

KG

11366

v.10/16

CLXIV

164

11579

11550

11580

1
14
14

2
2
2

3
3
6

1
2
15

2
2
1
1

2
2
1

11589

Star Measures

11

1	19719	19772	19546	19696
10.9	10919	19098	10254	18972
19.9	06	90	52	70
	21	70	48	91
	<u>10.9312</u>	<u>10.9324</u>	<u>19.9295</u>	<u>19.9275</u>

2	10170	20122	18510	18908
22.4	16978	13830	10328	17096
27.8	76	26	30	98
	78	28	28	26
	<u>22.3696</u>	<u>22.3702</u>	<u>27.8196</u>	<u>27.8186</u>

3	20068	20439	20984	18098
32.0	17122	13692	15312	13264
6.4	22	92	12	62
	62	34	82	410
	<u>32.2944</u>	<u>32.2956</u>	<u>6.5171</u>	<u>6.5159</u>

Moon Measures

1		19829	20218
24		13152	16902
14.7		58	890
7		38	18
		<u>14.6680</u>	<u>14.6680</u>
2		18662	20201
23		8758	10110
15		70	00
1		72	96
		<u>14.9903</u>	<u>14.9905</u>

2	18382	18884
22.2	16112	11136
16	18	48
	82	92
	<u>22.2267</u>	<u>22.2251</u>

11599

Star Measures

11

<u>1</u>	19719	19772	19596	19696
10.9	10919	19098	10259	18872
19.9	06	90	52	70
	21	70	98	91
	<u>10.9312</u>	<u>10.9329</u>	<u>19.9295</u>	<u>19.9275</u>

<u>2</u>	10170	20122	18510	18908
22.4	16978	12830	10328	17096
27.8	76	26	30	98
	78	28	28	26
	<u>22.3696</u>	<u>22.3702</u>	<u>27.8196</u>	<u>27.8186</u>

<u>3</u>	20068	20739	20989	18098
32.2	17122	13692	15312	13269
6.9	22	92	12	62
	62	39	82	10
	<u>32.2994</u>	<u>32.2956</u>	<u>6.5171</u>	<u>6.5159</u>

Moon Measures

<u>1</u>			19829	20219
29			13152	16902
19.7			58	890
7			38	18
			<u>19.6680</u>	<u>19.6680</u>
<u>2</u>			18662	20201
23			8758	10110
15			70	00
?			72	96
1			<u>19.9903</u>	<u>19.9905</u>

<u>3</u>	18382	18889		
2.2	16112	11136		
16	18	98		
	82	92		
	<u>22.2267</u>	<u>22.2251</u>		

Moon Measures

<u>4</u>	18430	19880
22.1	17162	11049
16.5	62	98
-4	38	92
	<u>22.1269</u>	<u>22.1257</u>

<u>5</u>	18469	19880
22.2	16798	11530
17	802	20
	72	98
	<u>22.1665</u>	<u>22.1629</u>

<u>6</u>	20538	19888
22.7	13502	16900
18	08	98
	36	889
	<u>22.7035</u>	<u>22.7021</u>

<u>7</u>		19202	19810
23		16808	11782
18.2		12	92
		20	28
		<u>18.2396</u>	<u>18.2362</u>

<u>8</u>	18912	20372	20190	20410
23.8	12223	17070	19962	15580
18.4	19	62	56	90
4	18	82	50	27
	<u>23.6695</u>	<u>23.6691</u>	<u>18.5186</u>	<u>18.5182</u>

Moon Measures

<u>9</u>	18930	19880
22.1	17162	11449
16.5	62	98
-x	38	92
	<u>22.1269</u>	<u>22.1257</u>

<u>5</u>	18969	19880
22.2	16798	11530
17	802	20
	72	98
	<u>22.1665</u>	<u>22.1629</u>

<u>6</u>	20538	19878
22.7	13502	16900
18	02	98
	36	889
	<u>22.7035</u>	<u>22.7021</u>

<u>7</u>		19202	19910
23		16808	11788
18.2		12	92
		20	28
		<u>18.2396</u>	<u>18.2362</u>

<u>8</u>	18912	20372	20190	20910
23.8	12223	17070	19962	15580
18.9	19	62	56	92
1	18	82	50	27
	<u>23.6695</u>	<u>23.6691</u>	<u>18.5186</u>	<u>18.5182</u>

11549

Times Etc

3

Nov. 7 '16

Epa to Stars	23	59	0	11
" " Moon	0	05	23.0	0.05 23.3
Clock fast		11	08.5	

H. Sid Time	23	59	1465	$9 - 9 = - 1^h 25^m$
H. Long	9	49	31.05	
G. Sid G.	7	38	45.70	
Sid. T. M. H.	15	5	29.96	
Interval	13	33	20.74	
Reduction		2	13.25	
G. M. T.	13	31	07.49	

From Nant Alm.	R. A.	Loc.
Moon 13 ^h	1	18 19.84 + 13 42 92.7
Motion 1 ^m		2.1303 + 12.540
" 31.1248	1	6.31 6 30.3
Tabular Place	1	19 26.15 13 49 13.0

Moon's Age 12 days

Parallax	57	24.82
Semi-d.	15	40.2
R		990.2
Ang.		13.2
Dist. (6)		-1.1
H		9523
R		20814
alt		-977
(149/11)		19770
R		3.7791

$$937 = 13$$

$$9 = -501.2$$

$$+ 27$$

$$477.2$$

11549

Times Etc

3

Nov. 7 '16

Eph. T. Stars	23	59	0	11
" Moon	0	05	23.0	0.05 23.3"
Clock fast	11	08.5		

H. Sid Time	23	59	19.65"	$\theta - \gamma = -1^{\circ} 25''$
H. Long	9	49	31.05"	
G. Sid T.	9	38	45.70"	
Sid. T. M. H.	15	5	29.96"	
Interpol	13	33	20.79"	
Reduction		2	13.25"	
G. M. T.	13	31	07.49"	

From Naut Alm.	R. A.	Dec.
Moon 13 ^h	1	18 19.89 +13 42 92.7
Motion in 1"		2.1305" + 12.570"
" " 31.1298	1	6.31 6 30.3
Tabular Place	1	19 26.15" 13 49 13.0"

Moon Age 12 days

Parallax	57	27.82
Second.	15	40.2"
θ		99.0.2"
Ang.		13.2"
L.R. (6)		-1.1"
R		95.23"
R		209.19"
alt		-97.9"
(189/11)		1979.0"
R		3.7791"

937 = 13'

$$a = -5^{\circ} 01.2'$$

$$+ 29$$

$$977.2'$$

Curt. Cor.

Σ	n	$\Delta \Sigma$	-9.23	$+1.13$	-10
-11.56	$+2.09$	-80	$+89$	$+2$	$= +11$
$+0.51$	$+10.33$	$+1$	-2	-1	$+11 = +10$
$+10.76$	-12.15	$+68$	-85	$+23$	$-10 = +10$

$$M = +2.20 \quad -1.75 \quad 0 \quad -9 \quad -2 \quad -21 = -0.07$$

$\Delta \Sigma$	-9.24	$+1.33$	$+16$
$+7$	-9	$= -2$	$-15 = -17$
$+28$	-43	$= -15$	$+1 = -16$
-78	$+78$	$= -30$	$+14 = -16$
0	$+6$	$+3$	$+25 = +1.2$

11549

Standard Coordinates

4

Cape No 177-Mg7.4

Cape No 192-Mg8.9

Cape No 203-Mg8.6

C	1	12	14.86	1	18	41.20	1	24	7.25
L			14.97			41.26			7.27
E			14.86			41.21			7.23
Mean	1	12	14.88	1	18	41.20	1	24	7.25
Pre			50.79 ⁿ			51.07 ⁿ			+50.79 ⁿ
α	1	13	05.67	1	19	32.27 ⁿ	1	29	38.09 ⁿ
A	1	19	16	1	19	16	1	19	16
$\delta-A$		-6	10.33			+16.27		+6	42.09 ⁿ
$\sin(\delta-A)$			-370.29			+16.27 ⁿ			+342.00 ⁿ
$\log u$			2.56854 ⁿ			1.21139 ⁿ			2.53703 ⁿ
$\log s$			998728 ⁿ			998521 ⁿ			999048 ⁿ
$\log z$			106306 ⁿ			970384 ⁿ			103175 ⁿ
γ_0	-		115629 ⁿ			+0.5056 ⁿ			+10.7585 ⁿ
γ_1			-90 ⁿ			+01 ⁿ			+68 ⁿ
γ_2			104333 ⁿ			225057 ⁿ			327653 ⁿ
X			10.9318 ⁿ			223699 ⁿ			322950 ⁿ
$X-3$			+7987			-1358 ⁿ			-4703 ⁿ

C	+13	42	57.6	+18	47	01.1	+11	52	19.6
L			57.6			47			18.7
E			56.7			47			18.3
Mean	13	42	57.3	18	47	0.7	11	52	18.9 ⁿ
Pre		+5	87.8 ⁿ		+5	1.8 ⁿ		+9	59.2
S	13	48	02.1 ⁿ	18	52	2.2	11	57	18.1 ⁿ
D	13	31	46	13	31	46	13	31	46
$S-D$	+1	16	16.1 ⁿ	+1	20	16.2	-1	34	27.9
$\tan u$			+976.1 ⁿ			+9817.0 ⁿ			-5669.3
$\log u$			2.98979 ⁿ			3.68278			3.75333
$\log s$			0.32064 ⁿ			1.01393			1.08468 ⁿ
$\log t$			93903 ⁿ			94240			93258 ⁿ
γ_0			21281 ⁿ			94314			20635
γ_1			85698 ⁿ			59088			87427
γ_2			+209.27 ⁿ			+10.3259			+12.1529
γ_3			+0.0371			+0.0001			+0.0277
γ_4			201298			283260			58748
γ_5			199285 ⁿ			278191 ⁿ			65165 ⁿ
(γ_6)			-2013			-5069			+6717

11549

Standard Coordinates

4

Cape No 177-Mg 7.9

Cape No 192-Mg 8.9

Cape No 203-Mg 8.

C	1	12	19.86	1	18	91.20	1	29	7.25
I			19.99			91.20			7.27
E			19.86			91.21			7.23
Mean	1	12	19.88	1	18	91.20	1	29	7.25
Pre			50.79			51.07			+50.79
X	1	13	05.67	1	19	32.27	1	29	58.09
A	1	19	16	1	19	16	1	19	16
X-A		-6	10.33			+16.27			+5.92.09
sin(X-A)			-370.29			+16.27			+392.00
log "			2.56859			1.24139			2.53903
" cos			9987.28			9985.21			9990.98
" sin			2.06306			9.70389			1.03175
Z	-		11.5627			+0.5056			+10.7585
Z'			-90			+01			+68
Z			10.9333			22.5057			32.7653
X			10.9318			22.3699			32.2950
X-Z			+7987			-1358			-9703

C	+13	92	57.6	+19	97	01.1	+11	52	19.6
I			57.6			97			18.7
E			56.7			97			18.3
Mean	13	92	57.3	19	97	0.9	11	52	18.9
Pre		+5	08.8		+5	1.8		+9	59.2
S	13	98	02.1	19	52	2.2	11	57	18.1
D	13	31	96	13	31	96	13	31	96
S-D	+1	16	16.1	+1	20	16.2	-1	39	27.9
tan "			+976.1			+9817.0			-5669.3
log "			2.98979			3.68278			3.70333
" cos			0.32064			1.01393			1.08968
logland			9.3903			9.9290			9.3258
Z			2.1281			9.9319			2.0635
"			8.5698			5.9088			8.9927
"									
"	+2	09	27	+10	32	59	-12	15	29
"	+0	03	71	+0	00	01	+0	02	77
"	20	12	98	28	32	60	5	87	98
"	19	92	85	27	81	91	6	51	65
(y-h)	-20	13		-50	69		+6	91	7

11579

Plate Center and Constants

x	y	x	y	x	y	x	y
10.9318	19.9285	1	13	05.7	13.98	02.1	
223699	27.8191	1	19	32.3	19.52	2.2	
32,2950	6.5165	1	27	58.0	11.57	18.1	
3 65.5967	57.2671	13	56	96.0	38.15	22.9	
21.8655	18.088	1	19	12.0	13.32	27.5	
22	18			+7.2		-71.1	
+0.135	-1.088	1	19	16.2	13.31	76.7	
315	966.5						
+7.2							

Center { A 1 19 16
D 13 31 46

$$\begin{aligned}
 x-3 & +500x & +77.97 & +11.27 & -12007 \\
 +9987 & +5966 = +10453 & +1592 = 11995 & +13 = +12008 & +1 \\
 -1358 & +11185 = -9827 & +2153 = 11980 & +27 = 12007 & 0 \\
 -76.83 & +16177 = 11767 & +3509 = 11968 & +39 = 12007 & 0 \\
 29.0695 & +12035 = & +12867 & +297 & 29,2038
 \end{aligned}$$

$$\begin{aligned}
 y-4 & -500y & -79.37 & +2.27 & -7128 \\
 -2013 & +9969 = +7956 & -867 = +7089 & +87 = +7128 & 0 \\
 -5069 & +13910 = +8841 & -1778 = 7063 & +61 = 7128 & 0 \\
 +6417 & +3258 = +9675 & -2567 = 7119 & +17 = 7128 & 0 \\
 16.6176 & +8307 = & -1909 & +377 & 16.5453
 \end{aligned}$$

Tables a = +1.6 e = -1.9 a-e = +1.5 b+d = +1.2
 Obs - +501.2 = -502.2 = +1.0 = +1.9
 10-e -501.8 -501.3 +0.7

11599

Plate center and Constants

k	y	z	d
10.9318	19.9285	1 13 05.7	13 98 02.1
223699	27.8191	1 19 32.3	19 52 2.2
32,2950	6.5165	1 29 58.0	11 57 18.1
3 65,5967	579.2691	13 56 96.0	38 157 22.9
21.8655	18.088	1 19 12.0	13 32 27.5
22	18	+9.2	-81.1
+0.135	- .088	1 19 16.2	13 31 96.9
315	966.5		
+4.2			

center { A 1 19 16
D 13 31 96

$$\begin{array}{rclclcl}
 x-3 & +500x & & +77.94 & & +1.24 & -12007 \\
 +9987 & +5966 & = +10953 & +1592 & = 11995 & +13 & = 12008 & +1 \\
 -1358 & +11185 & = 9827 & +2153 & = 11980 & +27 & = 12007 & 0 \\
 -9683 & +16177 & = 11769 & +509 & = 11968 & +39 & = 12007 & 0 \\
 28,0695 & +12035 & & +1286 & & +297 & 28,2097
 \end{array}$$

$$\begin{array}{rclclcl}
 y-4 & -5204 & & -77.3x & & +2.24 & -7128 \\
 -2013 & +9969 & = +7956 & -868 & = +7088 & +77 & = +7128 & 0 \\
 -5069 & +13910 & = +8841 & -1778 & = 7063 & +61 & = 7128 & 0 \\
 +6917 & +3238 & = +9675 & -2569 & = 7119 & +17 & = 7128 & 0 \\
 16,6176 & +83075 & & -1909 & & +38 & 16,5953
 \end{array}$$

Tables a = +.6 e = -.7 a-e = +1.3 b+d = +1.2
Obs = +504.2 = -502.2 = +1.0 = +1.9

$A = -1$ $B = 8$

115-99

Moon's Center

6

	y	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$O - C$
1	24.0700	0.0000	+2	0.0000	3.7877	+86
2	23.0000	-1.0700	+2	3.1445	3.7806	+15
3	22.2259	-1.8441	+1	3.4003	3.7773	-18
4	22.1263	-1.9437	0	3.7779	3.7779	-12
5	22.1647	-1.9053	-0	3.6301	2.7791	0
6	22.7028	-1.3672	-1	1.8695	3.7908	+117
7	23.0000	-1.0700	-2	1.1453	3.7827	+36
8	23.6643	-0.4007	-2	0.1607	3.7882	+91

 $R^2 = 3.7791$

	y	$y - y_0$	Δy	$(y - y_0)^2$	Δ	
1	-1.96680	-1.9460	-2	3.7877	180	
2	1.99909	-1.6236	-1	2.6361	197	213
3	1.60000	-0.6140	-0	0.3770	108	251
4	1.66140	0.0000	0	0.0000	90	270
5	1.70000	+0.3860	+0	0.1490	79	281
6	1.80000	+1.3860	+1	1.9213	95	315
7	1.82379	+1.6239	+1	2.6374	33	326
8	1.85184	+1.9084	+2	3.6275	12	348 168'

Approx. Center

 $x = 23$ $y = 17.9904$

18.2379

33.2283

 $y_0 = 16.6141$ $y_{\text{mean}} = 17.6680$ $R = 1.9461$

1.9470

 $x_{\text{mean}} = 22.1263$ $y_0 = 24.0724$

Center

 $y_0 = 16.6140$ $x_0 = 24.0700$

115-99

Morris Center

6

y	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$O - C$
1 29.0700	0.0000	+2	0.0000	3.7877	+86
2 23.0000	-1.0700	+2	3.1995	3.7806	+15
3 22.2259	-1.8941	+1	3.9003	3.7773	-18
4 22.1263	-1.9437	0	3.7779	3.7779	-12
5 22.1697	-1.9053	-0	3.6301	2.7791	0
6 22.7028	-1.3672	-1	1.8695	3.7908	+117
7 23.0000	-1.0700	-2	1.1953	3.7827	+36
8 22.6693	-0.4007	-2	0.1607	3.7882	+91

 $R = 3.7791$

y	$y - y_0$	Δy	$(y - y_0)^2$	Σ
1 -19.6680	-1.9460	-2	3.7877	180
2 19.9909	-1.6236	-1	2.6361	197
3 16.0000	-0.6190	-0	0.3770	108
4 16.6190	0.0000	0	0.0000	90
5 17.0000	+0.3860	+0	0.1490	79
6 18.0000	+1.3860	+1	1.9213	95
7 18.2379	+1.6239	+1	2.6374	33
8 18.5189	+1.9099	+2	3.6275	12

168°

Approx: Center

 $x = 23$

y	19.9909
	18.2379
	33.2283
y_0	16.6191
y_{\min}	19.6680
R	1.9461
Δ_{\min}	22.1263
y_0	29.0722

1.9790

Center

y_0	16.6190
x_0	29.0700

Formation of Normals.

1	0.0	-	0.0	-	168.0
2	+ 173	-	16.0	-	29.0
3	+ 112	+	33.0	+	11.0
4	0.0	+	23.0		0.0
5	- 0.74		0		0
6	- 190	-	160.5	+	16.25
7	- 173	-	38.5	+	58.5
8	- 076	-	36.7	+	173.0
	+ 2.85	+	56.0	+	905.0
	- 5.13	-	251.4	-	192.0
	- 2.28	-	195.4	+	213.0

	a	b	c	new a-c
a	- 30	+ 6	0 - 57	+ 57 ✓
b	- 0	+ 32	- 22	+ 3
c	- 57	+ 53	+ 1	- 27
		+ 58	+ 4	- 27
		+ 57	+ 3	- 21
		+ 51	- 3	+ 83
		+ 32	- 22	- 16
		+ 12	- 42	+ 13 - 14 ✓

- .133

$$-2.28 + 15.13 = +1.12 \Delta$$

$$+ [] - 0.30 = -1.28 \Delta$$

$$+14.83 = -0.16 \Delta$$

11599

Conditional Equations

7

1	0.00	-19.5	=	+	86		0	-	25	=	-25	+	111
2	-1.07	-1.62	=	+	15		+10	-	20	=	-10	+	25
3	-1.89	-0.61	=	-	18		+18	-	8	=	+10	-	28
4	-1.99	0.00	=	-	12		+19		0	=	+19	-	31
5	-1.91	+0.39	=		0		+19	+	5	=	+24	-	24
6	-1.37	+1.39	=	+	117		+13	+	48	=	+31	+	86
7	-1.07	+1.62	=	+	36		+10	+	20	=	+30	+	6
8	-0.90	+1.90	=	+	91		+39	+	24	=	+63	+	28

$$+256 = 83$$

Average 72

$$17.12 - 2.28 = -195.7 \quad -9.60 \Delta$$

$$-2.28 + 15.13 = +213.0 \quad +1.12 \Delta$$

$$+1 \quad - \quad 0.30 = -26.0$$

$$-0.01 \Delta$$

$$+14.83 = +187.0$$

$$b = +12.6$$

$$17.12 - 28.7 = -195.7$$

$$a = -9.7$$

$$-0.56 \Delta$$

Arc Measured 168°

$$\frac{P}{h} = .24$$

$$\frac{\sum V}{h} = +21.6$$

$$I \quad 6 \quad R = 1.99$$

$$\frac{+21.6}{24} = +9.0$$

$$\Delta R = +1.1$$

$$-2RC = -2.72$$

$$\text{Error} +0.7$$

$$\Delta R = +0.7$$

$$\Delta b = +0.02$$

$$\Delta s = 0.0$$

$$\Delta a = +1.52$$

$$\Delta \gamma = +0.05$$

11599

Conditional Equations

7

$$\begin{array}{rcl}
 1 & 0.00 - 1.95 & = + 86 \\
 2 & -1.07 - 1.62 & = + 12 \\
 3 & -1.89 - 0.61 & = - 18 \\
 4 & -1.99 - 0.00 & = - 12 \\
 5 & -1.91 + 0.39 & = 0 \\
 6 & -1.37 + 1.39 & = + 117 \\
 7 & -1.07 + 1.62 & = + 36 \\
 8 & -0.90 + 1.90 & = + 91
 \end{array}$$

$$\begin{array}{rcl}
 0 & - 25 & = -25 + 111 \\
 + 10 & - 20 & = -10 + 25 \\
 + 18 & - 8 & = +10 - 28 \\
 + 19 & 0 & = +19 - 31 \\
 + 19 & + 5 & = +24 - 29 \\
 + 13 & + 18 & = +31 + 86 \\
 + 10 & + 20 & = +30 + 6 \\
 + 39 & + 24 & = +63 + 28
 \end{array}$$

$$+256 = 83$$

Average 72

$$17.12 - 2.28 = -195.7$$

$$-2.28 + 15.13 = +213.0$$

$$+15.13 - 0.30 = -26.0$$

$$+19.83 = +187.0$$

$$17.12 - 28.7 = -195.9$$

$$b = +12.6$$

$$a = -9.7$$

Are Measured 168°

$$\frac{p}{h} = 2.4$$

$$\frac{\sum v}{h} = +21.6$$

$$\frac{+21.6}{24} = +0.9$$

$$\Delta R = +11$$

11579

Miron's Mean Position.

8

 X_0 27.0700^v-5^v27.0695^v Y_0 16.6170^v+6^v16.6186^vFrom Plate Constants $X = 27.2038^v$ $Y = 16.5453^v$ $Z = +2.2038^v$ $h = -1.7549^v$ Log γ 0.39317^vLog δ 9.98812^v8.50727^v1.84781^vLog $\tan \delta$ 9.3778⁵⁰^v Z^v 0.6863^v7.0537^v7.1145⁺^v $\alpha - A$ $h_1 + 0.0013^v$ $\alpha - A$ +70.99^vLog h_0 0.16318^v7.33115^v A 1 19 16^v283204^v -6792 α_0 1 20 26.74^v $\delta - D$ -11 19.2^v

Red

+9.75^v $D + 13$ 31 - 46^v α' 1 20 31.19^v δ_0 13 20 26.8^v

Red

+30.3^v δ' 13 20 57.1^v

11579 Miron's Mean Position 5

X_0 29.0700" Y_0 16.6190"
 $-5"$ $+6"$
 29.0695" 16.6196"

From Plate Constants $X = 29.2038"$ $Y = 16.5773"$
 $Z + 2.2038"$ $h = 1.7599"$

$\log Z$ 0.39317"
 $\cos \delta$ 99.8812"
 8.50729"
 1.89781"

$\log \tan \delta$ 9.3798"
 Z 0.6863
 7.0539"
 7.1195+ "

$X-A$ $h_1 + 0.0013"$

$X-A$ +70.99"

$\log h_0$ 0.11218"
 7.33115"

A 1 19 16"

283204 $h = 6793$

X_0 1 20 26.74"

$\delta-D$ -11 19.2"

Red +9.75"

$D+13$ 31-96"

X' 1 20 31.19"

δ_0 13 20 26.8"

Red +30.3"

δ' 13 20 57.0"

$$\begin{array}{r}
 1 \quad 9 \quad 25.13 \\
 \underline{20.96} \\
 + 7.67 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 + 70 \quad 07 \quad 82.99 \\
 \underline{53.28} \\
 + 29.71
 \end{array}$$

$$\begin{array}{r}
 1 \quad 19 \quad 35.63 \\
 \underline{50.73} \\
 + 7.90 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 + 26 \quad 79 \quad 57.07 \\
 \underline{22.39} \\
 + 31.68
 \end{array}$$

$$\begin{array}{r}
 1 \quad 26 \quad 63.93 \\
 \underline{59.13} \\
 + 7.80 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 + 19 \quad 57 \quad 77.68 \\
 \underline{77.75} \\
 + 30.23
 \end{array}$$



11579

Reduction to Apparent Place

9

$$H + \alpha \quad 4 \quad 09.1 = 62 \quad 16.5$$

$$H \quad 2 \quad 98.7$$

$$\alpha \quad 1 \quad 20.4$$

$$G \quad 23 \quad 22.6$$

$$G + \alpha \quad 0 \quad 43.0 \quad 13 \quad 45.0$$

$$\delta + 13 \quad 20 \quad 27$$

$$\log \cos \quad 9.9881$$

$$L + 0.7576$$

$$L \quad 0.7457$$

$$\log \cos (G + \alpha) \quad 9.9923$$

$$\log \quad 1.3627$$

$$\sin (G + \alpha) \quad 9.2707$$

$$\tan \quad 9.3750$$

$$8.8239$$

$$\log \sin \delta \quad 9.3631$$

$$H \cos (H + \alpha) \quad 9.6676$$

$$H \quad 1.2934$$

$$\sin \quad 9.9470$$

$$\sec \delta \quad 0.0119$$

$$8.8239$$

$$\log q \quad 1.3547$$

$$q \quad 8.8320$$

$$L' \quad 0.3271$$

$$L \quad 0.0762$$

$$f + 3.495$$

$$g + 0.068$$

$$h + 1.192$$

$$+ 4.755$$

$$g + 2.263$$

$$h' + 2.109$$

$$i' + 5.568$$

$$+ 30.307$$

11579

Reduction to Apparent Place

9

$$H + \lambda \quad 2 \quad 09.4 = 62 \quad 16.5$$

$$H \quad 2 \quad 98.7$$

$$\lambda \quad 1 \quad 20.9$$

$$C \quad 23 \quad 22.6$$

$$C + \lambda \quad 0 \quad 93.0 = 10 \quad 25.07$$

$$\delta + 1.3 \quad 20 \quad 27,$$

$$\log \cos \delta \quad 99881$$

$$+ 0.7502$$

$$+ 0.7453$$

$$\log \cos (C + \lambda) \quad 99923$$

$$+ 13622$$

$$\sin (C + \lambda) \quad 9.2707$$

$$\tan \delta \quad 9.3750$$

$$8.8239$$

$$\log \sin \delta \quad 9.3631$$

$$\log (H + \lambda) \quad 9.6676$$

$$+ 12938$$

$$\sin \delta \quad 9.9979$$

$$\cos \delta \quad 0.0117$$

$$8.8239$$

$$\log 9 \quad 1.9587$$

$$+ 88320$$

$$A' \quad 0.8271$$

$$+ 0.0762$$

$$f \quad 13.895$$

$$+ 0.068$$

$$+ 1.192$$

$$+ 9.755$$

$$g \quad 22.63$$

$$+ 2.109$$

$$+ 5.568$$

$$+ 30.307$$

11599

Sunar Parallax.

10

α 1 20 31.19^v
 δ 23 57 17.65^v
 $\delta - \alpha$ -1 26 16.58^v
 $\gamma - \alpha$ -21 37 8.10^v
 $\frac{1}{2}(\alpha + \gamma)$ - 8 2.40^v
 $\frac{1}{2}$ 21 26 5.7^v

π 57 29.82^v
 9.86913
 8.22272^v
 9.56590^v
 0.01276^v
 7.67001^v

9.95727
 0.00000
 0.03112^v
 9.98839^v

$\delta - \alpha$ -16 08.80^v
 $=$ -1 9.32^v

γ 48 17 2.9^v

δ 13 20 57.1

$\delta - \alpha$ 30 53 05.3^v

9.82690
 8.22272^v
 9.71038^v
 0.15639^v
 7.91589^v

$\delta - \alpha$ +28 19.5^v

δ 13 49 16.6^v

Eph. +13 49 13.0^v

O-C +3.6^v

Cur. Corr +1.2

2nd Circle Ref. 0.0

Err Corr 0.0

δ +13 49 16.6

O-C +3.6

α 1 19 26.87^v

Eph. α 1 19 26.15^v

O-C +0.72^v

-0.07

+0.05^v

α 1 19 26.92

+0.77

Good.

11599

Lunar Parallax.

10

$$\begin{array}{rcll}
 \lambda' & 1 & 20 & 31.19'' \\
 + & 23 & 59 & 19.65'' \\
 \delta - \lambda' - 1 & 26 & 16.59'' \\
 = -21 & 39 & 8.10'' \\
 \frac{1}{2}(\lambda') & -8 & 2.90'' \\
 2 & 21 & 26 & 5.7''
 \end{array}$$

$$\begin{array}{rcll}
 \pi & 57 & 29.82'' \\
 9.86913 \\
 8.22272'' \\
 9.56590'' \\
 0.01276'' \\
 \hline
 7.67001''
 \end{array}$$

$$\begin{array}{rcll}
 9.95727 \\
 0.00000 \\
 0.03112'' \\
 \hline
 9.98839''
 \end{array}$$

$$\begin{array}{rcll}
 \lambda - \lambda' & -16 & 09.80'' \\
 = & -1 & 9.32''
 \end{array}$$

$$\lambda \quad 99 \quad 19 \quad 2.9''$$

$$\delta \quad 13 \quad 20 \quad 57.0''$$

$$\delta - \lambda \quad 30 \quad 53 \quad 05.3''$$

$$\begin{array}{rcll}
 9.82690 \\
 8.22272'' \\
 9.71038'' \\
 0.15639'' \\
 \hline
 7.91589''
 \end{array}$$

$$\delta - \lambda' \quad 28 \quad 19.5''$$

$$\delta \quad 13 \quad 99 \quad 16.5''$$

$$\lambda \quad 1 \quad 19 \quad 26.83''$$

$$\lambda \quad 1 \quad 19 \quad 26.15''$$

$$\text{Eph } \lambda + 13 \quad 99 \quad 13.0''$$

$$\text{Eph } \lambda \quad 1 \quad 19 \quad 26.15''$$

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

$$O-C \quad +0.72''$$

$$\text{Quadr. Corr} \quad +4.2''$$

$$-0.07''$$

$$2^{\text{nd}} \text{ Order Ref.} \quad 0.0''$$

Good

11550

Star Measures.

21

	d	2	d	4	2
1	19762	20944	18316		
11	72	10430	16789	14340	
20.2	64	32	91	92	
	62	38		12836	
	<u>10.9994</u>	<u>10.9988</u>	<u>20.1526</u>	<u>20.1505</u>	

2	19020	18900	20648	19538
22.4	14250	13668	10802	19336
27.9	54	62	10	9390
	06	878	30	18
	<u>22.4761</u>	<u>22.4769</u>	<u>27.9824</u>	<u>27.9800</u>

3	19572	19678	19851	20258
32.2	18666	12578	13548	16538
6.6	62	74	48	40
	50	68	30	80
	<u>32.2914</u>	<u>32.2906</u>	<u>6.6290</u>	<u>6.6284</u>

Moon Measures.

1	18630	19952
25.2	16406	12152
15.2	396	64
	30	82
	<u>15.2229</u>	<u>15.2213</u>

2	18650	19936
24.8	16672	11902
15.1	76	892
4	42	26
	<u>15.1974</u>	<u>15.1970</u>

3	16670	19898
24	13438	13138
15.3	42	22
	74	89
	<u>15.3230</u>	<u>15.3238</u>

Pair Plate.

11550

↑

Star Measures.

↑

21

	d	~	d	~
1	19762	20494	18316	
11	72	10930	16789	19340
20.2	64	32	91	92
	62	38		12836
	<u>10.9994</u>	<u>10.9988</u>	<u>20.1526</u>	<u>20.1505</u>

2	19020	18900	20648	19538
22.4	19250	13668	10802	19336
27.9	54	62	10	9390
	06	878	30	18
	<u>22.9761</u>	<u>22.9769</u>	<u>27.9824</u>	<u>27.9800</u>

3	19572	19678	19851	20258
32.2	16666	12578	13598	16508
6.6	62	79	48	90
	50	68	30	80
	<u>32.2919</u>	<u>32.2906</u>	<u>6.6290</u>	<u>6.6284</u>

Moon Measures.

1	18630	19952
25.2	16906	12152
15.2	396	69
	30	92
	<u>15.2229</u>	<u>15.2213</u>
2	18650	19930
29.8	16672	11902
15.1	76	892
-7	92	26
	<u>15.1979</u>	<u>15.1970</u>
3	16670	19898
24	18438	13138
15.3	92	22
	79	89
	<u>15.3230</u>	<u>15.3238</u>

phase limit?

11550

Moon Measures

12

	d	3		d	3
9	20	720		13	220
23.2	19	598			22
16		96		12	099
		02			
	23.1	121		23.1	122

5	2.8	10008	19309	
17.1	125	23	16898	
-X		21	792	
		9982	18	
	22.7	474	22.7	466
6	200	28	203	22
22.9	105	57	197	66
18		51		62
		24		82
	22.9	470	22.9	474

7	18158	19230	
24	9552	18836	
18.9	24	26	
	48	08	
	18.9	630	
		18.9	600

8	19748	20677	
24.1	18638	11730	
19	70	28	
	39	61	
	24.1	075	
		24.1	067

11550

Moon Measures

12

	d	r	d	r
9	20720		13220	
23.2	19590		22	
16	96		12099	
	02			
	<u>23.1121</u>		<u>23.1122</u>	

5			
22.8	20008	19309	
17.1	12523	16898	
-X	21	792	
	9992	18	
	<u>22.7979</u>	<u>22.7966</u>	
6	20028	20322	
22.9	10557	19766	
18	51	62	
	29	82	
	<u>22.9470</u>	<u>22.9449</u>	

7		18158	19230
29		9552	18836
18.9		29	26
		48	08
		<u>18.9630</u>	<u>18.9680</u>

8	19798	20677
24.1	18678	11730
19	70	28
	29	61
	<u>24.1075</u>	<u>24.1067</u>

11550 *Lunina* Etc.

13

Nov. 7

Exp. to Stars	0	13		0	25
to Moon	0	18	52.8	0	18 53.1
Clock Fast		11	08.5		

H. Sid Time	0	07	87.95	$\phi - \alpha = -14$	12 ^m
H. Long	4	44	31.05		
G. Sid T.	4	52	15.50		
Sid T. M.M.	15	5	29.96		
External	13	46	50.54		
Reduction		2	15.96		
G. M. T.	13	44	35.08		

From Naut Alman.		R.A.		Dec.	
Moon 13 ^h	1	18	19.89	+13	42 42.7
Motion in 1 ^m			2.1366		12.531
" 49.5897	1		34.99	9	18.7
Tabular Place	1	19	54.83	13	52 01.4

Moon's age 12 days

Parallax	57	24.59
Semid.	15	40.1
R		970.1
Aug		13.7
Sr (4)		-0.6
R		952.9
R		20727
AR		-978
(1+9)/R		19449
R		37826

934 13:20

$a = -503$
 $+ 27$
 $- 479$

11550

Jupiter Etc.

13

Nov. 7

Exp. to Stars	0	13		0	25
" " Moon	0	18	52.8	0	18 53.1
Clock Fast		11	08.5		

H. Sid Time	0	07	99.95
H. Long	9	99	31.05
g. Sid T.	9	52	15.30
Sid J. M.H.	15	5	29.96
Internal	13	96	50.59
Reduction		2	15.96
g. M. J.	13	94	35.08

From Mount Allen.		R.A.		Dec.
Moon	13 ^h	1	18 19.89	+13 42 92.7
Motion in ^{hr}			2.1306	12.531
" " 99.5897		1	3999	9 18.7
Tabular Place	1	19	59.83	13 52 01.4

Moon's age 12 days

Parallax 57 29.59

Semi-d. 15 90.1

R. 990.1

Ang 13.9

Lr (9) -0.6

R 95.29

R 2.0927

ak -978

(1+4)R 1.9449

R 3.7826

939 13.20

a = -503

+ 29

- 979

11550

Plato Constants

17

X	10.9991	22.9765	32.2910
Y	10.9333	22.5057	32.7653
X-Y	+5.658	-292	-4743

ay	20.1515	27.9812	6.6287
y	20.1298	28.3260	5.8798
y-h	+217	-3448	+7539

$$\begin{aligned}
 X-Y &+ 500X & +22.84 & +3X & -11650 \\
 +5.658 + 5.580 & = +11.238 + 959 & = +11617 + 33 & = +11650 \\
 -292 + 11238 & = 10946 + 638 & = 11584 + 67 & = 51 + 1 \\
 -9793 + 16195 & = 11402 + 151 & = 11553 + 97 & = 50 \\
 24.6898 + 12395 & & +391 & +79 & 248058
 \end{aligned}$$

$$\begin{aligned}
 y-h &+ 500y & -27.1X & +3.54 & -10098 \\
 +217 + 10076 & = +10293 - 265 & = +10028 + 70 & = +10098 \\
 -3948 + 13991 & = 10593 - 592 & = + 01 + 98 & = 99 + 1 \\
 +7539 + 3319 & = 10853 - 778 & = + 75 + 23 & = 98 \\
 17.1822 + 8571 & & -595 & +60 & 16.9360
 \end{aligned}$$

$$\begin{aligned}
 \text{Tables } a &= +1.6 & e &= -.6 & a-e &= +1.2 & 1+d &= +.5 \\
 \text{Obs } & & & & & & & \\
 & & -503.0 & -503.5 & = +0.5 & & & +1.3 \\
 b-c & & -503.6 & -502.9 & & & & +0.8
 \end{aligned}$$

11550

Plate constants

19

x	10.9991	22.9765	32.2910
y	10.9333	22.5057	32.7653
$x-y$	+5.658	-292	-9.793

η	20.1515	27.9812	6.6287
η	20.1298	28.3260	5.8798
$\eta-h$	+217	-3448	+7539

$x-y$	+500h	+22.84	+3h	-1165
+5.658	+5.500	= +11158	+959	= +11617
-292	+11238	= 10946	+638	= 11584
-9.793	+16195	= 11902	+151	= 11553
29.6898	+12395	+391	+79	29.8058

$\eta-h$	+500y	-29.1x	+3.5y	-1009
+217	+10076	= +10293	-265	= +10028
-3448	+13991	= 10593	-592	= + 01
+7539	+3319	= 10853	-778	= + 75
17.1922	+8571	-595	+60	16.9360

Tables $a = +.6$ $e = -.6$ $a-e = +1.2$ $b+d = +.5$
 Obs $= -503.0$ $= -503.5$ $= +0.5$ $= +1.$

A -1.5
B +.8

Morris + Butler

15

x	$(x-x_0)$	Δx	$(x-x_0)^2$	$(x-x_0)(y-y_0)$	$y-y_0$
1 25 00 00	+0.3080	+1	0.0950	3.7818	-8
2 24 69 20	0.0000	+1	0.0000	3.7830	+4
3 24 00 00	-0.6920	+1	0.4788	3.7865	+39
4 23 11 21	-1.3799	+1	2.4958	3.7992	+266
5 22 79 70	-1.9450	0	3.7830	3.7830	+4
6 22 99 57	-1.7463	-0	3.0495	3.7859	+33
7 24 00 00	-0.6920	-1	0.4790	3.7900	+74
8 24 10 71	-0.5849	-1	0.3422	3.7948	+122

 $R = 3.7826$

y	$(y-y_0)$	Δy	$(y-y_0)^2$	Σ
1 15 22 21	-1.9199	-2	3.6868	1.79 ^v 1.71
2 15 19 72	-1.9448	-2	3.7830	1.80
3 15 32 39	-1.8186	-1	3.3077	2.01
4 16 00 00	-1.1420	-1	1.3049	2.39
5 17 14 20	0.0000	0	0.0000	2.70
6 18 00 00	+0.8580	+1	0.7364	2.96
7 18 96 15	+1.8195	+1	3.3110	3.39 ^v
8 19 00 00	+1.8580	+1	3.4526	3.43 1.64 ^o

Approx Center

 $x = 24$ y

15.3239

18.9615

34.2849

 $y_0 = 17.1828$ $y_{min} = 15.1972$ $R = 1.9452$

1.9489

 $y_{min} = 22.7970$

24.6922

Center $\begin{cases} x_0 & 24.6920 \\ y_0 & 17.1820 \end{cases}$

Moon's Center

13

11550	X	$(X-X_0)$	ΔX	$(X-X_0)^2$	$(X-X_0)(Y-Y_0)$	$Y-C$
1	250000	+0.3080	+1	0.0950	3.7818	-8
2	296920	00.0000	+1	0.0000	3.7830	+9
3	290000	-0.6920	+1	0.4788	3.7865	+39
4	231121	-1.5779	+1	2.4958	3.7992	+166
5	227970	-1.9950	0	3.7830	3.7830	+9
6	229957	-1.7963	-0	3.0995	3.7859	+33
7	290000	-0.6920	-1	0.4790	3.7900	+79
8	291071	-0.5899	-1	0.3422	3.7993	+122

$$R = 3.7826$$

Y	$(Y-Y_0)$	ΔY	$(Y-Y_0)^2$	C
1 15.2221	-1.9199	-2	3.6868	1.79
2 15.1972	-1.9448	-2	3.7830	1.80
3 15.3239	-1.8186	-1	3.3077	2.01
7 16.0000	-1.1420	-1	1.3049	2.39
5 17.1920	0.0000	0	0.0000	2.70
6 18.0000	+0.8580	+1	0.7364	2.96
7 18.9615	+1.8195	+1	3.3110	3.39
8 19.0000	+1.8580	+1	3.4526	3.73
				169.0

$$1.69^0$$

Approx. Center

$$X = 29$$

$$Y = 15.3239$$

$$18.9615$$

$$39.2899$$

$$Y_0 = 17.1929$$

$$Y_{min} = 15.1972$$

$$R = 1.7952$$

$$1.7999$$

$$Y_{min} = 22.7970$$

$$29.6922$$

$$\text{Center} \begin{cases} X_0 = 29.6920 \\ Y_0 = 17.1920 \end{cases}$$

Formation of Normals

1	-0.59	-	2.5	+	15.5
2	0	-	0	-	7.5
3	+12.6	-	27.0	-	71.0
4	+18.0	-	28.20	-	189.5
5	0	-	7.5	+	0
6	-13.0	-	58.0	+	28.5
7	-12.6	-	51.0	+	135.0
8	-1.08	-	71.0	+	227.0
	+3.06	-	479.0	+	406.0
	-44.3			-	268.0
	-1.37			+	138.0

	a	b	c	new b-c
a	-10	-3	+4	-15
b	-2	+0	+4	-12
c	-16	+7	+4	-5
		+16	+2	+2
		+19	0	+3
		+17	-2	-1
		+7	-4	-13
		+6	-4	-14
		+		

new
b-c
-1 ✓
0
+1
+103
-79
-48
+27
+74 ✓

127

$$-1.37 + 19.38 = -2.28 \Delta$$

$$+ [] - 0.17 = -0.88 \Delta$$

$$+ 19.71 = -3.16 \Delta$$

$$+ 10.72 = -6.92 \Delta - 0.22 \Delta = -7.17 \Delta$$

11550

Conditional Equations

16

0-c

1	+ 0.31	- 1.92	= -8	- 19	- 8	= -22	+19
2	0.00	- 1.99	= +4	0	- 8	= -8	+12
3	- 0.69	- 1.82	= +39	+30	- 7	= +23	+6
4	- 1.58	- 1.19	= +166	+70	- 5	= +65	+101
5	- 1.99	0.00	= +4	+86	0	= +86	-82
6	- 1.75	+ 0.86	= +33	+77	+ 3	= +80	-77
7	- 0.69	+ 1.82	= +79	+30	+ 7	= +37	+37
8	- 0.58	+ 1.86	= +122	+27	+ 7	= +34	+88
						+ 258	- 129

$$10.72 - 1.37 = -979.0 \quad -6.92 \Delta \text{average } 98$$

$$-1.37 + 19.58 = +138.0 \quad -2.28 \Delta$$

$$+ [] - .17 = -61.2$$

$$- .16 \Delta$$

$$+ 19.51 = +76.8$$

$$b = +3.95$$

$$10.72 = -979.0 + 5.9 = -972.6$$

$$a = -99.0$$

$$- .66 \Delta$$

Arc Measured 167°

$$\frac{p}{h} = .215$$

$$\frac{\Sigma v}{h} = +16.1$$

$$\text{Err } R \quad R \quad 1.97$$

$$-2RC = -0.78$$

$$\frac{+16.1}{.215} = +79.8 \quad \Delta R = +0.9$$

$$\text{Corr} + 0.2$$

$$\Delta t = +0.12$$

$$\Delta S = +0.1$$

$$\Delta R = +9.7$$

$$\Delta a = +0.51$$

$$\Delta \varphi = +0.02$$

115°50'

Conditional Equations

16

0-c

1	+ 0.31	- 1.92	= -8	- 19	- 8	= -22	+19
2	0.00	- 1.99	= +9	0	- 8	= -8	+12
3	- 0.69	- 1.82	= +39	+30	- 7	= +23	+6
4	- 1.58	- 1.19	= +166	+70	- 5	= +65	+101
5	- 1.99	0.00	= +9	+86	0	= +86	-82
6	- 1.75	+ 0.86	= +23	+77	+ 3	= +80	-97
7	- 0.69	+ 1.82	= +79	+30	+ 7	= +37	+37
8	- 0.58	+ 1.86	= +122	+27	+ 7	= +34	+88
						+ 258	- 129

$$10.72 - 1.37 = -979.0$$

Average 98

$$+ 1.37 + 19.58 = +138.0$$

$$+ 1.37 - 1.17 = -61.2$$

$$+ 19.91 = +76.8$$

$$b = +3.9$$

$$10.72 = -979.0 + 5.9 = -972.6$$

$$a = -99.0$$

Arc Measured 169°

$$\frac{p}{h} = .215$$

$$\frac{\sum v}{h} = +16.1$$

$$\frac{+16.1}{.215} = +79.5 \Delta 11 = +0.9$$

11550

Moon's Mean Position

17

$$\begin{aligned} X_0 & 29.6920'' \\ & -22'' \\ & 29.6898'' \end{aligned}$$

$$\begin{aligned} Y_0 & 17.1920'' \\ & +2'' \\ & 17.1922'' \end{aligned}$$

From Plate Constants

$$X \ 29.8058''$$

$$Y \ 16.9360''$$

$$Z \ +2.8058''$$

$$h \ -1.0640''$$

$$\log \gamma \ 0.44806''$$

$$\log \delta \ 998803''$$

$$8.50729$$

$$1.95279''$$

$$\log \tan \delta \ 9.3770''$$

$$\gamma \ 0.8961''$$

$$7.0539$$

$$7.3265''$$

$$q-A \ +89.70''$$

$$h_1 \ +.0021''$$

$$A \ 1 \ 19 \ 16.00''$$

$$\log h_0 \ 0.02780''$$

$$7.33113''$$

$$q_0 \ 1 \ 20 \ 85.70''$$

$$2.69665'' - 797.3$$

$$Red \ +9.75''$$

$$S-D \ -8 \ 17.3$$

$$q_1 \ 1 \ 20 \ 50.95''$$

$$D+13 \ 31 \ 46''$$

$$S_0-13 \ 23 \ 26.7''$$

$$Red \ +30.3''$$

$$S' \ 13 \ 23 \ 57.0''$$

11550

Moon's Mean Position

17

γ_0 29.6920"
 -22"
 29.6898"

γ_0 17.1920"
 +2"
 17.1922"

From Plate Constants

 χ 29.8058" η 16.9360" γ +2.8058" h -1.0690" $\log \gamma$ 0.47806" $\log \eta$ 9.3770 $\log \delta$ 998803" γ 0.8961"

8.50729

7.0539

1.95279"

7.3265"

 $\chi - A$ +89.70" h_1 +.0021" A 1 19 16.00" $\log h_1$ 0.02780"

7.33113"

 γ_0 1 20 75.70"

2.69665h - 799.3

 Red +9.75" $S-D$ -8 17.3 γ_1 1 20 50.95" $D+13$ 31 46" δ_0 13 23 28.7" Red +30.3" $\delta' 13$ 23 57.0"

11550

Lunar Parallax

18

$$\delta' \quad 1 \quad 20 \quad 50.95''$$

$$\delta \quad 0 \quad 07 \quad 49.75''$$

$$\delta - \delta' - 1 \quad 13 \quad 06.00''$$

$$= -18 \quad 16 \quad 30.00''$$

$$-18 \quad 6 \quad 51.9''$$

$$-18 \quad 9 \quad 38.1''$$

$$9.95727$$

$$0.00000$$

$$0.02219''$$

$$9.97946''$$

$$\delta \quad 43 \quad 38 \quad 43.8''$$

$$\delta + 13 \quad 23 \quad 57.0''$$

$$\delta - \delta \quad 30 \quad 14 \quad 46.8''$$

$$9.82640$$

$$8.22269''$$

$$9.70218''$$

$$0.16103''$$

$$7.91239''$$

$$\delta - \delta' \quad + 28 \quad 05.5''$$

$$\delta + 13 \quad 52 \quad 02.5''$$

$$\text{Eph} \delta + 13 \quad 52 \quad 01.9''$$

$$\text{O-C} \quad + 1.1$$

$$\text{Crown Corr} \quad + 1.2$$

$$249 \text{ Hades Ref} \quad 0.0$$

$$\text{Iron Corr} \quad + 0.1$$

$$\delta + 13 \quad 52 \quad 02.6$$

$$\delta - \epsilon \quad + 1.2$$

$$\pi \quad 57 \quad 29.5''$$

$$9.86913$$

$$8.22269''$$

$$9.79638''$$

$$0.01285''$$

$$7.60107''$$

$$\delta - \delta' - 13 \quad 93.75''$$

$$= -0 \quad 57.92$$

$$\delta \quad 1 \quad 19 \quad 55.53''$$

$$\text{Eph} \delta \quad 1 \quad 19 \quad 59.83''$$

$$\text{O-C} \quad + 0.70$$

$$-0.07$$

$$+ 0.02$$

$$\delta \quad 1 \quad 19 \quad 55.55''$$

$$+ 0.72$$

$$\text{Par}$$

11550

Lunar Parallax

15

δ' 1 20 50.95"
 δ 0 07 99.75"
 $\delta - \delta' - 1$ 13 06.00"
 $= -18$ 16 30.00"
 -18 6 54.9"
 -18 9 38.4"

9.95727
 0.00000
 0.02219
 997996"

δ 93 38 93.8"

$\delta + 13$ 23 57.0"

$\delta - \delta$ 30 19 98.8"

9.82690
 8.22269"
 9.70218"
 0.16103"
 79.1239"

$\delta - \delta'$ 28 06.25"

$\delta + 13$ 52 02.5"

Eph $\delta + 13$ 52 01.9"

O-C +7.4
 Crown Corr +1.2
 2nd Order Ref 0.0

π 57 29.59"

9.86913
 8.22269"
 9.996395
 0.01285"
 7601084"

$\delta - \delta' - 13$ 98.15"

$= -0$ 59.88

δ 1 19 55.53"

Eph δ 1 19 59.83"

O-C +0.90
 -0.07

Parr

11580		Star Measures		5	21
d		d		y	n
1	19470	20038	20388	19452	
14.9	9690	19836	19882	19901	
12.6	88	32	80	889	
	76	39	50	52	
	<u>14.9786</u>	<u>14.9796</u>	<u>12.5468</u>	<u>12.5444</u>	
2	20336	20350	20396	19362	
17.4	16620	19088	14008	15732	
21.7	26	84	10	30	
	32	52	82	58	
	<u>17.3712</u>	<u>17.3734</u>	<u>21.6378</u>	<u>21.6370</u>	
3	20373	20444	19861	20038	
29.6	13330	17472	10012	19872	
16-	30	82	06	82	
	67	50	61	28	
	<u>29.7039</u>	<u>29.7031</u>	<u>15.9852</u>	<u>15.9836</u>	

		Wilson Measures	
1	20091	20050	
23.2	17288	12786	
15-	284	800	indefinite
	98	52	
	<u>23.2807</u>	<u>23.2791</u>	
2	20619	20093	
22.3	17720	12998	
16	12	98	
	16	88	
	<u>22.2902</u>	<u>22.2910</u>	
3	19680	20061	
22.1	18258	11439	
16.6	62	34	
-X	36	62	
	<u>22.1380</u>	<u>22.1372</u>	

Four Plate

11580

Star Measures

21

	d	2	d	7	2
1	19970	20038	20388	19952	
19.9	9690	19836	19882	19901	
12.6	88	32	80	889	
	76	39	50	52	
	<u>199786</u>	<u>199796</u>	<u>125968</u>	<u>125999</u>	
2	20336	20350	20396	19362	
17.4	16620	19088	19008	15732	
21.7	26	89	10	30	
	32	52	82	58	
	<u>17.3712</u>	<u>17.3739</u>	<u>21.6378</u>	<u>21.6370</u>	
3	20373	20444	19861	20038	
29.6	13370	17972	10012	19872	
16-	30	82	06	82	
	67	50	61	28	
	<u>29.7039</u>	<u>29.7031</u>	<u>15.9852</u>	<u>15.9836</u>	

Moon Measures

1	20091	20050	
23.2	17288	12786	
13-	388	800	indefinite
	98	52	
	<u>23.2807</u>	<u>23.2791</u>	
2	20619	20093	
22.3	17720	12998	
16	12	98	
	16	88	
	<u>22.2902</u>	<u>22.2910</u>	
3	19690	20061	
22.1	18258	11939	
16.6	62	39	
-X	36	62	
	<u>22.1380</u>	<u>22.1372</u>	

Poor Plate

11580

Moon Measures

22

<u>4</u>	19692	20052
22.2	18160	11552
17	50	90
	52	50
	<u>22,1988</u>	<u>22,1496</u>

<u>5</u>	20493	20010
22.6	14570	15930
18	79	22
	92	12
	<u>22,5920</u>	<u>22,5914</u>

<u>6</u>	19780	19766
23	16498	13401
18.4	40	13
	82	50
	<u>18,3837</u>	<u>18,3652</u>

<u>7</u>	19710	18808
29.1	12822	15710
18.7	10	16
+7	10	09
	<u>18,6894</u>	<u>18,6904</u>

<u>8</u>	19690	19850
23	15292	14238
18.4	92	48
	86	90
	<u>18,4396</u>	<u>18,4400</u>

11550

Moon Measures

22

<u>4</u>	19692	20052
22.2	18160	11552
17	50	90
	52	50
	<u>22.1988</u>	<u>22.1996</u>

<u>5</u>	20993	20010
22.6	19570	10930
18	79	22
	92	12
	<u>22.5920</u>	<u>22.5914</u>

<u>6</u>	19780	19766
23	16098	13901
18.4	90	13
	82	50
	<u>18.3837</u>	<u>18.3652</u>

<u>7</u>	19710	18808
29.1	12822	15710
18.7	10	16
+7	10	07
	<u>18.6898</u>	<u>18.6909</u>

<u>8</u>	19690	19850
25	15292	19238
18.4	92	98
	86	90
	<u>18.7396</u>	<u>18.7400</u>

11580

Times Etc

20

Nov. 8

Epp. to Stars	3	44	3	56	
" " Moon	3	50	07.9	3	50 08.1
Clock fast		11	10.7		
H. Sid Time	3	38	57.3	$\delta - \alpha = +1^h$ 19.5	
H. Long	4	44	31.05		
G. Sid T.	8	23	28.35		
Sid T. M.H.	15	9	21.51		
Antenal	17	14	06.84		
Reduction		2	49.41		
G. M. T.	17	11	17.73		

From Naut Alman.

R. A

Decl

Moon 17 ^h	2	18	59.58	+19	00	17.7
Motions in 1 ^h			2.2052			7.978
" 11.2905			29.90		1	52.7
Tabular Place	2	19	24.98	19	02	10.4

Moon's Age 13 days

Parallax 56 49.58

Semi-d 15 30.6

P. 930.6

Aug. 13.6

K₂ (5) -0.8

P. 943.4

P. 2.0223

all -967

0.744 1.9256

H. 3.7079

934 13.78

9-502.4

+ 24

- 4784

11580 Times Etc 20

Mar. 5

Epp. to Stars	3	99	3	56	"
" " Moon	3	50	07.9	3	50 08.1
Clock fast		11	10.7		
H. Sid Time	3	38	57.3	8 - 2 = +1	19.5
H. Long	9	49	31.05		
G. Sid H	8	23	28.35		
Sid T M.H.	15	9	21.51		
Interval	17	19	06.89		
Reduction		2	99.91		
G M.T	17	11	17.93		

From Naut Alman		R. a		Dec	
Moon 17"	2	18	59.58	+19	00 17.7
Motion int ^l			2.2052		7.978
" 11.2905			29.90		1 52.7
Tabular Place	2	19	29.98	19	02 10.9

Moon's Age 13 days

Parallax	56	99.59
Semi d	15	30.6
IP		930.6
Aug		13.6
K ₂ (5)		-0.8
IP		993.9
IP		2.0223
alt		-967
1174H		1.9256
IP		3.7079

939 13.78

9 - 502.9
+ 29
- 478.9

11580 Plate Center & Constants 27

X	Y	X	Y
17.9791	12.5756		
17.3723	21.6379	2	19.283
29.7035	15.9899	2	21.321
47.0758	37.6218	24	35.607
23.5379	18.8109	2	18.0.2
22	18		-77.7
-1.5379	-8.109	2	17.125
315	766.5		-6
			17.9
			386

Center } A 2 17 10
 } D +18 48 36

$$\begin{aligned}
 & \xi - X + 500X = +20.34 \quad +2.9X = -12292 \\
 & +7300 + 7789 = +11789 + 918 = +12207 + 36 = +12293 \\
 & +12795 + 8686 = 11981 + 720 = 12201 + 91 = 12292 \\
 & -3212 + 19852 = 11640 + 531 = 12171 + 71 = 12292 \\
 & 24,0616 + 12031 = +358 = 24,1021
 \end{aligned}$$

$$\begin{aligned}
 & \eta - Y + 500Y = -30.5X \quad +3Y = -8526 \\
 & +2671 + 6273 = +8944 - 457 = +8987 + 38 = +8525 \\
 & -1828 + 10819 = +8991 - 530 = +8961 + 65 = +26 \\
 & +1392 + 7992 = +9384 - 906 = +8978 + 98 = +26 \\
 & 16.7596 + 8380 = -734 = +30 = 16.6766
 \end{aligned}$$

Tables $a = +.4$ $c = 0$ $a - c = +.4$ $b + d = -.3$
 Obs -502.7 -503 $+0.6$ -2.8
 $b - c = -502.8$ -503 -2.5

11580

Plate Center x Constants

29

X	Y	x	y
19.9791	12.5956		
17.3723	21.6379	2	19 28.3
29.7035	15.9879	2	21 32.1
29.70758	37.6218	29	35 60.9
23.5379	18.8109	2	18 0.2
22	18		-97.7
-1.5379	-8.109	2	17 12.5
31.2	966.5		18 98 38.6

Center } A 2 17 10
 } D +18 98 36

$$\begin{aligned}
 5-X &+ 500X & - & + 55.34 & + 2.19X & - 1225 \\
 + 7300 & + 7789 & = & + 11789 & + 918 & = + 12207 + 36 = + 12293 \\
 + 2795 & + 8686 & = & 11981 & + 720 & = 12201 + 71 = 12292 \\
 - 3212 & + 19852 & = & 11670 & + 531 & = 12171 + 71 = 12292 \\
 29.0616 & + 12031 & & + 558 & + 58 & 29.1021
 \end{aligned}$$

$$\begin{aligned}
 Y-Y &+ 500Y & - 300X & + 3Y & - 8521 \\
 + 2671 & + 6273 & = & + 8949 & - 957 & = + 8987 + 38 = + 8520 \\
 - 1828 & + 10819 & = & + 8991 & - 530 & = + 8961 + 65 = + 26 \\
 + 1092 & + 7992 & = & + 9389 & - 906 & = + 8978 + 98 = + 26 \\
 16.7596 & + 8380 & & - 739 & + 50 & 16.6766
 \end{aligned}$$

Tables $a = +.4$ $e = 0$ $a-e = +.4$ $b+d = -.3$
 lbs $-5.02.7$ -5.03 $-+0.6$ $= -2.8$

Quinn. Carr

ξ	η	$\Delta \xi$	-2.17	$-.64$	-3
-7.75	-5.78	-16	$+16 =$	$0 +3 =$	$+3$
-7.91	$+3.81$	-5	$+10 =$	$+5 -2 =$	$+3$
$+8.02$	-2.18	$+20$	$-17 =$	$+3 +1 =$	$+4$
$M = +2.1$	-1.3	0	-4	$+1$	$= -6 = -0.02$
		$\Delta \eta$	-1.67	-137	$+2$
		-13	$+9 =$	$-8 +2 =$	-2
		$+3$	$-6 =$	$-3 +1 =$	-2
		-4	$+3 =$	$-1 -2 =$	-3
		0	$+2$	-1	$= +3 = +0.1$

Standard Coordinates										25
Cape No 331 - Mag 7.7										Cape No 335 - Mag 6.9 - Cape No 354 Mag 8.1
C	2	12	13.27	2	13	35.05	2	20	39.77	
I			13.33			35.08			39.79	
E			13.33			35.06			39.81	
Mean	2	12	13.33	2	13	35.06	2	20	39.79	
Pec.			52.97			53.25			53.38	
Y	2	13	06.30	2	19	28.31	2	21	33.17	
A	2	17	10	2	17	10	2	17	10	
d-A			-7 03.70			-2 81.69			+ 9 23.17	
Sec			-2 43.69			-1 61.69			+ 2 63.15	
deg	2	38	6 89	2	20	8 68	2	42	0 20	
cos	9	97	8 07	9	97	4 87	9	97	6 88	
yo	0	87	2 12	0	69	0 79	0	90	9 32	
zo	-7	44	9 3	-9	90	6 7	+8	02	7 7	
z'			-16			-5			+20	
z	1	45	8 91	1	70	9 28	3	00	2 47	
x	1	49	7 91	1	73	7 23	2	97	0 35	
x-z	+1	43	0 0	+2	79	5	-3	21	2	
C	+1	75	9 29	+1	91	3 97	+1	82	7 17	
I			28.9			48.0			17.9	
E			29.7			47.7			17.0	
Mean	1	75	9 29	1	91	3 97	1	82	7 17	
Pec	+9	28	5	+9	25	9 26	+9	21	8	
S	1	80	3 57	1	91	3 7	1	83	1 39	
D	1	84	8 36	1	84	8 36	1	84	8 36	
S-D	-9	43	8.8	+2	93	37.7	-1	63	56.6	
tan(S-D)	-2	67	8.6	+1	77	7.7	-1	01	6.6	
deg	3	42	7 91	3	24	7 86	3	00	7 15	
h	0	75	9 06	0	58	1 01	0	33	8 30	
tan	9	51	35	9	54	7 7	9	52	52	
zo	1	79	9 2	1	38	1 6	1	80	8 8	
h	8	31	1 1	7	97	9 4	8	38	7 2	
h ₀	-5	74	2 0	+3	81	0 7	+2	17	9 2	
h ₁	+0	02	0 5	+0	00	9 5	+0	02	4 4	
h ₂	1	22	7 85	2	18	2 02	1	58	7 52	
h ₃	1	25	7 56	2	16	3 78	1	59	8 88	
h ₄	+2	67	1	-1	82	8	+1	39	2	

11580 Standard Coordinates 25

Cape No	331-Mg 7.7	Cape No	332-Mg 6.9	Cape No	354-Mg 8.1
C	2 12 13.37	2 13 35.05	2 20 39.77		
I	13.33	35.08	39.79		
E	13.33	35.06	39.81		
Mean	2 12 13.33	2 13 35.06	2 20 39.77		
Pre	52.97	53.25	53.38		
X	2 13 06.30	2 19 28.31	2 21 33.17		
A	2 17 10	2 17 10	2 17 10		
X-A	-9 03.70	-2 41.69	+9 23.17		
sum	-293.68	-161.69	+263.15		
log	2.386897	2.208684	2.720202		
log	9.97809	9.97987	9.97688		
log	0.872124	0.690794	0.90932		
log	-7.9493	-4.9067	+8.0224		
log	-16	-5	+20		
log	19.5791	17.0928	38.9297		
log	19.9791	17.3723	29.7035		
X-3	+9.000	+2.795	-3.212		
C	+17 59 29.0	119 13 97.8	+18 27 17.9		
I	28.9	98.0	17.9		
E	29.7	97.7	17.0		
Mean	17 59 29.1	19 13 97.8	18 27 17.6		
Pre	+9 28.5	+9 20.9	+9 21.8		
D	18 03 57.6	19 18 13.7	18 31 39.4		
D	18 48 36	18 48 36	18 48 36		
D-D	-9 43.8	+27 37.7	-16 56.6		
tan(D)	-26.78.6	+17.77.7	-10.16.6		
log	3.92791	3.29786	3.00715		
log	0.75906	0.58101	0.33830		
log	9.5135	9.5444	9.5252		
log	1.7992	1.3816	1.8068		
log	8.3111	7.9794	8.3872		
log	-5.7420	+3.8107	-2.1792		
log	+0.0205	+0.0095	+0.0292		
log	1.22785	21.8202	15.8952		
log	1.25856	21.6377	15.9887		
log	+2.671	-1.828	+1.392		

A0

B+5

11580

Marius Center

26

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0) + (y - y_0)$	$\Delta - C$
1	23.2774	-0.7856	0.6172	37.292	+213	
2	22.2906	-1.7724	3.1419	37.251	+172	
3	22.1376	-1.9254	3.7072	37.072	-7	
4	22.1992	-1.9138	3.6626	37.183	+109	
5	22.5917	-1.4713	2.1697	36.926	-153	
6	23.0000	-1.0630	1.1300	36.910	-169	
7	24.0630	0.0000	0.0000	37.095	+16	
8	25.0000	+0.9370	0.8780	36.867	-212	

3,7079

	y	$y - y_0$	Δy	$(y - y_0)^2$	Δ
1	13.0000	-1.7690	-1	3.1120	209
2	16.0000	-0.7690	0	0.5837	248
3	16	0.0000	0	0.0000	270
4	17.0000	+0.2360	0	0.0557	277
5	18.0000	+1.2360	+1	1.5279	310
6	18.3692	+1.6002	+1	2.5610	323 326
7	+18.6899	+1.9259	+1	3.7095	360
8	18.8398	+1.6758	+1	2.8087	29 \checkmark 185 ⁰

x_{min} 22.1376
 $low\ R$ 1.9256
 y_{max} 18.6899

Center x 24.0630
 y 16.7640

11580

Morris Center

26

	x	$1-x_0$	Δx	$(x-x_0)^2$	$(x-x_0) + (y-y_0)$	$b-c$
1	23.2779?	-0.7856	0.6172	3.7292	+213	
2	22.2906	-1.7729	0.3191	3.7251	+172	
3	22.1376	-1.9259	0.3707	3.7072	= 7	
4	22.1992	-1.9138	0.3662	3.7183	+109	
5	22.5917	-1.4713	0.2169	3.6926	-153	
6	23.0000	-1.0630	0.1130	3.6910	-169	
7	29.0630	0.0000	0.0000	3.7095	+16	
8	25.0000	+0.9370	0.0878	3.6867	-212	

3.7079

	y	$y-y_0$	Δy	$(y-y_0)^2$	\angle
1	15.0000	-1.7690	-1	3.1120	209
2	16.0000	-0.7690	0	0.5837	297
3	16	0.0000	0	0.0000	270
4	17.0000	+0.2360	0	0.0557	277
5	18.0000	+1.2360	+1	1.5279	310
6	18.3692	+1.6002	+1	2.5610	323
7	+18.6899	+1.9259	+1	3.7095	360
8	18.9398	+1.6758	+1	2.8087	29

185°

x_{min} 22.1376
 $len \ h$ 1.9256
 y_{max} 18.6899

Center 29.0630
 y_0 16.7690

Formation of Normals.

1	+ 1.39	- 168.5	- 375.0
2	+ 1.39	- 309.0	- 130.5
3	0	+ 13.5	- 0
4	- 0.46	- 198.5	+ 25.0
5	- 1.82	+ 225.0	- 190.0
6	- 1.70	+ 179.0	- 270.0
7	0	- 0	+ 309
8	+ 1.58	- 199.5	- 356.0
	+ 4.31	+ 417.5	+ 55.9
	- 398	- 870.5	- 1321.5
	+ 0.33	- 453.0	- 1265.6

	a	b	c	New 0-c
	+ 16	- 21	- 47	- 7 ✓
a	- 20	+ 35	- 9	+ 43
b	+ 12	+ 39	+ 0	- 60
c	- 39	+ 38	+ 3	+ 72 (+74)
	+ 29	+ 15	- 5 (+5)	- 91 (-81)
	+ 21	+ 19	+ 1	- 57
	+ 0	+ 23	- 16	+ 168
	- 19	+ 20	- 38	- 19.2 ✓

0.022

$$+ 0.33 + 14.36 = + 14.69$$

$$+ [] + 0.01 = - 0.18 \Delta$$

$$+ 14.35 = + 9.35 \Delta$$

$$15.30 = - 7.99 \Delta - 0.10 = - 8.09$$

11580

Conditional Equations

27
0-C

$$\begin{array}{rclcl}
 1 & -0.79 & -1.76 & = +213 & +22 + 154 = +176 +37 \\
 2 & -1.77 & -0.76 & = +172 & +49 + 67 = +116 +56 \\
 3 & -1.93 & 0.00 & = -7 & +53 \quad 0 = +53 -60 \\
 4 & -1.94 & +0.29 & = +104 & +53 - 21 = +32 +72 \\
 5 & -1.97 & +1.29 & = -153 & +41 - 108 = -67 -86 \\
 6 & -1.06 & +1.60 & = -169 & +29 - 180 = -151 -58 \\
 7 & -0.0 & +1.93 & = +16 & +0 - 168 = -168 +184 \\
 8 & +0.99 & +1.68 & = -212 & -26 - 82 = -108 -107
 \end{array}$$

$$15130 + 0.33 = -953.0 - 7.99 \Delta \text{average } 82$$

$$+0.33 + 19.36 = -1265.6 + 9.17 \Delta$$

$$+L + 0 = -9.8$$

$$+0.30 \Delta$$

$$+19.36 = -1255.8 \quad b = -87.9$$

$$15130 = -953.0 + 28.8 = -924.2 \quad a = -27.7$$

$$-0.53 \Delta$$

Arc Measured 1850

$$\frac{p}{h} = .37$$

$$\frac{v}{h} = +5.1$$

In 3" R 1.93

$$+ \frac{5.1}{.37} = +13.8 \quad \Delta R = +0.2$$

$$-2RC = -1.93$$

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

$$\Delta b = -0.58 \quad \Delta s = -0.3 \quad \Delta R = -0.3$$

$$\Delta a = +1.02 \quad \Delta q = +0.03$$

11580

Conditional Equations

27
0-0

1	-0.79	-1.76	= + 213	+ 292	+ 159	= + 17.61	+ 37
2	-1.77	-0.76	= + 172	+ 99	+ 67	= + 1.16	+ 56
3	-1.93	0.00	= - 7	+ 53	0	= + 5.3	- 60
4	-1.94	+0.29	= + 109	+ 53	- 21	= + 3.2	+ 72
5	-1.97	+1.29	= - 153	+ 91	- 108	= - 6.7	- 86
6	-1.06	+1.60	= - 169	+ 29	- 190	= - 11.1	- 58
7	-0.0	+1.93	= + 16	+ 0	- 168	= - 16.8	+ 189
8	+0.99	+1.68	= - 212	- 26	- 82	= - 10.8	- 107

$$15.30 + 0.33 = -953.0$$

$$+ 399 - 308$$

Average 82

$$+ 0.33 + 19.36 = -1265.6$$

$$+ [] + 0 = -9.8$$

$$+ 19.36 = -1255.8$$

$$b = -87.9$$

$$15.30 = -953.0 + 28.8 = -924.2 \quad a = -27.7$$

Arc Measured 185°

$$\frac{p}{h} = .37$$

$$\frac{z.v}{h} = +5.1$$

$$\frac{+5.1}{.37} = +13.8 \quad \Delta R = +0.2$$

11580 *Mavis* Mean Position

28

$$\begin{array}{r} x_0 \quad 29.0630'' \\ \quad - 19'' \\ \hline 29.0616'' \end{array}$$

$$\begin{array}{r} y_0 \quad 16.7670'' \\ \quad - 99'' \\ \hline 16.7596'' \end{array}$$

From Plate Constants

$$x \quad 29.1021''$$

$$y \quad 16.6766''$$

$$z \quad +2.1021''$$

$$\eta \quad -1.3234''$$

$$\log \xi \quad 0.32265''$$

$$\log \tan \delta \quad 9.5279''$$

$$\cos \delta \quad 997.661''$$

$$\xi^2 \quad 0.6453''$$

$$8.50729''$$

$$7.0537''$$

$$1.83880''$$

$$7.2266''$$

$$\delta - A \quad +68.99''$$

$$\eta_1 \quad +.0017''$$

$$A \quad 2 \quad 17 \quad 10''$$

$$\log k_0 \quad 0.12225''$$

$$7.33115''$$

$$k_0 \quad 2 \quad 18 \quad 18.99''$$

$$2.79110'' - 618.2$$

$$\text{Red} \quad +5.07''$$

$$\delta - D \quad -10 \quad 18.2$$

$$\delta' \quad 2 \quad 18 \quad 24.06''$$

$$D + 18 \quad 48 \quad 36''$$

$$\delta_0 \quad 18 \quad 38 \quad 17.8''$$

$$\text{Red} \quad +27.7''$$

$$\delta' \quad 18 \quad 38 \quad 45.5''$$

11580 *Mavis* Mean Position

25

$$\begin{array}{r} \lambda_0 \quad 29.0630'' \\ \quad - 14'' \\ \hline 29.0616'' \end{array}$$

$$\begin{array}{r} \eta_0 \quad 16.7690'' \\ \quad - 99'' \\ \hline 16.7596'' \end{array}$$

From Plate Constants

 $\lambda \quad 29.4021''$
 $\eta \quad 16.6766''$
 $\xi \quad +2.1021''$
 $\eta \quad -1.3239''$
 $\log \xi \quad 0.32265''$
 $\log \tan \delta \quad 9.5279''$
 $\cos \delta \quad 997.661''$
 $\xi^2 \quad 0.6453''$
 8.50729
 7.0539
 $1.83880''$
 $7.2266''$
 $\lambda - A \quad +68.99''$
 $\eta_1 \quad +.0017''$
 $A \quad 2 \quad 17 \quad 10''$
 $\log \eta_0 \quad 0.12223''$
 $7.33115''$
 $\lambda_0 \quad 2 \quad 18 \quad 18.99''$
 $2.79110'' - 618.2$
 $\text{Red} \quad +5.07$
 $\delta - D \quad -10 \quad 18.2$
 $\lambda' \quad 2 \quad 18 \quad 29.06$
 $D + 18 \quad 78 \quad 36''$
 $\delta_0 \quad 18 \quad 38 \quad 17.8''$
 $\text{Red} \quad +27.7$
 $\delta' \quad 18 \quad 38 \quad 45.3''$

Mar 8 3.16

$$\begin{array}{r}
 2 \quad 12 \quad 29.36 \checkmark \\
 - 18.93 \checkmark \\
 \hline
 + 5.93 \checkmark
 \end{array}$$

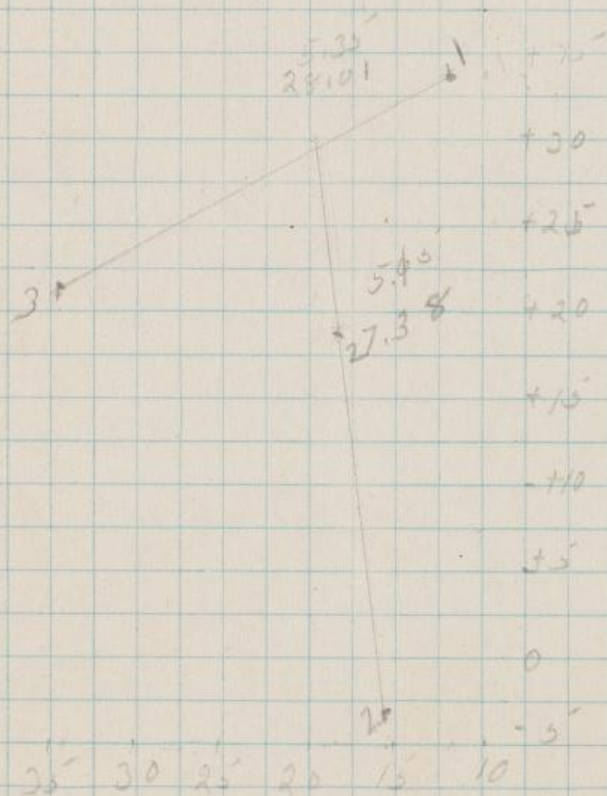
$$\begin{array}{r}
 + 33 \quad 27 \quad 62.18 \checkmark \\
 - 33.98 \checkmark \\
 \hline
 + 28.70 \checkmark
 \end{array}$$

$$\begin{array}{r}
 2 \quad 15 \quad 10.85 \checkmark \\
 - 6.12 \checkmark \\
 \hline
 + 4.73 \checkmark
 \end{array}$$

$$\begin{array}{r}
 - 3 \quad 21 \quad 9.15 \checkmark \\
 - 30.26 \checkmark \\
 \hline
 26.11 \checkmark
 \end{array}$$

$$\begin{array}{r}
 2 \quad 37 \quad 7.79 \checkmark \\
 - 2.61 \checkmark \\
 \hline
 + 5.18 \checkmark
 \end{array}$$

$$\begin{array}{r}
 + 21 \quad 35 \quad 82.26 \checkmark \\
 - 55.63 \checkmark \\
 \hline
 + 26.63 \checkmark
 \end{array}$$



Reduction to Apparent Place

29

$$\begin{array}{rcl}
 H + \alpha & 5 & 02.5 = 75^\circ 37.5' + 18^\circ 38.0' \\
 H & 2 & 49.2' \\
 \alpha & 2 & 18.3' \\
 G & 23 & 23.5' \\
 G + \alpha & 1 & 41.8' = 25^\circ 27.0'
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos \delta & & 9.9766 \\
 & & + 0.7487 \\
 & & 0.7253
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos(G + \alpha) & 9.9557 \\
 g & 13631 \\
 \sin & 9.6332 \\
 \tan \delta & 9.5280 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin \delta & 9.5096 \\
 \cos(H + \alpha) & 9.3949 \\
 h & 1.2942 \\
 \sin(H + \alpha) & 9.9862 \\
 \sec \delta & 0.0234 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log g' & 1.3188 \\
 g & 9.3782
 \end{array}$$

$$\begin{array}{rcl}
 h' & 0.1937 \\
 h & 0.1277
 \end{array}$$

$$\begin{array}{rcl}
 L & + 3.505 \\
 b & + 0.223 \\
 h & + 1.342 \\
 & + 5.070
 \end{array}$$

$$\begin{array}{rcl}
 g' & 20.838 \\
 h' & + 1.562 \\
 L & + 5.313 \\
 & + 27.710
 \end{array}$$

$$17 + 12 \quad 5^\circ 02.5' = 75^\circ 37.5' + 18^\circ 38.2'$$

14	2	99.2
----	---	------

4	2	18.3
---	---	------

6-	23	23, 5
----	----	-------

G + x 1 91.8 : 25 27.0

logans 9,9766

4 + 0 7 9 8 7

6 0.7253

Engel (Crd) 9.95-57

9 13631

Sum " 963 32

Jan 8 95280

8	8	2	3	9
---	---	---	---	---

Aug Sund 9.3.096

$\log(H, x) = 93999$

$\frac{1}{2}$	1	2	9	9	2
---------------	---	---	---	---	---

$$\sum_{i=1}^n (H+x_i) \quad 9 \quad 9 \quad 8 \quad 6 \quad 2$$

Sec d 0.0237

8	8	2	3	9
---	---	---	---	---

$\log q' = 1.3188$

9 9 3 9 8 2

h'					0.1937
----	--	--	--	--	--------

h 0.1277

$$f + 3.505$$

$$b + 0.223$$

$\frac{1}{2} + 1.392$

$$+ 5.070$$

9 20,839

$$h' + 1.562$$

$1 + 5,313$

$$+ 27.719$$

11580

Lunar Parallax

30

$$\gamma' \quad 2 \quad 18 \quad 29.06^{\circ}$$

$$\delta \quad 3 \quad 38 \quad 57.3^{\circ}$$

$$\delta - \gamma' + 1 \quad 20 \quad 33.28^{\circ}$$

$$= +20 \quad 8 \quad 18.60^{\circ}$$

$$+ 7 \quad 39.3$$

$$20 \quad 0 \quad 39.3^{\circ}$$

$$995727$$

$$000000$$

$$002709^{\circ}$$

$$998431^{\circ}$$

$$\delta \quad 43 \quad 57 \quad 55.2^{\circ}$$

$$\delta \quad 18 \quad 38 \quad 45.5^{\circ}$$

$$\delta - \delta' \quad 25 \quad 19 \quad 09.7^{\circ}$$

$$982690$$

$$8.21825^{\circ}$$

$$9.63110^{\circ}$$

$$0.15849^{\circ}$$

$$7.83424^{\circ}$$

$$\delta - \delta' \quad + 23 \quad 28.2^{\circ}$$

$$\delta \quad + 19 \quad 02 \quad 13.7^{\circ}$$

$$\text{Eph } \delta + 19 \quad 02 \quad 10.8^{\circ}$$

$$D-C \quad + 3.3^{\circ}$$

$$\text{Curv Corr} \quad + 0.1$$

$$2^{\text{nd}} \text{ Order Ref} \quad 0.0$$

$$\text{In Corr} \quad - 0.3$$

$$\delta \quad + 19 \quad 02 \quad 13.7^{\circ}$$

$$D-C \quad + 3.0$$

$$\pi \quad 56 \quad 49.54^{\circ}$$

$$9.86913$$

$$8.21825^{\circ}$$

$$9.53892^{\circ}$$

$$002443^{\circ}$$

$$764873^{\circ}$$

$$\delta - \delta' \quad 15 \quad 18.66$$

$$= \quad + 1 \quad 1.27^{\circ}$$

$$\delta \quad 2 \quad 19 \quad 25.30^{\circ}$$

$$\text{Eph } \delta \quad 2 \quad 19 \quad 24.78^{\circ}$$

$$D-C \quad + 0.82^{\circ}$$

$$- 0.02$$

$$+ 0.63$$

$$\gamma \quad 2 \quad 19 \quad 25.33$$

$$+ 0.85^{\circ}$$

Perr

11580

Lunar Parallax

30

$\gamma' \quad 2 \quad 18 \quad 29.06''$
 $\delta \quad 3 \quad 38 \quad 57.3''$
 $\gamma - \delta' + 1 \quad 20 \quad 33.27''$
 $= +20 \quad 8 \quad 18.60''$
 $\quad \quad +7 \quad 39.3''$
 $\quad \quad 20 \quad 0 \quad 39.3''$

9.95727

0.00000

0.02709

9.98431

 $\delta \quad 93 \quad 57 \quad 55.2''$
 $\delta \quad 18 \quad 38 \quad 70.5''$
 $\delta \quad 25 \quad 19 \quad 09.9''$

982690

8.21825

9.63110

0.15899

783929

 $\delta - \delta' \quad +23 \quad 28.3''$
 $\delta \quad +19 \quad 02 \quad 13.9''$
 $\text{Ceph } \delta +19 \quad 02 \quad 10.9''$
 $O-C \quad +3.3''$
 $\text{Ceph } \text{Ceph} \quad +0.1''$
 $2'' \text{ Under Ref} \quad 0.0''$
 $\text{In } \text{Ceph} \quad -0.3''$
 $\delta \quad +19 \quad 02 \quad 13.9''$
 $O-C \quad +3.0''$
 $\pi \quad 56 \quad 49.59''$

9.86913

8.21825

9.53892

0.02443

769873

 $\delta - \delta' \quad 15 \quad 18.66''$
 $= \quad +1 \quad 1.27''$
 $\delta \quad 2 \quad 19 \quad 25.30''$
 $\text{Ceph } \delta \quad 2 \quad 19 \quad 24.98''$
 $O-C \quad +0.82''$
 $-0.02''$
 $+0.03''$
 $\delta \quad 2 \quad 19 \quad 25.30''$
 $+0.83''$

