Corr.			+0.1
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$\delta -$	+22	14	56.5
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$\delta - \text{C}$	-		0.2
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π	54	11.3
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	9.86913
$\log \sin \pi$	8.19761
$\sin(\theta - \alpha')$	9.85521
$\sec \theta - \frac{1}{2}$	0.03359
$\log \sin(\alpha - \alpha')$	7.95584

$\alpha - \alpha'$	-31	01.95
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$=$	-02	4.13
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α	07	33	03.45
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$\text{eph } \alpha$	07	33	02.55
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$\alpha - \text{eph } \alpha$			+0.88
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curr			+0.02
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Inr. Corr.			-0.04
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$\alpha -$	07	33	02.37
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$\alpha - \text{C}$			+0.82
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