

KG
11366
v.980



1
1
1
2
3
3
3
3
8
1
2
1
2
2
1
3
2
1

8728

Star Measures

10-9

1

1

	19010	18892	18098	19702
13.5	1471618	1368285	1685662	10890
13.1	20	88	68	87
	14	96	92	690
	<u>13.4797</u>	<u>13.4790</u>	<u>13.1186</u>	<u>13.1196</u>

2

	18004	19816	17942	19552
25	17876	9950	14636	12898
33.4	76	4648	3234	98
	10	10	38	58
	<u>25.0128</u>	<u>25.0138</u>	<u>33.3306</u>	<u>33.3342</u>

3

	17250	16686	18882	18000
35.2	14747	9210	14870	11997
8.4	4042	0005	6869	9695
	50	88	80	10
	<u>35.2508</u>	<u>35.2518</u>	<u>38.4012</u>	<u>38.3988</u>

Moon Measures

1

	19332	16398
23	11580592	1708283
17.8	604	8483
	22	98
	<u>19.7732</u>	<u>17.7686</u>

2

	17034	15576
23.3	13192	977268
15	42	64
	38	72
	<u>23.3899</u>	<u>23.3894</u>

3

	18492	20208	14610	18000
24.1	17740	11086	6430	107782
16	3437	7882	4000	2042
	90	00	00	52
	<u>24.0757</u>	<u>24.0782</u>	<u>15.1970</u>	<u>15.7860</u>

8728

Star Measures

H-9

1

1	19510	18892	18098	19102
10.0	1971618	136825	1685662	16890
13.1	20	8855	68	2957
	14	36	42	690
	<u>139799</u>	<u>139790</u>	<u>131186</u>	<u>131176</u>

2	18004	19816	17942	19352
25	17876	9950	1463639	12898
33.4	76	4698	32	98
	10	10	38	28
	<u>250128</u>	<u>250138</u>	<u>333306</u>	<u>333372</u>

3	17250	16686	18812	18000
35.2	14747	9210	1957064	11999
4.4	9092	0002	68	7692
	20	88	80	18
	<u>352508</u>	<u>352518</u>	<u>387012</u>	<u>83988</u>

Thom Measures

4		19332	16398
5		11580592	14082
17.8		604	8453
		22	78
		<u>1917732</u>	<u>117656</u>

6	17034	15226
23	13192	977268
15	42	67
	38	72
	<u>233899</u>	<u>233898</u>

7	18992	20308	14610	17070
24.1	17740	1108642	1500000	117877
16	3437	78	20	40712
	90	00	12	82
	<u>240758</u>	<u>240782</u>	<u>152730</u>	<u>1578600</u>

Moon Measures

2

<u>4</u>	19822	17208
29.1	18142	8898
16.5	42	9099
	18	26
+2	<u>29.1680</u>	<u>24.1670</u>

<u>5</u>	19820	17224
29.1	18600	8448
17	00	78
	20	26
	<u>29.1220</u>	<u>29.1222</u>

<u>6</u>		20684	15360
24		1685276	9270
17.3		40	40
		86	58
		<u>17.3838</u>	<u>17.3882</u>

<u>7</u>	19016	13650
23.6	13180	95280
18	6070	3200
	12	52
	<u>23.5844</u>	<u>20.5878</u>

<u>8</u>		19790	15462
23		1562227	9618
18.9		3227	14
		80	52
		<u>18.9158</u>	<u>18.9160</u>

<u>9</u>		19732	14760
22.2		1375278	10960
18.6		9978	57
		39	60
+7		<u>18.5984</u>	<u>18.5996</u>

8728

Junes

3

June 28/15

Eps. to Stars	21	27	21	36
" " Moon	21	30	01.9	21 30 02.2
Clock fast		1	52.8	
H. Sid. J.	21	28	09.25	$\theta - \alpha = +0^h 5^m$
H. Long	4	44	31.05	
G. Sid. J.	26	12	40.30	
G. T. M. Noon	6	22	0.20	
Interval	19	50	40.10	
Reduction		3	15.06	
G. M. J.	19	47	25.04	

From Naut alms.	R. A.	Place
Moon 19 ^h	20 32 27.71	-19 59 53.1
Motion in 1 ^m	2.9058	11.910
" " 47 ^m 173	+1 54.08	9 24.8
Tabular Place	20 34 21.49	-19 50 28.3

Moon's age	16 days	
Parallax	59'	35.67"
Semid.	16'	15.8"
R.		975.8"
ang		7.6"
Sr. ⁺		-0.6"
R.		982.8"
R.		2,106.7"
ak.		-1008"
1+g/R		2,0059"
R ²		40236"

$$934 = 7.$$

$$a = -502.4$$

$$\begin{array}{r} 27 \\ -478.4 \end{array}$$

8128

Times

3

June 22/16

Exp. 10210	21	29	21	26
" " 10210	21	30	01.9"	21 30 02.2-
Clock fast		1	52.8"	
H. Sid. T.	21	28	09.25"	$\pm x \pm 0^h 5^m 9^s$
H. Long	9	49	31.05"	
G. Sid. T.	26	42	90.30"	
G. 1 M. Moon	6	22	0.20-	
Interval	19	50	90.10-	
Reduction		3	15.06-	
G. 1 M. J.	19	47	25.09-	

Moon Hant Alm

H. 21

Sec.

Moon 19 ^h	20	32	27.91	-19	59	23.1
Moon 101 ^m			1.108			11.210
47 ^h 9173		11	54.08		9	24.8
Tabular Place	20	34	21.49"	-19	50	24.3"

Moon 22/16

Page

10 days

Parallax	59"	35.67"
Secant	16"	15.8"
"		975.8-
"		1.6-
"		-0.6-
"		9828-
"		2.1067-
"		-1008-
"		20059-
"		90236-

-50.29"

27

4784-

11416

18"

8728

Plate Center & Constants

7

x	y	α	δ
13.4792	13.1191	20 28 30.14	-21 11 12.4
25.0133	33.3329	35 12.73	18 26 19.6
35.2513	8.4000	41 19.46	21 49 25.7
3) 73.7438	54.8515	3) 104.5733	60 86 57.7
27.5812	18.2838	20 34 57.11	-20 28 59.2
22	18.	- 1 20	- 2 10.6
- 2.581	- 2.838	20 33 39.1	-20 31 09.8
31.5	766.5		

- 1^m 20.0

- 2' 10".6

 Plate Center $\begin{cases} A = 20 33 39 \\ D = -20 31 10 \end{cases}$

$$\begin{array}{rclcl}
 x - \bar{x} + 500x & + 7.6y & + 2.7x & - 18291 & \\
 +7910 + 6740 & = +19150 + 60 = +19210 & + 32 = +19242 & = +1 & \\
 +1521 + 12507 & = +14028 + 153 = +14181 & + 60 = +14241 & = 0 & \\
 -3508 + 17626 & = +14118 + 39 = +14157 & + 84 = +14241 & = 0 & \\
 22.1606 + 11080 & + 76 & + 53 & = 21.8579 &
 \end{array}$$

$$\begin{array}{rclcl}
 y - \bar{y} + 500y & - 1.1x & + 12.5y & - 9777 & \\
 +3067 + 6560 & = +9627 - 15 = +9612 & + 164 = +9776 & = -1 & \\
 -7278 + 16666 & = +9388 - 28 = +9360 & + 417 = +9777 & = 0 & \\
 +3571 + 9200 & = +9771 - 39 = +9672 & + 105 = +9777 & = 0 & \\
 16.5921 + 8296 & - 24 & + 207 & = 16.4623 &
 \end{array}$$

$$\begin{array}{lclcl}
 \text{Tables } a = -8 & e = -10.3 & a - e = +10.0 & f + d = -7.5 & \\
 \text{lbs} & = -502.4 & = -512.5 & = +10.1 & = -3.5
 \end{array}$$

$$\begin{array}{rclcl}
 O - C & -501.6 & -501.7 & & +1.0
 \end{array}$$

9728

Plate Center & Constants

9

1	2	3	4
13.9792	13.1191	20.2830	19.12.9
25.0133	33.3329	35.12.73	18.26.19.6
32.2513	89.000	41.19.96	21.99.23.7
3) 737438	548515	31.10.957.33	60.86.57.7
29.581.2	18.2838	20.38.57.11	-20.28.59.2
22	18	-1.20	-2.10.6
-2581	-2838	20.38.39.1	-20.31.09.8
315	7665		

- 1" 20.0

- 2" 10.6

 Plate Center { A = 20 38 39
 (D = -20 31 10

25 + 500X	+764	+2.9X	-19291
-7710 + 6740 = +19150	+60 = +19210	+32 = +19292	= +1
11521 + 12507 = +19028	+152 = 19181	+60 = 19291	= 0
-3508 + 17626 = +19118	+29 = +19147	+89 = 19291	= 0
22.1606 + 11080	+76	+53	21.8579

4" 11 + 500Y	-1.1X	+12.54	-9777
+3067 + 6560 = +9627	-15 = +9612	169 = +9776	= -1
-7278 + 16666 = +9388	-28 = +9360	717 = +9777	= 0
+5571 + 9200 = +9771	-39 = +9672	105 = +9777	= 0
16.5921 + 8296	-29	+207	= 16.9623

 Tables a = -8 e = -11.3 a-e = +10.5 f+d = -9.5
 lbs = = =

	ξ	η	$\Delta\xi$	$-\xi^{-2}$	$+6\eta$	-16
1	-9.26	-5.15	-26	+46	2 +20 -3 ~ +17	
2	+2.86	+16.06	+20	-14 ~ +6	+10 ~ +16	
3	+13.59	-10.07	+90	-68 ~ +22	-6 ~ +16	
M	-0.14	-1.57	0	+1	-1	<u>-16</u>

$\Delta\eta$	-6.14		+1.25		-7
-14	+31	= +17	-10	= +6	-1
+103	-98	= +5	+3	= +8	+1
-70	+61	= -9	+16	= +7	0
0	+9		-2		<u>0</u>

8728

Standard Coordinates

Cape No 2838 - Mg 8.5				Cape No 2863 - Mg 9.5				Cape No 2868 - Mg 9.5			
α	20	27	37.86	20	37	21.77		20	40	22.21	
δ			37.86								
E			37.80	B 20	37	21.98		B 20	40	22.21	
Mean	20	27	37.84								
Rec			+52.30			+51.25				+52.25	
δ	20	28	30.19	20	35	12.73		20	41	14.46	
A	20	33	39	20	33	39		20	33	39	
$\alpha-A$			-05 08.86			+1 33.73				+07 35.46	
Sid-A			-30 8.83			+93.73				+4 55.38	
log "	2	4	897.2 n	1	97	188		2	4	583.8	
" mod	9	9	6961	9	9	7712		9	9	6770	
" 90	0	9	6657 n	0	4	5624		1	1	3332	
ϵ_0	-9	25	92	+2	85	92		+1	35	931	
ϵ_1			-26			+20				+90	
ϵ_2	12	73	82	24	86	12		35	60	21	
χ	13	47	92	25	01	33		35	25	13	
$\chi-\epsilon$	+7	4	10	+1	5	21		-	3	508	
C	-21	19	13.4	-1	8	29 26.7					
ϵ			13.5								
E			13.3	B-1	8	29 27.3		B-21	52	39.5	
Mean	-21	19	13.4								
Rec			+3 01.0			+3 07.7				+3 13.8	
δ	-21	11	12.4	-1	8	26 19.6		-21	49	25.7	
D	-20	31	10	-20	31	10		-20	31	10	
S-D	-40	02	4	+2	04	50.4		-1	18	15.7	
tan "	-2	4	02.5			+74 93.6				-46 96.5	
log "	3	3	8066 n	3	8	7769		3	6	7177 n	
" 90	0	7	1181 n	1	2	0684		1	0	0292 n	
tan δ	9	5	884 n	9	5	230 n		9	6	026 n	
ϵ_0	1	9	331	0	9	125		2	2	666	
" 90	8	5	749 n	7	4	889 n		8	9	226 n	
ϵ_0	-5	1	500	+1	6	0633		-1	0	0674	
ϵ_1	-0	0	376	-0	0	031		-0	0	837	
ϵ_2	12	8	124	3	4	0602		7	8	489	
χ	13	1	191	3	3	3324		8	7	000	
$\chi-\epsilon$	+3	0	67	-7	2	78		+5	5	11	

Standard Coordinates											
Cape	2838	-149	8.5	Cape	2838	-149	5.9	Cape	2838	-149	5.5
0	20	27	37.86	20	39	21.97					
L			37.86								
E			37.80	020	39	21.98	B	20	90	22.21	
Mean	20	27	37.89								
Rec			52.30			+51.25				+52.20	
2	20	28	30.19	20	39	12.73	20	41	19.96		
A	20	38	39	20	38	39	20	38	39		
A-A	-05	08	86	+01	36	23	+07	35	46		
S-A	-30	8	83			193.73				+955	38
Log	2	9	89	7	2	n	1	97	1	88	
Log	9	9	69	6	1		9	97	7	12	
Log	0	9	66	5	7	n	0	9	56	29	
Log											1.13332
Log	-9	25	92	+28	59	2	+13	59	31		
Log			-26			+20			+90		
Log	1	2	73	82	2	9	86	12	3	56	021
Log	1	3	97	72	2	5	01	33	3	5	2513
Log	+7	9	10			+1	521		-	35	08
C	-21	19	13.9	-18	29	26.7					
L			13.5								
E			13.3	0-18	29	27.3	B	-21	52	39.5	
Mean	-21	19	13.9								
Rec	+3	01	0	+3	07	7	+3	13	8		
2	-21	11	12.9	-18	26	19.6	-21	49	25.7		
D	-20	31	10	-20	31	10	-20	31	10		
S-D	-90	02	9	+2	09	30.9	-1	18	15.7		
Log	-2	40	25	+7	9	93.8				-96	96.5
Log	-3	38	06.6	3	87	9.88	3	67	17.7	n	
Log	0	7	1181	1	20	584	1	00	292	n	
Log	9	58	84	9	52	30	9	60	26	n	
Log	1	9	331	0	9	125	2	26	66		
Log	8	57	99	7	98	89	8	92	26	n	
Log	-5	15	00	+16	06	33	-10	06	74		
Log	-0	03	76	+0	00	31	-0	08	37		
Log	1	2	8129	3	40	602	7	89	89		
Log	1	3	1191	3	33	329	8	90	00		
Log											

$$\alpha = +7$$

$$\beta = +10.1$$

8728

Moon's Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$
1	23,0000	+0,8390	-18	0,7009	4,0235	-001
2	23,3894	+1,2284	-16	1,5050	4,0445	+209
3	24,0768	+1,9158	-6	3,6680	4,0198	-38
4	+24,1675	+2,0065	0	4,0260	4,0260	+24
5	24,1221	+1,9611	+4	3,8475	4,0133	-103
6	24,0000	+1,8390	+8	3,3849	4,0142	-94
7	23,5861	+1,4251	+14	2,0349	4,0162	-74
8	23,0000	+0,8390	+18	0,7070	4,0325	+89
9	22,1610	+0,0000	+20	0,0000	4,0272	+36

 $R = 4.0236$

	y		Δy		$(y - y_0)^2$		L
1	-14,7709	-	1,8221	-	7	3,3226	155 ✓
2	15,0000	-	1,5930	-	6	2,5395	142 ✓
3	16,0000	-	0,5930	-	2	0,3518	107 ✓
4	16,5930		0,0000		0	0,0000	90 ✓
5	17,0000	+	0,4070	+	2	0,1658	78 ✓
6	17,3860	+	0,7930	+	3	0,6293	67 ✓
7	18,0000	+	1,4070	+	6	1,9813	45 ✓
8	-18,4159	+	1,8229	+	4	3,3255	25 ✓
9	+18,5990	+	2,0060	+	8	4,0272	0 ✓ 155

Approximate Center

$$\begin{aligned}
 x &= 23 & y &= 14,7709 \\
 & & & 18,4159 \\
 & & & \hline
 & & & 33,1868 \\
 y_0 &= 16,5934 \\
 y_{\max} &= 18,5990 \\
 R &= 2,0056 \\
 y_{\max} &= 24,1675 \\
 y_0 &= 22,1610
 \end{aligned}$$

$$\begin{aligned}
 \text{Moon's Center} & \begin{cases} x_0 = 22,1610 \\ y_0 = 16,5930 \end{cases}
 \end{aligned}$$

8.1.25	Moon's Center					6
X	X ₁₀	Δ1	(X - X ₁₀)	(X - X ₁₀)(Y - Y ₁₀)	(X - X ₁₀) ²	
1 230000	+08390	-13	0 7009	4 0235	-001	
2 233879	+12289	-16	1 5030	4 0973	+209	
3 290768	+19138	-6	3 6680	4 0193	-38	
4 +291675	+20065	0	4 0260	4 0260	+29	
5 291221	+19611	9	3 8975	4 0133	-103	
6 290000	+18390	8	3 3899	4 0192	-97	
7 235861	+19251	14	2 0377	4 0162	-79	
8 230000	+08390	+13	0 7070	4 0325	+89	
9 221610	+00000	+20	0 0000	4 0272	+36	

Σ = 9.0236

	Y		ΔY		(Y - Y ₁₀)		Σ
1	177709	-18221	-7		33226		135
2	150000	-15730	-6		25395		192
3	160000	-05930	-2		03518		107
4	165930	00000	0		00000		90
5	170000	+04070	+2		01628		78
6	173860	+07930	+3		06273		67
7	180000	+19070	+6		19813		45
8	189159	+18229	+7		33255		25
9	+185990	+20060	+8		90272		0

Approximate Center

$$x = 23 \quad y = 19.7709$$

$$18.9159$$

$$33.1868$$

$$y_0 = 16.5939$$

$$y_{max} = 18.5990$$

$$R = 2.0056$$

$$y_{max} = 29.1675$$

$$x_0 = 22.1610$$

Moon's Center

$$\left\{ \begin{array}{l} x_0 = 22.1610 \\ y_0 = 16.5930 \end{array} \right.$$

Formation of Normals.

1	- 1.53	- 0.8	+ 1.8
2	- 1.96	+ 257.0	- 332.5
3	- 1.13	- 73.0	+ 22.7
4	0.0	+ 48.0	+ 0.0
5	+ 0.80	- 202.0	- 42.0
6	+ 1.75	- 173.0	- 74.0
7	+ 2.02	- 106.0	- 104.0
8	+ 1.53	+ 75.0	+ 162.0
9	+ 0.0	+ 0.0	+ 72.5
	+ 5.80	+ 380.0	+ 258.7
	- 4.62	- 554.8	- 552.5
	+ 1.18	- 174.8	- 293.8

	a	b	c	new 0-c
	+8	-4	-12 ^v	-39 ^v
a	+10	+12	-3	+183 ^v
b	+2	+19	-1	-31 ^v
c	-16	+20	+6	+77 ^v
		+20	+1	-76 ^v
		+18	+2	+70 ^v
		+14	+3	-38 ^v
		+8	+4	+123 ^v
		+0	+4	+59 ^v
		+		

$$+1.18 + 16.37 = +2.77$$

$$+ [] + .05 = +0.72$$

$$+16.29 = +1.72$$

$$19.87 = +12.07 - 0.12 = +11.95$$

=

5728

Conditional Equations

7

0-c

1	+	0.84	-	1.82	=	-1	-	6	+	32	=	+26	-27
2	+	1.23	-	1.59	=	+209	-	9	+	28	=	+19	+190
3	+	1.92	-	0.59	=	-38	-	15	+	10	=	-5	-33
4	+	2.01		0.00	=	+24	-	16		0	=	-16	+90
5	+	1.96	+	0.91	=	-103	-	15	-	7	=	-22	-81
6	+	1.84	+	0.79	=	-94	-	14	-	14	=	-28	+66
7	+	1.43	+	1.41	=	-77	-	11	-	24	=	-35	-39
8	+	0.84	+	1.82	=	+89	-	6	-	32	=	-38	+127
9	+	0.00	+	2.01	=	+36	-	0	-	35	=	-35	+71

+494 - 180

$$+19.87 + 1.18 = -174.8 + 12.07$$

$$+ 1.18 + 16.34 = -293.8 + 2.47$$

$$+ 1.18 + .07 = -10.4$$

$$+ 0.11 \Delta$$

$$+ 16.27 = -283.4$$

$$b = -17.4$$

$$+19.87 = -174.8 + 20.5 = -154.3$$

$$a = -7.8$$

$$+ 0.60$$

Arc Measured 155°

$$\frac{p}{h} = 21$$

$$\frac{\Sigma v}{h} = +35$$

$$\mp 7 \quad R \quad 2.00$$

$$-2Re = -0.80$$

$$\frac{+35}{1} = +166$$

$$\Delta R = +2.0$$

$$Corr = +0.2$$

$$\Delta b = -0.09$$

$$\Delta S = 0.0$$

$$\Delta R = +1.8$$

$$\Delta q = -0.78$$

$$\Delta \alpha = -0.02$$

3728

Conditional Equations

7

1	+	0.59	-	1.82	-	-	1	-	6	+	32	-	+26	-27
2	+	1.23	-	1.24	-	+209		-	9	+	28	-	+19	+190
3	+	1.82	-	0.59	-	-38		-	12	+	10	-	-3	-33
4	+	2.01		0.00	=	+29		-	16		0	-	-16	+90
5	+	1.96	+	0.91	=	-103		-	12	-	7	-	-22	-81
6	+	1.59	+	0.79	=	-99		-	14	-	14	-	-28	+66
7	+	1.92	+	1.91	=	-79		-	11	-	14	-	-33	-39
8	+	0.89	+	1.82	=	+89		-	6	-	32	-	-38	+127
9	+	0.00	+	2.01	=	+36		-	0		32	-	-32	+71
													+999	-180

$$+19.87 + 1.18 = -179.8$$

$$+1.18 + 16.39 = -293.8$$

$$+1.18 + .07 = -10.9$$

$$+16.27 = -283.9$$

$$b = -17.9$$

$$+19.87 = -179.8 + 20.5 = -159.3$$

$$a = -7.8$$

Arc Measured 155°

$$\frac{p}{h} = .165^\circ$$

$$\frac{\Sigma v}{h} = +35^\circ$$

$$\frac{+35}{165} = +.166$$

$$\Delta R = +0.4$$

8728

Moon's Mean Position

8

$$\begin{array}{r} \gamma_0 = 22.1610'' \\ - 9'' \\ \hline 22.1606'' \end{array}$$

$$\begin{array}{r} \eta_0 = 16.5930'' \\ - 9'' \\ \hline 16.5921'' \end{array}$$

From Plate Constants

$$\gamma = 21.8574''$$

$$\eta = 16.4623''$$

$$\xi = -0.1926''$$

$$\eta = -1.5377''$$

$$\begin{array}{r} \log \gamma \quad 9.15412'' \\ \log \delta \quad 9.97097'' \\ \hline 8.50729'' \\ 0.67591'' \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.5766'' \\ \log \xi \quad 8.3082'' \\ \hline 7.0539'' \end{array}$$

$$\begin{array}{r} \eta_0 = 0 \quad 9.9382'' \\ \eta_0 - 1.5377'' \end{array}$$

$$\alpha - A \quad - 9.79''$$

$$\begin{array}{r} \log \eta_0 \quad 0.18687'' \\ 7.33115'' \\ \hline 2.83572'' \end{array}$$

$$A \quad 20 \quad 33 \quad 39''$$

$$- 717.3''$$

$$\alpha_0 \quad 20 \quad 33 \quad 34.26''$$

$$\delta - D \quad - 11 \quad 57.3''$$

$$\text{Red} \quad + 3.81''$$

$$p - 20 \quad 31 \quad 10''$$

$$\alpha' \quad 20 \quad 33 \quad 38.07''$$

$$\delta_0 - 20 \quad 43 \quad 07.3''$$

$$\text{Red} \quad + 8.6''$$

$$\delta' - 20 \quad 42 \quad 58.7''$$

8728

Uranus Mean Position

8

$$\begin{array}{r} \gamma_0 = 22.1610'' \\ - 9'' \\ \hline 22.1606'' \end{array}$$

$$\begin{array}{r} \gamma_0 = 16.5930'' \\ - 9'' \\ \hline 16.5921'' \end{array}$$

Uranus Plate Constants

$$\gamma = 21.8579''$$

$$\gamma = 16.4623''$$

$$\gamma_1 = -0.1726''$$

$$\gamma_1 = -1.5377''$$

$$\log \gamma = 9.15712''$$

$$\log \gamma = 9.5766''$$

$$\log \gamma = 9.97097''$$

$$\log \gamma = 8.3082''$$

$$8.50729''$$

$$7.0339''$$

$$0.67571''$$

$$\log \gamma = 9.9382''$$

$$\log \gamma = -1.5377''$$

$$X-A = -9.77''$$

$$X-A = 0.18687''$$

$$H = 20.33.39''$$

$$7.33112''$$

$$28.2572''$$

$$T_0 = 20.33.39.26''$$

$$-7.173''$$

$$Red = +3.81''$$

$$B-D = -11.57.3''$$

$$I. = 20.33.38.07''$$

$$D-20.31.10''$$

$$D-20.43.07.3''$$

$$Red = +8.6''$$

$$D'-20.42.58.7''$$

$$\begin{array}{r}
 19 \quad 57 \quad 39.18 \\
 \underline{26.02} \\
 + 9.16 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 -27^\circ \quad 56 \quad 43.3 \\
 \underline{49.3} \\
 + 6.0 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 20 \quad 35 \quad 16.51 \\
 \underline{12.77} \\
 + 3.74 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 -18^\circ \quad 26 \quad 10.1 \\
 \underline{18.6} \\
 + 8.5 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 20 \quad 41 \quad 7.90 \\
 \underline{3.94} \\
 + 3.96 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 -25^\circ \quad 37 \quad 26.7 \\
 \underline{36.8} \\
 10.1 \\
 \hline
 \end{array}$$

-16°

-18°

-20°

-22°

-24°

-26°

-28°

50 40 30 20 10 0 10 20
20^h 19^h

8728

Reduction to Apparent Place

9

$122^{\circ} \quad 24.0'$
 $H + \alpha \quad 8 \quad 09.6$
 $H \quad 11 \quad 36.0$
 $\alpha \quad 20 \quad 33.6$
 $G \quad 22 \quad 23.6$
 $G + \alpha \quad 18 \quad 57.2$
 $289^{\circ} \quad 18.0'$

$\delta \quad -20 \quad 43 \quad 07$
 $\log \cos \delta \quad 9.9710$
 $" \quad + \quad 9.9658$
 $" \quad - \quad 9.9368$

$\log \cos G + \alpha \quad 9.3927$
 $" \quad g \quad 1.1983$
 $" \quad \sin \quad 9.9863 \quad n$
 $" \quad \tan \delta \quad 9.5778 \quad n$
 $\quad \quad \quad 8.8239$

$\log \sin \delta \quad 9.5787 \quad n$
 $" \quad \cos H + \alpha \quad 9.7290 \quad n$
 $" \quad h \quad 1.3107$
 $" \quad \sin \quad 9.9265$
 $" \quad \sec \delta \quad 0.0290$
 $\quad \quad \quad 8.8239$

$\log g' \quad 0.5910$
 $" \quad g \quad 9.5863$

$\log h' \quad 0.5884$
 $" \quad h \quad 0.0901$

$f \quad +2.199$
 $g \quad +0.386$
 $h \quad +1.230$
 $\quad \quad \quad +3.810$

$g' \quad +3.900$
 $h' \quad +3.876$
 $i' \quad +0.865$
 $\quad \quad \quad +8.641$

8728

Reduction To Apparent Place

9

$122^{\circ} \quad 29^{\circ}0'$
 $H + \alpha \quad 8 \quad 09.6$
 $H \quad 11 \quad 36.0$
 $\alpha \quad 20 \quad 33.6$
 $G \quad 22 \quad 23.6$
 $G + \alpha \quad 18 \quad 27.2$
 $289^{\circ} \quad 18^{\circ}0'$

$\delta \quad -20 \quad 43 \quad 07$

$\log \cos \delta \quad 9.97110$

$\alpha \quad 9.9658$

$\alpha' \quad 9.9368$

$\log \cos G + \alpha \quad 9.3927$
 $g \quad 1.1983$
 $\text{Sum} \quad 9.9863^{\text{h}}$
 $\tan \delta \quad 9.5178^{\text{h}}$
 8.8239

$\log \sin \delta \quad 7.5987^{\text{h}}$
 $\cos H + \alpha \quad 9.7290^{\text{h}}$
 $h \quad 1.3107$
 $\text{Sum} \quad 9.9265$
 $\sec \delta \quad 0.0290$
 8.8239

$\log g' \quad 0.5910$
 $g \quad 9.2863$

$\log h' \quad 0.5889$
 $h \quad 0.0901$

f	$+2.199$	g'	$+3.900$
g	$+0.386$	h'	$+3.876$
h	$+1.230$	α	$+0.863$
	$+3.810$		$+8.691$

8728

Lunar Parallax

10

$$\begin{array}{rcl}
 \alpha' & 20 & 33 & 38.07'' \\
 \delta & 21 & 28 & 09.25'' \\
 \delta - \alpha' & + & 59 & 31.18'' \\
 = & +130 & 37' & 47.70'' \\
 \frac{1}{2} (\delta - \alpha') & & +5 & 31.31'' \\
 & 13 & 32 & 16.7''
 \end{array}$$

$$\pi \quad 59' 35.67''$$

$$\begin{array}{r}
 9.86913'' \\
 8.23891'' \\
 9.37226'' \\
 0.02652'' \\
 \hline
 7.50682''
 \end{array}$$

$$\begin{array}{r}
 9.95727'' \\
 0.00000'' \\
 0.01224'' \\
 \hline
 9.96951''
 \end{array}$$

$$\delta - \alpha' \quad +11 \quad 02.62$$

$$\begin{array}{r}
 = \\
 33 \quad 38.07
 \end{array}$$

$$\gamma \quad 42 \quad 59 \quad 25.4''$$

$$\delta \quad -20 \quad 42 \quad 58.7''$$

$$\gamma - \delta \quad 63 \quad 42 \quad 24.1''$$

$$\begin{array}{r}
 9.82690'' \\
 8.23891'' \\
 9.95257'' \\
 0.16630'' \\
 \hline
 8.18418''
 \end{array}$$

$$\sin(\delta - \delta) \quad 8.18418''$$

$$\delta - \delta' \quad +52 \quad 32.3''$$

$$\delta \quad -19 \quad 50 \quad 26.7'' \quad \alpha \quad 20 \quad 37 \quad 22.24''$$

$$\text{Ann. Ephs} \quad -19 \quad 50 \quad 28.3'' \quad \alpha \quad 20 \quad 37 \quad 21.79''$$

$$\delta - \alpha \quad +1.9'' \quad \delta - \alpha \quad +0.75''$$

$$\begin{array}{r}
 2^{\text{nd}} \text{ Cor. Ref.} \\
 \text{Corr. of Plate} \quad +0.2 \\
 \quad \quad \quad -0.0 \\
 \quad \quad \quad -0.05''
 \end{array}$$

$$\text{In Corr} \quad 0.0 \quad -0.02$$

$$\delta \quad -19 \quad 50 \quad 26.7'' \quad \alpha \quad 20 \quad 37 \quad 22.22''$$

$$\delta - \alpha \quad +1.9'' \quad +0.73''$$

8728

Lunar Parallax

10

α' 20 33 38.07"
 ϵ 21 28 09.25"
 $\epsilon - \alpha'$ + 5.9 31.18"
 $=$ +13.37' 47.70"
 $\frac{1}{2}(\alpha - \epsilon)$ +5 31.31"
 $\frac{1}{2}$ 13 32 16.9"

π 5.9" 35.67"
 9.86913"
 8.23891"
 9.37226"
 0.02652"
 7.30682"

9.95727"
 0.00000"
 0.01229"
 9.96951"

$\delta - \alpha'$ +11 02.63

$=$ +99.17"

γ 92 59 23.9"

δ -20 42 58.7"

$\gamma - \delta$ 63 92 29.1"

9.82690"
 8.23891"
 9.95257"
 0.16630"

$\sin(\gamma - \delta)$ 8.18918"

$\delta - \delta'$ 32 32.3"

δ -19 50 26.9" γ 20 39 22.29"

Ans Ephs -19 50 28.3" γ 20 39 21.99"

10-C + 1.9" 10-C + 0.75"

Curv. of Plate -0.0 -0.05"

1
 12.9 18900
 11.5 14342.2
 4242
 390
12.4054

19086
 13140
 38
 7660
12.9068

18030
 13038
 3039
 29
9999

8729

Star Measures.

10 = 4

11

1	19680	18002	18938	20278
12.4	14692	13000	13942	15262
11.0	7282	00	42	6865
	82	8012	36	67
	<u>12.4998</u>	<u>12.4992</u>	<u>11.4996</u>	<u>11.4998</u>

2	18682	16976	19820	18308
23.9	9652	159949	12570	1559296
31.8	8850	8891	70	600
	92	52	42	16
	<u>23.9032</u>	<u>23.9044</u>	<u>31.7272</u>	<u>31.7286</u>

3	17316	18050	18596	16830
34.2	1547276	990812	1090810	1499993
6.9	8076	16	12	92
	06	46	88	47
	<u>34.1838</u>	<u>34.1866</u>	<u>6.8180</u>	<u>6.8160</u>

Moon Measures.

1			17752	17728
23			980900	1567094
13.8			96	50.94
			50	20
			<u>13.7952</u>	<u>13.7920</u>

2	15338	18046		
23.2	1300602	1038689		
14	1299802	9289		
	38	48		
	<u>23.2336</u>	<u>23.2342</u>		

3	20352	20032		
23.8	12752	1763235		
10	4247	38		
	52	32		
	<u>23.7606</u>	<u>23.7604</u>		

51-1

Star Measures.

1-9

11

	19080	18002	18938	20278
4	~~19292~~	~~13050~~	13992	12262
	3282	00	72	68
	82	8012	36	67
	<u>12.9998</u>	<u>12.9992</u>	<u>11.9996</u>	<u>11.9998</u>
	18682	16996	18878	18308
1.9	9632	19999	12570	1559296
1.8	7850	8891	70	600
	92	22	92	16
	<u>23.9032</u>	<u>23.9049</u>	<u>31.7272</u>	<u>31.7286</u>
	17316	18050	13596	16830
2	15972	990812	1090810	1999973
9	8076	16	12	72
	06	96	88	99
	<u>34.1838</u>	<u>34.1866</u>	<u>6.8180</u>	<u>6.8160</u>

Moon Measures.

3		17752	17728
8		980900	156809
		96	329
		50	20
		<u>13.7952</u>	<u>13.7920</u>
-	15338	18096	
1.2	1300602	1038689	
7	12998	9289	
	38	98	
	<u>23.2336</u>	<u>23.2392</u>	
-	20332	20032	
1.8	1275297	1763235	
	7297	38	
	52	32	
	<u>23.7606</u>	<u>23.7604</u>	

5
2
1
+
3
23
16
6
2
17
7
2
17
8
21
17
t

8729

Moon Measures.

12

<u>2</u>	20366	20020
23.9	12330	18058
15.4	30	5059
	68	26
+X	<u>23,8038</u>	<u>23,8032</u>

<u>5</u>	19386	20012
23.7	12328	1708688
16	28	90
	86	10
	<u>23,7058</u>	<u>23,7078</u>

<u>6</u>	20176	18692
23	1020216	18636
17.3	3016	3239
		80
	<u>16,9960</u>	<u>16,9982</u>

<u>7</u>	19558	18358
22	1566259	1228281
17.3	56	80
	62	52
	<u>17,3900</u>	<u>17,3928</u>

<u>8</u>	19972	18350
21.8	15498	12387
17.4	48	7278
	72	47
+Y	<u>17,9024</u>	<u>17,9032</u>

3729

Moon Measures

12

<u>2</u>	20366	20020
23.9	12330	18058
12.9	30	5059
	68	26
<u>47</u>	<u>23.8038</u>	<u>23.8032</u>

<u>2</u>	19386	20012
23.7	12328	1708688
16	28	90
	86	10
	<u>23.7058</u>	<u>23.7078</u>

<u>6</u>		20176	18692
13		1020216	18636
40		30	3239
			80
		<u>169960</u>	<u>16.9982</u>

<u>7</u>		19558	18358
22		1566259	1228281
16.3		56	80
		62	32
		<u>17.3900</u>	<u>17.3928</u>

<u>8</u>		19972	18350
11.8		15448	12389
17.9		48	7278
		72	44
<u>47</u>		<u>17.9024</u>	<u>17.9032</u>

8729

Times & Etc.

13

June 28 '15

Exp. to stars	21	39		21	51	
" " Moon	21	75	22.0"	21	75	22.2"
Clock fast		1	52.8"			

H Sid Time	21	43	29.3"	$\phi - \alpha = +1^h$	8 ^m
H Long	4	44	31.05"		
G Sid Time	26	28	00.35"		
G. T. M. Moon	6	22	0.20"		
Interval	20	06	00.15"		
Reduction		3	17.57"		
G. M. T.	20	02	42.58"		

From Naut. Alman.		R. A.		Dec.	
Moon	20	34	51.71	-19	47 57.8
Motion in 1 ^m			+2.4002		11.977
" 2,17097			+6.50		+32.5
Tabular Place	20	34	58.21"	-19	47 25.3"

Moon's age	16 days
" Parallax	59' 35" 15"
Semid	16' 15" 17"
R.	975.7"
Aug.	7.4"
Ln. 4	-0.6"
R.	982.5"
R.	2.106.1"
AR.	-1009"
(HAR)	2.0052"
R.	4.0208"

$$934 = 6.8 +$$

$$a = 503.1"$$

$$\begin{array}{r} 27 \\ -479.1 \end{array}$$

8729

Lunar & etc

13

June 28 1915

Opp to Stars	21	39	21	51
Moon	21	75	22.0	21 75 22.2
Clock fast		1	52.8	

H Sid Time	21	73	27.3	8-11-11 ^h	8 ^m
H Long	9	79	31.05		
G Sid Time	24	28	00.35		
G 1111 Moon	6	22	0.20		
Reduction	20	06	0.15		
Reduction		3	11.57		
G 1111	20	02	925.8		

From Nantucket	11	41		Dec
Moon	20	39	51.71	-19 77 57.8
Mercury 1 st			+29002	14.977
2 nd 7097			+6.50	132.5
Jupiter Hail	20	39	58.21	-19 77 25.3

Mars Age 16 days

Parallax 59' 35.18"

Semi 16' 15.7"

R 975.7

diaz 7.7

km -0.6

R 982.5

R 2.1061

R 10.07

Hail 200.32

R 7.0208

734 = 6.5+

a = 503.1

$$\begin{array}{r} 29 \\ -9191 \end{array}$$

8729 Plate Constants

17

$$\begin{array}{rcl}
 x & 12.9064 & 23.9038 & 34.1852 \\
 y & 12.7382 & 29.8612 & 35.6021 \\
 x-y & -3321 & -9574 & -14169
 \end{array}$$

$$\begin{array}{rcl}
 \eta & 11.4995 & 31.7279 & 6.8170 \\
 \eta & 12.8129 & 39.0602 & 7.8989 \\
 \eta-\eta & -13129 & -23323 & -10319
 \end{array}$$

$$\begin{array}{rcl}
 x-y & +500x & +23.1y & +3.1x & -3186 \\
 -3321 + 6203 & = +2882 + 266 & = +3148 + 38 & = +3186 = 0 \\
 -9574 + 11952 & = +2378 + 733 & = +3111 + 79 & = +3185 = -1 \\
 -14169 + 17093 & = +2924 + 157 & = +3081 + 105 & = +3186 = 0 \\
 21.7959 + 10898 & +356 & +68 & = 22.6095
 \end{array}$$

$$\begin{array}{rcl}
 \eta-\eta & +500\eta & -18.9x & +17.9y & +7772 \\
 -13129 + 5750 & = -7379 - 228 & = -7607 + 166 & = -7441 = +1 \\
 -23323 + 15869 & = -7459 - 8702 & = -7899 + 857 & = -7442 = 0 \\
 -10319 + 3408 & = -6911 - 629 & = -7540 + 98 & = -7442 = 0 \\
 15.3978 + 7699 & -401 & +222 & = 16.8936
 \end{array}$$

$$\begin{array}{rcl}
 \text{Tables} & a = -8 & e = -11.5 & A-e = +10.7 & A+d = -6 \\
 \text{lbs} & = -503.1 & = -514.7 & = +11.3 & = -4.7
 \end{array}$$

$$\begin{array}{rcl}
 O-C & -502.3 & -502.9 & +1.3
 \end{array}$$

129 Plate Constants

19

x	12.9965	23.9038	391852
y	12.7382	29.8612	356021
-z	-3328	-9579	-19169

x	11.9995	31.7279	6.8170
y	12.8129	39.0602	7.8989
y-h	-13129	-23323	-10319

x-z	15001	+23.17	+318	-3186
-3021 + 6403	= +2582 + 266	= +2175 + 38	= +3186 = 0	
-9579 + 11432	= +2375 + 733	= +3111 + 79	= +3185 = -1	
-19169 + 17073	= +2727 + 157	= +3481 + 103	= +3184 = 0	
21.7959 + 10898	+356	+68	22.6095	

y-h	+580.4	-1848	+19.94	+7772
-13129 + 5720	= -7319 - 228	= -7607 + 146	= -7771 = +1	
-23323 + 15469	= -7959 - 770	= -7398 + 157	= -7772 = 0	
-10319 + 3908	= -6911 - 629	= -7540 + 78	= -7772 = 0	
10.3978 + 7699	-901	+222	11.8970	

Tables a = -8 e = -11.5 A-e = +10.7 + d = -6
 Ubs = -50.31 = -519.7 = +11.3 = -4.7

$$a = + 5^-$$

$$B = + 10.1$$

8729	x	Morris	Center				
		$(x-x_0)$	Δx	$(x-x_0)^2$	$(x-y_0) + (y-y_0)^2$	$6-c$	$15-$
1	23,0000	+1,2030	-8	1,4453	4,0117	-91	
2	23,2339	+1,4369	-7	2,0627	4,0098	-110	
3	23,7605	+1,9635	-2	3,8546	4,0101	-107	
4	+23,8035	+2,0065	0	4,0260	4,0260	+52	
5	23,7068	+1,9098	+3	3,6485	4,0164	-99	
6	23,0000	+1,2030	+8	1,4491	4,0177	-31	
7	22,0000	+0,2030	+10	0,0416	4,0392	+189	
8	21,7970	-0,0000	+10	0,0000	4,0433	+225	

$$R^2 = 4.0208$$

	y	$(y-y_0)$	Δy	$(y-y_0)^2$	$\angle$
1	-13,7936	-1,6004	-16	2,5664	143°
2	19,0000	-1,3940	-19	1,9471	134°
3	15,0000	-0,3940	-9	0,1555	101°
4	15,3940	0,0000	0	0,0000	90°
5	16,0000	+0,6060	+6	0,3679	72°
6	-16,9951	+1,6011	+16	2,5686	37°
7	17,3914	+1,9974	+20	3,9976	6°
8	+17,4028	+2,0088	+20	4,0433	0° 143°

Approximate Center

$$\begin{aligned}
 y &= 23. \quad y = 13.7936 \\
 &\quad 16.9951 \\
 &\quad \hline
 &\quad 30.7887 \\
 y_0 &= 15.3943 \\
 y_{\max} &= 17.4028 \\
 R &= 2.0085 \\
 x_{\max} &= 23.8035 \\
 x_0 &= 21.7970
 \end{aligned}$$

$$\text{Morris Center} = \begin{cases} x_0 = 21.7970 \\ y_0 = 15.3940 \end{cases}$$

3129		Munro's Center		1915		1915	
		$X - X_0$	$Y - Y_0$	$(X - X_0)^2$	$(Y - Y_0)^2$	$(X - X_0)(Y - Y_0)$	Σ
1	23.00.00	-1.2030	-1.9953	1.4472	3.9812	-2.4011	-91
2	23.23.39	+1.9369	-2.0621	3.7514	4.2522	-4.0008	-110
3	23.76.05	+1.9635	-2.8392	3.8553	8.0610	-5.5707	-107
4	23.80.32	+1.2006	-4.0260	1.4414	16.2107	-4.8324	-32
5	23.70.08	-1.9098	-3.6733	3.6475	13.4911	7.0511	-94
6	23.00.00	+1.2030	-1.7791	1.4472	3.1651	-2.1351	-31
7	22.00.00	+0.2030	-0.9716	0.0412	0.9441	-0.1972	-159
8	21.79.70	0.0000	-0.0000	0.0000	0.0000	0.0000	+225

$\Sigma = 9.0208$

	X	Y	$X - Y$	$(X - Y)^2$	Σ
1	13.79.36	-1.6007	-16	256.64	143
2	14.00.00	-1.3910	-19	361.00	134
3	12.00.00	-0.3990	-9	81.00	101
4	12.39.70	0.0000	0	0.00	90
5	16.00.00	+0.6060	+6	36.00	72
6	16.99.51	+1.6011	+16	256.00	37
7	17.39.14	+1.9974	+20	399.00	6
8	+17.90.28	+2.0088	+20	400.00	0

1930

Approximate Center

$X = 23$	$Y =$	13.79.36
		16.99.51
		30.78.87
	$Y_0 =$	13.39.43
	$X_0 =$	17.40.28
	$Y_0 =$	2.00.85
	$X_0 =$	23.80.32
	$Y_0 =$	21.79.70

Munro's Center = $\begin{cases} X_0 & 21.79.70 \\ Y_0 & 13.39.40 \end{cases}$

Formation of Normals.

1	- 1.92	- 109.5	+ 146.0
2	- 2.00	- 15.85	+ 153.0
3	- 0.76	- 210.0	+ 41.7
4	0.0	+ 104.5	+ 0.0
5	+ 1.16	- 184.0	- 26.9
6	+ 1.92	- 37.0	- 49.5
7	+ 4.0	+ 36.8	+ 368.0
8	+ 0.0	+ 0.0	+ 452.0
	+ 3.48	+ 1.713	+ 1160.7
	- 4.68	- 599.0	- 76.4
	- 1.20	- 757.7	+ 1084.3

	a	b	c	new 8-c
	+ 12	- 6	- 10	+ 37
	+ 17	- 5	- 7	+ 10
a	+ 10	+ 20	- 2	+ 2
b	+ 7	+ 20	+ 0	+ 4
c	- 16	+ 19	+ 2	+ 3
	+ 12	+ 6	+ 2	- 10
	+ 2	+ 8	- 6	+ 47
	+ 0	+ 8	- 8	+ 81

$$- 1.20 + 15.67 = + 2.87$$

$$- 19^{\circ} 47'$$

$$+ [] - 0.9 = + 0.72$$

$$+ 15.55 = + 315.6$$

$$+ 16.53 = + 9.92 + 0.28 = + 10.20$$

8729

Conditional Equations.

16
0-C

1	+	1,20	-	1,60	=	-	91	-	27	-	108	=	-	135	+	77
2	+	1,99	-	1,39	=	-	110	-	33	-	99	=	-	127	+	17
3	+	1,96	-	0,39	=	-	107	-	45	-	26	=	-	71	-	36
4	+	2,01		0,00	=	+	52	-	76	+	0	=	-	76	+	98
5	+	1,91	+	0,61	=	-	44	-	43	+	41	=	-	2	-	92
6	+	1,20	+	1,60	=	-	31	-	27	+	108	=	+	81	-	112
7	+	0,20	+	2,00	=	+	184	-	4	+	135	=	+	131	+	53
8	+	0,00	+	2,01	=	+	225	-	0	+	136	=	+	136	+	89

+301 - 190

$$+16,53 - 1,20 = -457.7 + 9.92$$

$$- 1,20 + 15,64 = +1087.3 + 2.87$$

$$+ 1,20 - .09 = - 33.2$$

$$+ 15,55 = +1051.1$$

$$b = +0.23 \Delta$$

$$b = +67.7$$

$$+16,53 = -457.7 + 81.3 = -376.7$$

$$a = -22.8$$

$$+0.62 \Delta$$

Arc Measured 173°

$$\frac{P}{n} .12$$

$$\frac{2V}{n} = +17$$

$$Im \gamma \quad R \quad 2.00$$

$$-2RC = -.80$$

$$\frac{+17.}{.12} = +117$$

$$\Delta R = +1.7$$

$$Corr + 0.2$$

$$\Delta \theta = -0.18$$

$$\Delta \delta = -0''.1$$

$$\Delta R = +1.2$$

$$\Delta a = -0.50$$

$$\Delta d = -0.02$$

5729

Conditional Equations

16

0.0

$$\begin{array}{rclcl}
 1 & +1.20 & -1.60 & = & -91 & -27 & -108 & = & -135 & +79 \\
 2 & +1.44 & -1.29 & = & -110 & -33 & -94 & = & -127 & +17 \\
 3 & +1.96 & -0.39 & = & -107 & -45 & -26 & = & -71 & -36 \\
 4 & +2.01 & 0.00 & = & +22 & -46 & +0 & = & -46 & +98 \\
 5 & +1.91 & +0.61 & = & -44 & -43 & +91 & = & 2 & -72 \\
 6 & +1.20 & +1.60 & = & 31 & -27 & +108 & = & +81 & -112 \\
 7 & +0.20 & +2.00 & = & +184 & -9 & +135 & = & +131 & +53 \\
 8 & +0.00 & +2.01 & = & +225 & 0 & +136 & = & +136 & +89 \\
 & & & & & & & & +301 & -190
 \end{array}$$

$$+16.53 - 1.20 = -95.17$$

$$- 1.20 + 15.64 = +1087.3$$

$$+ 1.20 - .09 = -332$$

$$+15.55 = +1051.1$$

$$b = +67.1$$

$$+16.53 = -957.7 + 813 = -316.4$$

$$a = -22.8$$

Are measured 1730

$$\frac{P}{h} .12$$

$$\frac{2V}{h} = +17$$

$$\frac{+19.}{.12} = +117$$

$$\Delta R = +1.9$$

8729 Moon's Mean Position

17

$$\begin{array}{r} \chi_0 = 21.7970'' \\ - 1.1'' \\ \hline 21.7959'' \end{array}$$

$$\begin{array}{r} \alpha_0 = 15.3970'' \\ + 3.8'' \\ \hline 15.3974'' \end{array}$$

From Plate Constants

$$\chi = 22.6095''$$

$$\alpha = 16.8936''$$

$$\zeta = +.6095''$$

$$\eta = -1.1064''$$

$$\begin{array}{r} \log \chi = 9.97112'' \\ \log \zeta = 9.78497'' \\ \hline 8.50729'' \\ 1.30661'' \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.5785'' \\ \zeta^2 = 9.5699'' \\ \hline 7.0534'' \\ 6.2018'' \end{array}$$

$$\chi - A = +20.26''$$

$$\eta = -0.0002''$$

$$A = 20 \ 33 \ 39.02''$$

$$\eta_0 = -1.1062''$$

$$\alpha_0 = 20 \ 33 \ 59.26''$$

$$\log h_0 = 0.04388''$$

$$\text{Red} = +3.8\phi''$$

$$7.33115''$$

$$2.71259''$$

$$\chi_1 = 20 \ 37 \ 03.07''$$

$$S-D = -8 \ 35.9''$$

$$D = 20 \ 31 \ 10.0''$$

$$S_0 = 20 \ 39 \ 46.0''$$

$$\text{Red} = +8.7''$$

$$S' = 20 \ 39 \ 37.3''$$

2729 Moon's Mean Position

17

$$\begin{array}{r} 10 = 21.7970'' \\ - 11'' \\ \hline 21.7959'' \end{array}$$

$$\begin{array}{r} 10 = 13.3970'' \\ + 39'' \\ \hline 13.3979'' \end{array}$$

Moon Plate Constants

$$x = 22.6095''$$

$$y = 16.8936''$$

$$z = +6095''$$

$$u = -11069''$$

$$\log x = 9.97112''$$

$$\log \tan \delta = 9.5785''$$

$$\log y = 9.78797''$$

$$z = 9.5679''$$

$$85.0729''$$

$$7.0539''$$

$$1.30661''$$

$$6.2018''$$

$$x - A = +20.26''$$

$$u = -0.0002''$$

$$A = 20.33.39.00''$$

$$u_0 = -1.1062''$$

$$x_0 = 20.33.58.26''$$

$$\log u_0 = 0.04389''$$

$$7.33115''$$

$$Red = +3.84''$$

$$2.71269''$$

$$-5.1605''$$

$$x_1 = 20.37.03.07''$$

$$D = 20.31.10.0''$$

$$D = 20.31.10.0''$$

$$D_0 = 20.39.46.0''$$

$$Red = +8.7''$$

$$D' = 20.37.37.3''$$

8729

Reduction to Apparent place.

18

122° 30.0
 $H + \alpha$ 32 10.0
 H 11 36.0
 α 20 34.0
 G 22 23.6
 $G + \alpha$ 42 57.6

289° 24.0

$\log \cos G + \alpha$ 9.3957
 g 1.1983
 $\sin "$ 9.9864 n
 $\tan \delta$ 9.5764 n
 8.8239

$\log g'$ 0.5940
 g 9.5847

$f + 2.193$
 $g + 0.384$
 $h + 1.229$

 $+ 3.806$

δ -20 39 43.9

$\log \cos \delta$ 9.9711
 L 9.9658 +
 L' 9.9369

$\log \sin \delta$ 9.5476 n
 $\cos (H + \alpha)$ 9.7302 n
 h 1.3107
 $\sin (H + \alpha)$ 9.9260
 $\sec \delta$ 0.0289
 8.8239

$\log h$ 0.5885
 h 0.0895

$g' + 3.927$
 $h' + 3.877$
 $L' + 0.863$

 $+ 8.667$

8729 Reduction to Apparent Place.

18

$$1 \times 2^{\circ} \quad 30.0$$

$$H + \alpha \quad 32 \quad 10.0$$

$$H \quad 11 \quad 36.0$$

$$\alpha \quad 20 \quad 34.9$$

$$G \quad 22 \quad 23.6$$

$$G + \alpha \quad 92 \quad 57.6$$

$$289^{\circ} \quad 28.0$$

$$\log \cos \delta \quad 9.3957$$

$$q \quad 1.1953$$

$$\sin \delta \quad 9.9869 \text{ n}$$

$$\tan \delta \quad 9.5769 \text{ n}$$

$$88.239$$

$$\log q' \quad 0.5940$$

$$q \quad 9.5847$$

$$f + 2193$$

$$g + 0387$$

$$h + 1229$$

$$1.5806$$

$$\delta \quad -20 \quad 39 \quad 95.9$$

$$\log \cos \delta \quad 9.9711$$

$$L \quad 9.9658$$

$$i \quad 9.9367$$

$$\log \sin \delta \quad 9.5176 \text{ n}$$

$$\log H + \alpha \quad 9.7302 \text{ n}$$

$$L \quad 1.3107$$

$$\sin H + \alpha \quad 9.7260$$

$$\tan \delta \quad 0.0289$$

$$88.239$$

$$\log h \quad 0.5888$$

$$h \quad 0.0895$$

$$g' + 3927$$

$$h' + 3877$$

$$i' + 0865$$

$$+ 8.668$$

8729

Lunar Parallax.

19

$$\begin{array}{rcl}
 \alpha' & 20 & 39 \quad 03.07'' \\
 \delta & 21 & 43 \quad 29.3'' \\
 6-\alpha' + & 1 & 09 \quad 26.23'' \\
 = & +17^\circ & 21' \quad 33.95'' \\
 \\
 5-\alpha' & +6 & 59.31'' \\
 2 & 17 & 17 \quad 34.19''
 \end{array}
 \quad
 \begin{array}{rcl}
 \pi & 59' & 35''.15'' \\
 \\
 9.86913 \\
 8.23885'' \\
 9.47473'' \\
 0.02644'' \\
 \hline
 7.60915''
 \end{array}$$

$$\begin{array}{rcl}
 9.95727'' \\
 0.00000'' \\
 0.01997'' \\
 \hline
 9.97724''
 \end{array}$$

$$\begin{array}{rcl}
 \alpha-\alpha' & 13 & 58.63'' \\
 = & +0 & 55.91''
 \end{array}$$

$$\gamma \quad 43 \quad 29 \quad 57.5''$$

$$\delta - 20 \quad 39 \quad 37.3''$$

$$\gamma - \delta \quad 64 \quad 09 \quad 34.8''$$

$$\begin{array}{rcl}
 9.82670 \\
 8.23885'' \\
 9.95424'' \\
 \hline
 0.16220'' \\
 8.18169''
 \end{array}$$

$$\delta - \delta' \quad +52 \quad 17.2''$$

$$\delta \quad -19 \quad 47 \quad 23.6''$$

$$\alpha \quad 20 \quad 39 \quad 58.98''$$

$$\text{Am Eph } \delta - 19 \quad 47 \quad 25.3'' \quad \text{A.E. } \alpha \quad 20 \quad 39 \quad 58.21''$$

$$\alpha - \epsilon \quad +2.2'' \quad \omega - \epsilon \quad +0.77''$$

$$\text{Curv. of Plate } 0 \quad -1.05''$$

$$2^{\text{nd}} \text{ Order Ref } +0.2$$

$$\text{In Corr} \quad -0.1 \quad -0.02$$

$$\delta \quad -19 \quad 47 \quad 23.0$$

$$\alpha \quad 20 \quad 39 \quad 58.96$$

$$\alpha - \epsilon \quad +2.3$$

$$+1.75''$$

8729

Lunar Parallax

19

20	39	03.07"	20	39	55.10"
21	73	7.3"			
+ 1	09	26.23"			7.26913
+ 17	21	33.95"			8.23885
					9.97973
	+ 6	59.31"			00.2699
17	19	39.19"			7.60979

1.93727"
 000000"
 001997"
 997724"

13 58.63"

10 55.91"

1.93 29 57.5"

2 - 20 39 37.3"

2 69 09 39.8"

9.82670
 8.23885"
 9.95929"
0.16220
 8.18169"

+ 52 19.2"

- 19 47 23.0" 20 39 58.98"

- 19 47 23.0" 20 39 58.21"

+ 2.2" + 0.77"

Curv. of Plate 0 - 1.05"

2nd Order Ref + 0.2

In Curv. - 0.1 - 0.02

- 19 47 23.0" 20 39 58.98"

