

KG
11366
v. 968



1
11
28.8

2
11.9
7+

3
31.7
15.8

1
20
19.2

2
20.2
14.2
Mmm

3
21.1
19.4

7549

Star Measures $dl. = 5$

1

	λ	χ	λ	χ	λ	χ	λ	χ
1	17098		15562		16698		16008	
11	16360		6300		10112		12552	
28.8	78 ⁵⁴		08 ⁰⁴		12 ¹²		44 ⁴⁸	
	82		56		88		00	
	<u>11.0744</u>		<u>11.0748</u>		<u>28.6580</u>		<u>28.6544</u>	

2	16838		14142		14868		16612	
11.9	8359 ⁵³		12622		17056 ⁵⁸		739091	
7+	52		22		60		92	
	17		32		92		00	
	<u>11.8974</u>		<u>11.8982</u>		<u>7.0808</u>		<u>7.0790</u>	

3	17078		14542		16660		13580	
31.7	10000 ⁹		11630 ³⁰		10096 ⁴⁷		10172 ⁶⁷	
15.8	9998		30		98		62	
	78		32		96		70	
	<u>31.7078</u>		<u>31.7090</u>		<u>75.6604</u>		<u>15.6590</u>	

Moon Measures

1			15086		15407	
20			13504		696658	
19.2			06		50	
			68		392	
			<u>14.1580</u>		<u>14.1566</u>	

2			17059		15380	
20.2			12566 ⁶¹		686858	
14.2			56		98	
14.2			92		78	
14.2			<u>14.1792</u>		<u>14.1980</u>	

3			13960		14448	
21.1			10540		7820	
14.7			38		20	
			50		38	
			<u>14.3418</u>		<u>14.3378</u>	

Star Measure

Cape No 1729 Mag 8.0

	1 st A	2 nd A	3 rd A	4 th A
31.6	17018	17538	19699	16777
26.0	11610	16936	10219	12218
	12	38	12	18
	010	32	50	800
	31.5902	26.0602	26.0569	31.5918

7549

Star Measures

1

L	17098	19562	16698	16008
11	7636.0	6340	10112	12532
8.8	48 ⁵⁹	28 ⁰⁹	12 ¹²	99 ⁴⁸
	82	56	88	00
	<u>11.0799</u>	<u>11.0798</u>	<u>286580</u>	<u>28.6599</u>
-	16838	14192	14828	16612
19	8359 ⁵³	12622	19056 ⁵⁸	739091
1+	52	22	60 ⁵⁸	92
	19	32	92	00
	<u>11.8979</u>	<u>11.8982</u>	<u>70808</u>	<u>7.0790</u>
3	17078	19542	16660	13580
11	10000	11630 ³⁰	10096 ⁴⁷	10172 ⁰⁷
10.8	9998	30	98	02
	78	32	96	70
	<u>31.7078</u>	<u>31.7090</u>	<u>156609</u>	<u>15.6590</u>

Moon Measures

L		15086	15409
10		13509	696658
19.2		06	50
		68	392
		<u>19.1580</u>	<u>19.1566</u>
L		14059	13380
10.2		12566 ⁶¹	686858
19.2		56	48
14.2		72	88
14.2		<u>19.1792</u>	<u>19.1980</u>
3		13960	14448
11.1		10590	7820
19.9		38	20
		50	38
		<u>19.3918</u>	<u>19.3378</u>

Star Measure

Age nr 1729 Mg. 8.0

	γ d	γ d	γ -R	γ -R
31.6	17018	17538	19699	16799
26.0	11610	16932	10217	12218
	12	38	12	18
	010	32	50	800
	31.5902	26.0602	26.0569	31.5418

7.5.49

Moon Measures.

<u>4</u>	1 4 3 0 7	1 7 0 0 0
21.8	6 4 8 2	1 4 8 7 0 6 9
15	8 7	6 8
	0 2	9 0
	<u>21.7820</u>	<u>21.7872</u>

<u>5</u>		1 6 0 3 0 0	1 8 9 8 2
22		1 2 1 6 0	1 2 3 5 2 5 9
15.3		6 6 6 3	6 6 5 9
		2 0	7 6
		<u>15.3869</u>	<u>15.3880</u>

<u>6</u>	1 6 1 5 2	1 7 3 3 0
22.1	1 8 6 8 8	8 7 8 7
16.1	8 6 8 7	8 7
	7 2	1 0
X-max	<u>22.1867</u>	<u>22.1972</u>

<u>7</u>		1 8 5 0 0	1 8 0 9 2
22.		9 6 8 6 9 1	1 6 9 1 8 9 0 6
16.9		9 6	8 9 4
		4 9 9	7 7
		<u>16.8809</u>	<u>16.8816</u>

<u>8</u>	1 7 7 0 6	1 7 3 6 8	1 6 4 7 8	1 6 4 5 2
21.5	9 7 2 0 2 9	9 6 5 0	1 0 7 0 2 6 9 9	1 2 2 1 0 1 0
17.5	2 8 2 9	5 2	6 9 6	1 0 1 0
	6 8 6	6 8	6 8	4 2
Sen.	<u>21.5272</u>	<u>21.5282</u>	<u>17.5779</u>	<u>17.5762</u>

73-79

Moon Measures.

1	14307	178080
1.8	6982	1787269
15	87	88
	02	80
	<u>21,7820</u>	<u>21,7872</u>

2		180000	18982
22		12160	12322
15.3		6663	6659
		20	76
		<u>15,3869</u>	<u>15,3880</u>

6	16152	17330
12.1	18688	1789
6.1	8687	89
	92	10
	<u>21,1969</u>	<u>22,1972</u>

7		18500	18092
2.		7686	16918
6.9		999	79
		<u>16,8809</u>	<u>16,8816</u>

8	17706	17288	16973	16932
11.5	9420	9630	10102	12210
17.2	2829	32	696	92
	686	68	68	
	<u>21,5272</u>	<u>21,5282</u>	<u>17,5779</u>	<u>17,5762</u>

7589

Times & Etc.

10 = 5

5

Jan. 7 '15

Expos. to Stars

13

19

13

31

" " Moon

13

24

52.6

13

24

52.8

Clock slow

0

39.7

H. Sid Time

13

25

32.4

0-d = +0

48.3

H. Long.

4

44

31.03

G. Sid Time

18

10

03.43

Sid. Time M.H.

19

03

52.57

Interval

23

06

10.88

Reduction

03

47.09

G.M.T.

23

02

23.79

From Naut. Alman.

R. A.

Dec.

Moon 23

12

36

52.79

- 07

55

11.7

Motion 1^m

+ 20.89

- 15.731

2.3965

+ 5.01

- 37.70

Tabular place

12

36

57.80

- 07

55

49.1

Moon's

Age

22 days.

934 = 9.6

Parallax

58

46.14

Semidiam.

16

02.40

R.

962.7

Augmen.

10.2

S_{hr} 5

- 0.8

R.

971.8

a = -503.9

R.

2.0832

+ 2.7

aR.

- 100.0

- 479.9

(1+a)R.

1.9832

R²

3.9331

7489

Times & Etc.

10.5

60

Jan. 7 15

Expos. to Stars	13	19	13	31
" " Moon	13	29	52.6	13 29 52.8
Clock slow		0	39.7	

H. Sid Time	13	25	329	8-4= 0 48.5
H. Long	7	44	31.05	
G. Sid Time	18	10	03.45	
Sid. Time at H.	19	03	52.57	
Intertrack	23	06	10.88	
Reduction		03	47.09	
G.M.T.	23	02	23.79	

Moon Hunt. alt. R. A.

Dec.

Moon 23	12	36	52.19	-07 55	11.9
Motion 1 ^m			20.88		-13.731
2.3965			5.080		-31.10
Tabular place	12	36	57.80	-07 55	49.1

Moon's Age 22 days.

739 7.5

Parallax	58	46.14
Semi-diam.	16	02.70
H		962.1
Argument		10.20
Per		-0.8
R.		971.8
R.		2.0832
rk.		-1.999
At all		1.9828
R.		3.9384

a = -503.9

+2.7

-779.9

7549 Plate Constants.

7

x	11.0746	11.8478	31.5410	31.7086
y	11.2012	11.9919	32.6955	32.8615
$x-y$	-1266	-1936	-11545	-11531

α	28.6562	7.0799	26.0583	15.6597
η	28.5656	5.8874	25.8329	14.8938
$\alpha-\eta$	+906	+11925	+2359	+7659

$$\begin{array}{rcll}
 x-y & +500x & +10y & +3.9x & -9605^{\vee} \\
 -1266 + 5537 & = & 4271 + 287 & = & +4558 + 43 & = & 4601 & = & -7 \\
 -1436 + 5924 & = & 4488 + 71 & = & +4559 + 46 & = & 4605 & = & 0 \\
 -11545 + 15770 & = & 4225 + 261 & = & +4486 + 123 & = & 4609 & = & +7 \\
 -11531 + 15859 & = & 4328 + 157 & = & +4480 + 127 & = & 4607 & = & -1 \\
 20.1625 + 10081^{\vee} & & +161^{\vee} & & +79^{\vee} & = & 20.7341^{\vee}
 \end{array}$$

$$\begin{array}{rcll}
 \alpha-\eta & +500\alpha & -5.8\eta & +10.5\eta & -15.973^{\vee} \\
 +906 + 19328 & = & 15237 - 64 & = & 15170 + 301 & = & 15471 & = & -2 \\
 +11925 + 3540 & = & 15465 - 69 & = & 15396 + 75 & = & 15471 & = & -2 \\
 +2359 + 13029 & = & 15388 - 183 & = & 15205 + 274 & = & 15479 & = & +6 \\
 +7659 + 7830 & = & 15489 - 184 & = & 15305 + 165 & = & 15470 & = & -3 \\
 16.1349 + 8062^{\vee} & & -117^{\vee} & & +169^{\vee} & = & 15.3995^{\vee}
 \end{array}$$

Tables $a = -1.5$ $e = -5$ $a-e = +3.5$ $b+d = -1$
 Obs. $= -503.9$ $= -512.5$ $= +6.6$ $= -4.2$
 $-502.4^{\vee}$ $-505.5^{\vee}$ $-3.2^{\vee}$

7579 Plate Constants.

7.

λ	11.0796	11.8978	31.5910	31.7084
η	11.2012	11.9919	32.6955	32.8615
$\lambda - \eta$	- 1246	- 1936	- 11545	- 11531

η	28.6542	7.0899	26.0583	15.6597
η	28.5656	5.4884	25.8229	17.8938
$\eta - \eta$	+ 906	+ 11725	+ 2334	+ 7659

$$\begin{array}{rcll}
 \lambda - \eta & + 500\lambda & + 10\eta & + 3.9\lambda & - 9605 \\
 -1266 + 5537 & = & 9271 + 287 & = & + 9558 + 93 = 9651 = -7 \\
 -1936 + 5929 & = & 9988 + 71 & = & + 9559 + 96 = 9655 = 0 \\
 -11545 + 15770 & = & 9225 + 261 & = & + 9986 + 123 = 9609 = +7 \\
 -11531 + 15859 & = & 9328 + 157 & = & + 9980 + 127 = 9607 = -1 \\
 20.1635 + 10081 & = & + 161 & & + 79 = 20.7396
 \end{array}$$

$$\begin{array}{rcll}
 \eta - \eta & + 500\eta & - 5.8\lambda & + 10.5\eta & - 15.715 \\
 +906 + 19328 & = & 15234 - 67 & = & 15170 + 301 = 15471 = -1 \\
 +11925 + 3580 & = & 15965 - 69 & = & 15396 + 75 = 15471 = -2 \\
 12359 + 13029 & = & 15388 - 183 & = & 15205 + 274 = 15479 = +6 \\
 +1429 + 7830 & = & 15489 - 189 & = & 15300 + 169 = 15470 = -3 \\
 16.1392 + 8062 & = & - 117 & & + 169 = 15.3995
 \end{array}$$

Tables $a = -1.5$ $e = -5$ $a \cdot e = +3.5$ $b + d = -1$
 lbs. $=$ $=$ $=$ $=$

$A = +1.5$
 $B = +3.9$

7549 Moon's Center.

	x	$x-x_0$	$2x(x-x_0)$	$(x-x_0)^2 + (y-y_0)^2$	$Q-c$
1	20.6000	-0.1613	-30.0026	3.9370	+ 55
2	20.1613	0.0000	0.0000	3.9454	+ 139
3	21.0000	+0.8387	0.7029	3.9249	- 66
4	21.7846	+1.6233	2.6344	3.9215	- 100
5	22.0000	+1.8387	3.3804	3.9387	+ 72
6	+22.1468	+1.9855	0	3.9422	+ 107
7	22.0000	+1.8387	+1	3.9395	+ 80
8	21.5277	+1.3664	+2	3.9507	+ 192

$$R = 3.9315$$

$$3.9331 \quad \text{Corr} = -16$$

	y	$y-y_0$	$2y(y-y_0)$	L
1	14.1573	-1.9768	-8.3910	185
2	-14.1786	-1.9855	-8.3945	180
3	14.3298	-1.7943	-7.3222	156
4	15.0000	-1.1391	-4.1287	125
5	15.3872	-0.7469	-3.0558	112
6	16.4344	0.0000	0.0000	90
7	16.8810	+0.7469	+3.0558	68
8	17.5768	+1.4427	+6.2083	44

171

Approximate Center

$$x = 22 \quad y = 15.3872$$

$$\quad \quad \quad 16.8810$$

$$\quad \quad \quad 32.2682$$

$$y_0 = 16.1391$$

$$y_{\min} = 14.1786$$

$$R = 1.9855$$

$$x_{\max} = 22.1468$$

$$x_0 = 20.1613$$

Plate Center

$$\begin{cases} x_0 = 20.1613 \\ y_0 = 16.1391 \end{cases}$$

7549 Moon's Center.

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$	$(y - y_0)^2$	$w - e$
1	20.0000	-0.1613	0.0000	0.0000	3.9310	15.45	+
2	20.1613	0.0000	0.0000	0.0000	3.9954	15.97	+
3	21.0000	+0.8387	0.7029	0.7029	3.9299	15.44	-
4	21.7896	+1.6233	2.6349	2.6349	3.9215	15.37	-
5	22.0000	+1.8387	3.3809	3.3809	3.9387	15.51	+
6	+22.1968	+1.9855	3.9422	3.9422	3.9922	15.94	+
7	22.0000	+1.8387	3.3812	3.3812	3.9395	15.52	+
8	21.5277	+1.3664	1.8676	1.8676	3.9507	15.61	+

$$R = 3.9315$$

	y	$y - y_0$	$(y - y_0)^2$	$(x - x_0)(y - y_0)$	$x - x_0$	$(x - x_0)^2$
1	19.1573	-1.7768	3.1568	3.1568	1.7768	3.1568
2	19.1986	-1.7355	3.0023	3.0023	1.7355	3.0023
3	19.3398	-1.5943	2.5413	2.5413	1.5943	2.5413
4	19.0000	-1.9391	3.7603	3.7603	1.9391	3.7603
5	19.3872	-1.5518	2.4083	2.4083	1.5518	2.4083
6	16.4394	-4.5627	20.8173	20.8173	4.5627	20.8173
7	16.8810	-4.1211	16.9833	16.9833	4.1211	16.9833
8	17.5768	-3.4253	11.7323	11.7323	3.4253	11.7323

Approximate Center

$$\begin{aligned}
 x_0 &= 22.0000 \\
 y_0 &= 19.3872 \\
 \hline
 x &= 22.2682 \\
 y &= 16.1391 \\
 \hline
 x_{\text{mean}} &= 19.1986 \\
 R &= 1.9355 \\
 x_{\text{max}} &= 22.1968 \\
 y_0 &= 20.1613
 \end{aligned}$$

Plate Center

$$\begin{cases}
 x_0 = 20.1613 \\
 y_0 = 16.1391
 \end{cases}$$

Formation of Normals.

1	+ 0.32	- 8.8 + 2.6	- 109.0 + 31.6
2	- 0.00	+ 0.0 - 0.0	- 276.0 + 31.8
3	- 1.50	- 55.5 - 13.5	+ 118.0 + 28.6
4	- 1.83	- 162.0 - 25.9	+ 113.0 + 18.1
5	- 1.38	+ 132.5 - 29.9	- 59.0 + 12.0
6	+ 0.00	+ 213.0 - 31.9	+ 00.0 - 0.0
7	+ 1.38	+ 177.0 - 29.9	+ 60.0 - 12.0
8	+ 1.97	+ 263.0 - 21.9	+ 276.0 - 23.0
	+ 3.64	+ 755.5	+ 567.0
	- 4.71	- 226.3	- 439.0
	- 1.07	+ 529.2	+ 128.0
		- 179.4	+ 87.1
		+ 379.8	+ 215.1

	a	b	c	new b-c
a	+ 23	- 9	+ 24	- 20
b	- 12	+ 0	+ 24	- 16
c	- 70	+ 49	+ 22	+ 1
		+ 37	+ 14	+ 11
		+ 42	+ 9	+ 11
		+ 46	- 0	+ 6
		+ 42	- 9	- 7
		+ 31	- 17	- 26

$$15.9 - 1.07 = +9.3 \Delta$$

$$-1.07 + 15.6 = -5.75 \Delta$$

$$+ [] - .1 + 0.61 \Delta$$

$$+ 15.5 = -4.87 \Delta$$

$$+ 15.9 = +9.34 \Delta - 0.31 \Delta = +9.03 \Delta$$

7549

Conditional Equations.

6

Corr = -16

O-C

1	-0.16	-1.98	= + 55	-4	-30	= -34	+89
2	0.00	-1.99	= + 139	0	-31	= -31	+170
3	+0.84	-1.79	= -66	+21	-28	= -7	-59
4	+1.62	-1.13	= -100	+40	-17	= +23	-123
5	+1.84	-0.75	= +72	+46	-12	= +34	+38
6	+1.99	+0.00	= +107	+49	+0	= +49	+58
7	+1.84	+0.75	= +80	+46	+12	= +58	+22
8	+1.37	+1.44	= +192	+34	+22	= +56	+126
						+503	-182
						+321	

$$\begin{array}{rcl}
 a & b & \\
 +15.9 & -1.04 & = +379.8 \\
 -1.04 & +15.6 & = +215.1
 \end{array}$$

$$\begin{array}{rcl}
 8 \times -16 & = & -128 \\
 +9.374 & + & 193 \\
 -5.75 \Delta & &
 \end{array}$$

$$+1.04 - .07 = +24.9$$

$$+15.53 = +240.0$$

$$b = +15.9 - .30 \Delta$$

$$+15.9 = +16 + 379.8 = +395.8$$

$$a = +24.9 + .57 \Delta$$

Arc Measured 141°

$$\frac{p}{h} = 1115$$

$$\frac{2v}{h} = +27.1$$

$$\text{Irr } 5^- \quad R \quad 1.98 \quad \frac{+27.1}{1115} = +210$$

$$\Delta R = +2.6$$

$$-2RC = -1.98$$

$$\text{Corr } +0.5$$

$$\Delta R = +2.1$$

$$\Delta b = +0.59$$

$$\Delta d = +0.3$$

$$\Delta a = -1.13$$

$$\Delta \alpha = -0.07$$

7549

Conditional Equations

Corr. = -16

6

D-C

1	-0.16	-1.98	= + 55	-4	-30	= -34	+ 89
2	0.00	-1.99	= + 139	0	-31	= -31	+ 170
3	+0.84	-1.79	= -66	+21	-28	= -7	-59
4	+1.62	-1.13	= -100	+40	-17	= +23	-123
5	+1.89	-0.75	= +72	+46	-12	= +34	+38
6	+1.99	+0.00	= +107	+49	+0	= +49	+58
7	+1.89	+0.75	= +80	+46	+12	= +58	+22
8	+1.37	+1.14	= +192	+34	+22	= +56	+126

+503 = 182

+321

8 x -16 = -128

+193

$$a \quad b$$

$$+15.9 \quad -1.09 = +379.8$$

$$-1.09 \quad +15.6 = +215.1$$

$$+1.09 \quad -0.7 = +29.9$$

$$+15.53 = +2140.0$$

$$b = +15.9$$

$$+15.9 = +167 + 379.8 = +329.8$$

$$a = +24.9$$

Arc Measured 171°

$$\frac{p}{h} = 1115$$

$$\frac{2v}{h} = +29.1$$

$$\frac{+29.1}{115} = +210$$

$$\Delta P = +2.6$$

7549. Moon's Mean Position

7

$$\chi_0 = 20.1613''$$

$$+12 = 20.1625''$$

$$\gamma_0 = 16.1341''$$

$$+8 = 16.1349''$$

From Plate Constants

$$\chi = 20.7341''$$

$$\gamma = 15.3995''$$

$$\xi = -1.2659''$$

$$\eta = 2.6005''$$

$$\log \xi = 0.10240''$$

$$\log \eta = 9.99499''$$

$$8.50727''$$

$$\log(A) = 1.60047''$$

$$\log \tan \delta = 9.1834''$$

$$\xi = 0.2048''$$

$$7.0537''$$

$$6.7413''$$

$$\delta - A = -39.82''$$

$$A = 12 \ 37 \ 00''$$

$$\delta_0 = 12 \ 36 \ 20.18''$$

$$\text{Red} = +.73''$$

$$\delta = 12 \ 36 \ 20.91''$$

$$\eta_1 = -0.0003''$$

$$\eta_0 = -2.6002''$$

$$\log \eta_0 = 0.41505''$$

$$7.33115''$$

$$3.08385''$$

$$\delta - D = -1212.97''$$

$$= -20 \ 13.0''$$

$$D = 8 \ 21 \ 00''$$

$$\delta_0 = 08 \ 41 \ 13.0''$$

$$\text{Red} = -7.5''$$

$$\delta' = 08 \ 41 \ 17.5''$$

7549. Moon's Mean Position

7

$$x_0 = 20.1613'' \quad y_0 = 16.1391''$$

$$+12'' = 20.1625'' \quad +8''$$

From Plate Constants 16.1349''

$$x = 20.7346''$$

$$y = 15.3995''$$

$$\xi = -1.2659''$$

$$\eta = 2.6005''$$

$$\log 50.10290''$$

$$\log 9.99999''$$

$$8.50729''$$

$$1.60007''$$

$$\log \tan \delta = 9.1831''$$

$$\xi = 9.2098''$$

$$7.0539''$$

$$6.7413''$$

$$\log(x-x_0)$$

$$x - x_0 = -39.82''$$

$$A = 12.3740''$$

$$q = 12.362018''$$

$$\text{Red} = +.13''$$

$$x = 12.362096''$$

$$n_1 = -0.0003''$$

$$n_0 = -2.6002''$$

$$\log n_0 = 0.71500''$$

$$7.33115''$$

$$3.08385''$$

$$S-D = -1212.97''$$

$$= -20.13.9$$

$$D = 8.21.00''$$

$$\delta_0 = 08.41.17.0''$$

$$\text{Red} = -7.5''$$

$$S' = 08.41.17.5''$$

M Virgins

$$\begin{array}{r}
 12 \quad 15 \quad 34.95 \\
 \underline{33.73} \\
 + 1.02
 \end{array}$$

$$\begin{array}{r}
 - 0 \quad 11 \quad 47.9 \\
 \underline{40.25} \\
 - 7.65
 \end{array}$$

X Virg.

$$\begin{array}{r}
 12 \quad 34 \quad 52.30 \\
 \underline{51.75} \\
 + 0.85
 \end{array}$$

$$\begin{array}{r}
 - 7 \quad 31 \quad 46.3 \\
 \underline{40.65} \\
 - 5.65
 \end{array}$$

(2) S Corvi

$$\begin{array}{r}
 12 \quad 25 \quad 28.70 \\
 \underline{27.86} \\
 + 0.94
 \end{array}$$

$$\begin{array}{r}
 - 16 \quad 02 \quad 34.8 \\
 \underline{32.34} \\
 - 2.46
 \end{array}$$

(3) 8 Virg.

$$\begin{array}{r}
 13 \quad 5 \quad 33.52 \\
 \underline{32.83} \\
 + 0.69
 \end{array}$$

$$\begin{array}{r}
 - 5 \quad 5 \quad 15.0 \\
 \underline{7.7} \\
 + 7.3
 \end{array}$$

0.

2

4

3
0

6

8

10

12

14

16

18

7549 Reduction to App. Place.

$$= 173^{\circ} 29'$$

$$H + \alpha \quad 11 \quad 33.6$$

$$H \quad 22 \quad 57.3$$

$$\alpha \quad 12 \quad 36.3$$

$$G \quad 19 \quad 55.2$$

$$G + \alpha \quad 8 \quad 31.5$$

$$= 127^{\circ} 52.5'$$

$$\log \cos (H + \alpha) \quad 9.7881 n$$

$$g \quad 0.9298$$

$$\sin \quad 9.8973$$

$$\tan \delta \quad 9.1841 n$$

$$\underline{8.8239}$$

$$\log (g)' \quad 0.7179 n$$

$$(g) \quad 8.8351 n$$

$$f + 0.670$$

$$g - 0.068$$

$$h + 0.158$$

$$\underline{+ .730 \quad \checkmark}$$

$$\delta \quad - 8 \quad 41 \quad 13.1$$

$$\log \cos \delta \quad 9.9950$$

$$\underline{L \quad 0.3773 \quad n}$$

$$(L') 0.3723 n$$

$$\log \sin \delta \quad 9.1791 n$$

$$\cos (H + \alpha) \quad 9.9971 n$$

$$h \quad 1.3081$$

$$\sin \quad 9.0626$$

$$\sec \delta \quad 0.0050$$

$$\underline{8.8239}$$

$$\log h' \quad 0.7843$$

$$h \quad 9.1996$$

$$g' - 5.223$$

$$h' + 3.050$$

$$i - 2.357$$

$$\underline{- 4.530 \quad \checkmark}$$

7599 Reduction to App. Place.

$$= 173^{\circ} 29'$$

$$H + \alpha \quad 11 \quad 33.6$$

$$H \quad 22 \quad 57.3$$

$$\alpha \quad 12 \quad 36.3$$

$$G \quad 17 \quad 55.2$$

$$G + \alpha \quad 8 \quad 31.5$$

$$= 127^{\circ} 52.5'$$

$$\log \cos (H - \alpha) \quad 7.7881 \text{ n}$$

$$q \quad 0.9278$$

$$\sin \quad 7.8973$$

$$\cos \quad 7.1871 \text{ n}$$

$$\underline{8.8229}$$

$$\log q' \quad 0.7179 \text{ n}$$

$$q \quad 8.8951 \text{ n}$$

$$f + 0.670$$

$$g - 0.065$$

$$h + 0.158$$

$$+ 730$$

$$\delta - \alpha \quad 41 \quad 13.1$$

$$\log \cos \delta \quad 9.9950$$

$$+ 0.3773 \text{ n}$$

$$(10) 0.3723 \text{ n}$$

$$\log \sin \delta \quad 9.1791 \text{ n}$$

$$\cos (H - \alpha) \quad 9.9971 \text{ n}$$

$$h \quad 1.3081$$

$$\sin \quad 9.0626$$

$$\cos \delta \quad 0.0050$$

$$\underline{8.8239}$$

$$\log h' \quad 0.9873$$

$$h \quad 9.1996$$

$$g' - 5.223$$

$$h' + 3.050$$

$$a - 2.357$$

$$- 4.530$$

7549

Lunar Parallax

$$\begin{array}{r}
 \alpha' \quad 12^h \quad 36 \quad 20.91'' \\
 \delta \quad 13 \quad 25 \quad 32.4'' \\
 \alpha - \alpha' \quad 0 \quad 49 \quad 11.79'' \\
 = \quad 12^0 \quad 17' \quad 52'' 35'' \\
 \quad \quad + 7 \quad 40.5'' \\
 \quad 12 \quad 13 \quad 11.85''
 \end{array}$$

$$9.95727''$$

$$0.00000''$$

$$0.00996''$$

$$\tan \gamma \quad 9.96723''$$

$$\gamma = 42 \quad 50 \quad 25.4''$$

$$\delta \quad -8 \quad 41 \quad 17.5''$$

$$\delta - \delta' \quad 51 \quad 31 \quad 42.9''$$

$$9.82670''$$

$$8.23285''$$

$$9.89372''$$

$$0.16752''$$

$$\sin(\delta - \delta') \quad 8.12050''$$

$$\delta' \quad -8 \quad 41 \quad 17.5''$$

$$\pi \quad 58' \quad 46'' 19''$$

$$9.86913''$$

$$8.23285''$$

$$9.32838''$$

$$0.00418''$$

$$7.43454''$$

$$9' \quad 21'' 0''$$

$$= + 37.9''$$

$$20.94$$

$$S - S' \quad + 45' \quad 22.3'' \quad \alpha \quad 12 \quad 36 \quad 58.34''$$

$$S \quad -07 \quad 55 \quad 55.2''$$

$$\text{Am. Eph. S} \quad -07 \quad 55 \quad 49.1'' \quad \alpha \quad 12 \quad 36 \quad 57.80''$$

$$0 - c \quad -6.1'' \quad 0 - c \quad + 0.51''$$

$$2^{\text{nd}} \text{ Ord. Ref.} \quad + 0.1$$

$$\text{Curv. of Plate} \quad + 0.7 \quad + 0.07$$

$$\text{Err. Corr} \quad + 0.3 \quad - 0.07$$

$$J \quad -07 \quad 55 \quad 57.8 \quad 12 \quad 36 \quad 58.27$$

7599

Lunar Parallax

3

$$\begin{array}{r}
 \alpha' \quad 12^{\circ} \quad 36 \quad 20.91'' \\
 \delta' \quad 13 \quad 25 \quad 32.9'' \\
 \alpha - \alpha' \quad 0 \quad 49 \quad 11.99'' \\
 = \quad 12^{\circ} \quad 17' \quad 52.35'' \\
 \quad \quad 19 \quad 40.5'' \\
 12 \quad 13 \quad 11.85'' \\
 9.95727'' \\
 0.00000'' \\
 \hline
 0.00996'' \\
 \text{sum} \quad 9.96723''
 \end{array}$$

$$\begin{array}{r}
 \delta' \quad -8 \quad 41 \quad 17.5'' \\
 \pi \quad 58' \quad 46.14'' \\
 9.86913'' \\
 8.23295'' \\
 9.32838'' \\
 \hline
 0.00918'' \\
 7.93954'' \\
 9' \quad 21.0''
 \end{array}$$

$$\alpha = 12^{\circ} \quad 50 \quad 25.9''$$

$$\delta = -8 \quad 41 \quad 17.5''$$

$$= 37.9''$$

$$20.91$$

$$\alpha - \delta \quad 51 \quad 31 \quad 42.9''$$

$$\begin{array}{r}
 9.82690'' \\
 8.23285'' \\
 9.87372'' \\
 \hline
 0.16752''
 \end{array}$$

$$\text{sum (3.5)} \quad 8.12050''$$

$$S - S' \quad - 75' \quad 20.3'' \quad \alpha \quad 12^{\circ} \quad 36 \quad 58.31''$$

$$S \quad - 07 \quad 55 \quad 56.3''$$

$$\text{Am Cphd} \quad - 07 \quad 55 \quad 49.1'' \quad \alpha \quad 12 \quad 36 \quad 57.80''$$

$$W - C \quad - 8.1'' \quad W - C \quad + 0.33''$$

$$\begin{array}{r}
 2^{\text{nd}} \text{ Ord Ref} \quad + 0.1 \\
 \text{Cur of Plate} \quad + 0.4 \\
 \hline
 \quad \quad \quad + 0.07
 \end{array}$$

$$\begin{array}{r}
 \text{Irr Corr} \quad + 0.3 \\
 S \quad - 07 \quad 55 \quad 57.8'' \\
 \hline
 12 \quad 36 \quad 58.27''
 \end{array}$$

7571

Star Measures

10.7

11

1	13228	19856	16000	19846
12.4	9960	8654	6190	17632
9.9	54	42	86	3830
	98	52	5989	40
	42			
	<u>12.3778</u>	<u>12.3794</u>	<u>9.9796</u>	<u>9.9790</u>
2	13100	14150	13578	13570
148	4906	12344	8872	8250
145	14	4092	6870	5050
	22	50	60	56
	02			
	<u>16.8189</u>	<u>16.8192</u>	<u>24.4400</u>	<u>24.7688</u>
3	16386	13158	16592	15152
3.4	12272	7300	14388	10260
156	73	7290	8888	5256
	74	68	18	50
	74			
	<u>33.9108</u>	<u>33.4122</u>	<u>15.5192</u>	<u>15.5106</u>

Moon's Measures

1		16982	19925
21.4		10596	14292
13.7		9696	9292
9.9		70	18
		<u>13.6378</u>	<u>13.6370</u>
2		16900	13960
22		9120	11684
13.8		1015	7077
		6880	3950
		<u>13.7770</u>	<u>13.7720</u>

3	15247	10882
22.4	17052	5200
14	056	88
	24	76
		92
	<u>22.7180</u>	
	17596	16877
	10182	11217
	82	10
	20	90
	<u>22.9354</u>	<u>22.9328</u>

7571

Star Measures

11

-	132 28	178 52	160 00	198 46
1.9	99 60	86 54	61 90	196 32
1.9	98 54	92 48	86 88	38 30
	92	51 88	59 84	40
	<u>12.377.8</u>	<u>12.379.9</u>	<u>9.979.8</u>	<u>9.979.0</u>

-	131 00	141 50	135 78	135 70
8	49 06	123 44	88 72	82 50
5	22 14	90 92	68 70	50 50
	02	50	60	56
	<u>16.818.9</u>	<u>16.819.2</u>	<u>29.970.0</u>	<u>29.968.8</u>

-	163 88	131 58	165 92	151 52
9	122 72	73 00	113 88	102 60
16	74 73	72 90	88 88	22
	74	68	18	50
	<u>33.910.8</u>	<u>33.912.2</u>	<u>15.517.2</u>	<u>15.510.6</u>

Moon's Measures.

4	169 82	149 20
21.9	105 96	112 72
13.7	96 96	92 90
7 min	70	18
	<u>13.637.8</u>	<u>13.637.0</u>

2	169 00	139 80
22	91 20	116 84
13.8	10 15	70 72
	68 80	39 50
	<u>13.777.0</u>	<u>13.772.7</u>

3	152 99	108 82
12.9	140 52	82 00
17	110 60	76
	29	92
	<u>22.918.0</u>	
	19 59	168 79
	10 52	112 19
	82	10
	20	90
	<u>22.935.9</u>	<u>22.932.8</u>

Moon Measure

12

15816

18699

967853

1980099

58

14798

808

97

19.6158

19.6107

5

14036

16187

23.2

1226865

798290

15

62

98

18

210

23.1768

23.1784

6

14092

16158

23.3

1128277

898081

15.6

72

82

92

58

Thay

23.2818

23.2822

7

13120

15128

23.2

1065456

760809

16

58

10

28

38

23.2474

23.2479

8

14722

16219

23

800209

1282617

16.6

106

08

08

16

16.6610

16.6601

9

12982

17030

22.7

507078

1195256

17

86

60

70

50

22.7396

22.7720

Moon Memo

12

2	15706	12679
23	9288 375	19400
17.7	358	1778 77
	888	97
	<u>19.6202</u>	<u>17.107</u>

5	19036	10129
23.2	12268 65	772290
15	62	78
	18	10
	<u>23.1768</u>	<u>23.1789</u>

6	19092	19158
23.3	11282 77	89201
15.6	72	82
May	92	58
	<u>23.2819</u>	<u>23.2822</u>

2	13130	10128
23.2	10659 56	760809
16	58	10
	28	31
	<u>23.2974</u>	<u>23.2979</u>

8	19722	10219
23	810209	1282617
16.6	106	08
	08	16
	<u>16.6610</u>	<u>16.6601</u>

2	12982	17030
22.7	5070 78	1192256
17	86	60
	70	50
	<u>22.7396</u>	<u>22.7720</u>

7571 Times and Etc.

Exp. to stars Jan 8 '15 13 02 " 13 14 "
 " to moon 13 08 24.5 " 13 08 24.7 "
 Clock slow 0 39.6 "

H. Sid. Time 13 09 09.20 $\delta - \alpha = -19^m$ "
 H. Long. 4 49 31.05 "
 G. Sid. T. 17 53 35.25 "
 Sid. T. M. noon 19 07 49.13 "
 Interval 22 45 46.12 "
 Reduction 3 43.75 "
 G.M.T. 22 42 02.37 "

From Natch. Alm. R. A. Dec.
 Moon 22^h 13 26 09.05 " 13 46 15.2 "
 Motion in 1^m 2.2098 " 14.634 "
 " " 42.8395 1 32.69 " 10 15.2 "
 Tabular Place 13 27 41.74 " -13 56 30.4 "

Moon's Age 23 days.

Parallax

Semid.

R

Augm.

Dir. 4

R.

R.

sr.

(+a) R

R²

934 - 8.9 "

59' 10.98 "

16' 05.8 "

965.8 "

9.4 "

-0.6

974.6 "

2.0892 "

-1003 "

1.9889 "

3.9557 "

a = 509.3

+27

- 480.3

7511 *Trinere and etc*

13

Cap to Stars Jan 4 '15 13 02 13 14
 " 1-moon 13 08 29.5 13 08 29.7
 Clock flow 0 39.6

H. Sid. Time 13 09 09.20 8-8 = - 19^m
 H. Long 7 44 31.05
 g. Sid. L. 17 53 25.45
 Sid. L. Moon 17 07 49.13
 Interval 22 45 46.12
 Reduction 3 43.75
 g.m.t. 2- 42 02.37

From Hank. Obs. R. A. Dec.
 Moon 22 13 26 09.05 13 46 15.2
 Motion in 1^m 20.15
 42.8395 4 22.47 16 25.2
 Tabular Place 13 27 41.71 13 56 36.7

Moon's Age 23 days.

Parallax

59' 10.98"

Semi-d.

16' 05.8"

R.

965.8"

Augur.

9.4"

Zr.

-0.6

R.

979.6"

R.

2089.2"

ak

-1003"

1+1/2

17889"

R.

39501"

734 = 1275"

a = 509.3

+27

- 780.3

7571

Plate Center and Constants.

19

X

Y

12.37 86	9.97 93	13-22-54.9	-15 31 59.3
16.81 88	29.76 97	13 25 26.7	-13 33 96
33.41 15	15.51 27	13 34 46.4	-14 46 36.5
3) 62.60 89	49.96 11	139 81 128.0	-42 110 181.8
20.86 96	16.62 68	13 27 42.6	-14 37 27.2
22	18	+35	+10 90
+ 1.130	+ 1.373	13 28 97.6	-14 26 47.2
31.5	466.5		

+ 35.5

640.5

= 10^m 40.5
 Plate Center $\begin{cases} A = 13 28 20 \\ D = -14 26 50 \end{cases}$

X-3

-467

+43X

-10726^h

$$+4530 + 6189 = +10719 - 46 = +10673 + 53 = +10726 \quad \sim 0$$

$$+2358 + 8909 = +10767 - 112 = +10655 + 72 = 27 \quad = +1$$

$$-6052 + 16706 = +10659 - 71 = +10583 + 193 = 26 \quad = 0$$

$$21.2971 + 10697^h - 72^h + 92^h = 21.2882^h$$

Y-Y

+575X

+9.5Y

-9075^h

$$+3922 + 4990 = 8912 + 68 = 8980 + 95 = +9075 \quad = 0$$

$$-3985 + 12235 = 8750 + 93 = 8843 + 232 = 9075 \quad = 0$$

$$+987 + 7756 = 8743 + 164 = 8927 + 147 = 9074 \quad = -1$$

$$15.6310 + 7815^h + 117^h + 148^h = 15.5315^h$$

 Tables $a = -1$ $e = -7$ $a-e = +6$ $b+d = +1$

 lbs. $= -504.3$ $= -509.5$ $= +5.2$ $= -0.9$

 O-C -503.3^h -502.5^h -1.9^h

7571

Plate Center and Constants

19

λ	γ				
12.3786	9.9793	13-22-59.9	-15	31	59.3
16.8188	29.7699	13 25 26.7	-13	33	96
32.4115	15.5137	13 34 26.4	-19	26	36.2
31.624089	49.9611	139 81 128.0	-42	110	191.8
20.8696	16.6268	13 27 42.6	-19	31	27.2
-2	18	+135	+10	90	
+ 1.130	+ 1.273	13 28 17.6	-19	26	47.2
<u>21.3</u>	<u>166.2</u>				
+ 35.3	690	Plate Center	{ A = 13 28 20		
	= 10 ^m 40.3		{ D = 19 26 50		

$$\begin{array}{rcll}
 \lambda - \gamma & -4.67 & +9.38 & -107.26'' \\
 7.530 + 6189 = +10719 - 16 = +10613 + 53 = +10726 & & & = 0 \\
 2358 + 8909 = +10167 - 112 = +10055 + 72 = 27 & & & = +1 \\
 -6052 + 16706 = +10659 - 71 = +10588 + 193 = 26 & & & = 0 \\
 21.2991 + 10697'' - 72'' + 72'' = 21.2882'' & & &
 \end{array}$$

$$\begin{array}{rcll}
 \gamma - \eta & +5.5\lambda & +9.51 & -90.75'' \\
 +3922 + 7790 = 11712 + 68 = 8980 + 95 = 9075 & & & = 0 \\
 -3785 + 12235 = 8750 + 93 = 8843 + 232 = 9075 & & & = 0 \\
 +981 + 1756 = 8713 + 159 = 8927 + 197 = 9074 & & & = -1 \\
 15.6310 + 7815'' + 117'' + 198'' = 15.5315'' & & &
 \end{array}$$

$$\begin{array}{lclcl}
 \text{batter } a = -1 & b = -7 & a-b = +6 & b+d = +1 \\
 \text{obs } & & &
 \end{array}$$

	ξ	η	$\Delta\xi$	-3.7ξ	-1η	-3
1	-10.07	-8.38	-42	+37 = -5	+8 = +3	
2	-5.42	+6.83	-10	+20 = +10	-7 = +3	
3	+12.01	-2.57	+45	-45 = -0	+3 = +3	
4	-0.71	-2.47		+3	+2	<u>+2</u>

	$\Delta\eta$	-3.7η	-1ξ	$+6$
	-35	+25 = -10	+3 = -7	-1
	+13	-20 = -7	+2 = -5	+1
	-10	+8 = -2	-5 = -7	-1
	0	+4	0	<u>+13</u>

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Standard Coordinates.

15

	Cape No. 1823-mg. 4.9	Cape No. 1825-mg. 9.0	Cape No. 1850-mg. 7.5
C	13 22 07.05	13 24 38.85	13 33 58.22
L	07.03	38.94	58.27
E	06.98	38.90	58.18
Mean	13 22 07.02	13 24 38.90	13 33 58.22
Dec.	47.89	47.83	48.19
α	13 22 54.91	13 25 26.73	13 34 46.41
A	13 28 20	13 28 20	13 28 20
$\alpha-A$	-05 25.09	-02 53.27	+ 6 26.41
$\sin(\alpha-A)$	-3 25.06	-17 3.27	+ 38 6.36
$\log "$	2.51196 n	2.23872 n	2.58699
" $\cos$	9.98384	9.98772	9.98639
" $\sin$	1.00304 n	0.73368 n	1.07962
ζ_0	-10,0702	-5,4160	+12.0122
ζ_1	-42	-10	+45
ζ_2	11,9256	16,5830	34,0167
χ	12,3786	16,8188	33,7115
$\chi-\zeta$	+4,330	+2,358	-6,052
C	-15 27 17.9	-13 29 05.4	-17 42 00.6
L	18.0	05.6	01.1
E	18.5	06.0	1.1
Mean	-15 27 18.1	-13 29 05.7	-17 42 00.9
Dec.	-4 41.2	-4 40.3	-4 35.6
S	-15 31 59.3	-13 33 46.0	-14 46 36.5
D	-17 26 50	-17 26 50	-17 26 50
S-D	-1 05 09.3	+53 04.0	-19 46.5
$\tan(S-D)$	-390 9.7	+3184.3	-1186.5
$\log "$	3.59215 n	3.50301	3.07426 n
" η_0	0.92330 n	0.83416	0.40541 n
$\log \tan S$	9.4440 n	9.3824 n	9.9212 n
" ζ_2	2.0061	1.4673	2.1592
" η_1	8.5035 n	7.9031 n	8.6338 n
η_0	-8.3810	+6.8259	-2.5433
η_1	-0.319	-0.080	-0.430
η	9.5871	24.8179	15.4137
η	9.9793	24.4694	15.5124
η	+3.922	-2.485	+9.87

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Standard Coordinates

	Cape No 1823-mg 4.9	Cape No 1825-mg 9.0	Cape No 1850-mg 7.5
C	13 22 07.05	13 24 38.85	13 33 58.22
L	07.03	38.99	58.27
B	06.98	38.90	58.18
Mean	13 22 07.02	13 24 38.90	13 33 58.22
Dec	91.89	97.83	98.19
X	13 22 54.91	13 25 26.13	13 34 96.91
A	13 28 20	13 28 20	13 28 20
X-A	-05 25.09	-02 53.27	+ 6 26.71
Sim(X-A)	-3 25.06	-1 73.27	+ 38 6 36
log "	2.51196 n	2.23872 n	2.58699
" cos δ	9.98389	9.98772	9.98539
" sin δ	1.00309 n	0.73368 n	1.01962
z ₀	-10.0702	-5.9160	+12.0122
z ₁	-42	-10	+45
z ₂	11 9256	16 5830	39 0167
z ₃	12 3786	16 8188	33 9115
X-z ₁	+ 9530	+ 2258	- 6052
C	-15 27 17.9	-13 29 05.4	-19 92 00.61
L	18.0	05.6	01.1
B	18.5	06.0	1.1
Mean	-15 27 18.1	-13 29 05.7	-19 92 00.9
Dec	-4 91.2	-4 90.3	-4 35.6
S	-15 31 59.3	-13 33 46.0	-19 96 36.7
D	-19 26 50	-19 26 50	-19 26 50
S-D	-105 09.3	+53 04.0	- 19 96.5
Sim(S-D)	-390 9.7	+3184.3	-1186.5
log "	3.59215 n	3.50301	3.07926 n
" cos δ	0.92330 n	0.83416	0.90541 n
log tan δ	9.9990 n	9.3829 n	9.9212 n
z ₀	20061	14673	21592
z ₁	85035 n	79031 n	86338 n
z ₂	-83810	+68259	-25933
z ₃	-0319	-0080	-0930
z ₄	95871	298179	159137
z ₅	99193	794194	159137
z ₆	3922	-2985	+ 987

A-1

B-+6

7571

Moon's Center

16

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0) + (y - y_0)^2$	$a - e$
1	21.2878	+0.0000	+2	0.0000	4.0024	+467
2	22.0000	+0.7122	+2	0.5075	3.9798	+271
3	22.7391	+1.4633	+2	1.3199	3.9968	+911
4	23.0000	+1.7122	+1	2.9319	3.9811	+259
5	23.1776	+1.8898	+1	3.5717	3.9777	+220
6	+23.2818	+1.9940	-0	3.9760	3.9760	+203
7	23.2474	+1.9596	-0	3.8400	3.9721	+164
8	23.0000	+1.7122	-1	2.9312	3.9804	+297
9	22.7408	+1.4530	-1	2.1109	3.9714	+157
				$R^2 =$	3.9557	

	y	Δy	$(y - y_0)^2$	$\leftarrow$		
1	-13.6379	-1.9999	-12	4.0024	180	
2	13.7745	-1.8623	-11	3.4723	159	
3	14.0000	-1.6368	-10	2.6824	175	
4	14.6131	-1.0237	-6	1.0492	121	
5	15.0000	-0.6368	-4	0.4060	108	
6	15.6368	+0.0000	+0	0.0000	90	
7	16.0000	+0.3632	+2	0.1321	80	
8	16.6605	+1.0237	+6	1.0492	59	
9	17.0000	+1.3632	+8	1.8605	47	133

Approximate Center

$$\begin{aligned}
 x &= 23 & y &= 14.6131 \\
 & & & 16.6605 \\
 & & & \hline
 & & & 31.2736 \\
 y_0 &= 15.6368 \\
 y_{\min} &= 13.6379 \\
 R &= 1.9999 \\
 R_m &= 1.9940 \\
 x_{\max} &= 23.2818 \\
 & 21.2878
 \end{aligned}$$

$$\begin{aligned}
 \text{Center} \quad & \begin{cases} x_0 = 21.2878 \\ y_0 = 15.6368 \end{cases}
 \end{aligned}$$

7571

Moonie Center

16

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$(y - y_0)^2$	$O-E$
1	21.2878	+0.0000	+2	0.0000	9.0029	-467
2	22.0000	+0.7122	-2	0.5075	3.9798	-291
3	22.4391	+1.1463	-2	1.0199	3.9968	-411
4	23.0000	+1.7122	+1	2.1319	3.9811	-259
5	23.1776	+1.8898	+1	3.5717	3.9777	-220
6	23.2818	+1.9990	-0	3.7760	3.9760	-203
7	23.2979	+1.9676	-0	3.6900	3.9721	-169
8	23.0000	+1.7122	-1	2.7312	3.1809	+297
9	22.7908	+1.4630	-1	2.1109	3.9719	+157
$R^2 =$					3.9557	

	y		$y - y_0$		$(y - y_0)^2$			
1	13.6379	-	1.9999	-	12	7.0029	180	
2	13.7795	-	1.8623	-	11	3.4723	159	
3	14.0000	-	1.6368	-	10	2.6829	145	
4	14.6131	-	1.0227	-	6	1.0472	121	
5	15.0000	-	0.6368	-	4	0.4060	108	
6	15.6368	-	0.0000	+	0	0.0000	90	
7	16.0000	+	0.3632	+	2	0.1321	80	
8	16.6605	+	1.0237	+	6	1.0492	59	
9	17.0000	+	1.3632	+	8	1.8605	47	133

Approximate Center

$$\begin{aligned}
 X &= 23 & y &= 14.6131 \\
 & & & 16.6602 \\
 & & & 31.2736 \\
 y_0 &= 15.6368 \\
 y_{min} &= 13.6379 \\
 R &= 1.9999 \\
 R^2 &= 1.9990 \\
 X_{max} &= 23.2818 \\
 & 21.2878
 \end{aligned}$$

$$\begin{aligned}
 \text{Center} \quad \left\{ \begin{aligned} x_0 &= 21.2878 \\ y_0 &= 15.6368 \end{aligned} \right.
 \end{aligned}$$

Formation of Normals.

1	- 0,00	+ 000,0	- 934,0
2	- 1,32	+ 171,0	- 449,0
3	- 1,88	+ 473,5	- 675,0
4	- 1,74	+ 434,5	- 259,0
5	- 1,21	+ 415,5	- 141,0
6	+ 0,00	+ 404,0	+ 00,0
7	+ 0,70	+ 322,0	+ 59,0
8	+ 1,74	+ 422,5	+ 252,0
9	+ 1,97	+ 228,0	+ 217,0
	+ 4,41	+ 2871,0	+ 525,0
	- 6,15		- 2458,0
	- 1,74		- 1933,0

	a	b	c	new o-c	
a	+23	+0	+18	-22	+212
b	-9	+16	+14	-4	-72
c	-70	+26	+13	+1	+76
	+39	+9	+8		-73
	+43	+6	+9		-83
	+46	-0	+6		-42
	+45	-3	+2		-70
	+39	-9	-10		+170
	+33	-12	-19		+113

.082

-13°

$$21.18 - 1.74 = +12.57 \Delta$$

$$-1.74 + 17.65 = -7.42 \Delta$$

$$+[\Sigma] - 0.17 = +1.03 \Delta$$

$$+17.51 = -3.39 \Delta$$

$$21.18 = +12.57 \Delta - 0.71 = +12.16 \Delta$$

7571

Conditional Equations

17

	$\bar{b}$				C				$b-c$	
1	+	0,00	-	2,00	=	+	967	+ 0	+ 233 = +233	+ 239
2	+	0,71	-	1,86	=	+	241	+ 90	+ 216 = +306	- 65
3	+	1,15	-	1,69	=	+	911	+ 175	+ 191 = +336	+ 76
4	+	1,71	-	1,02	=	+	254	+ 216	+ 119 = +335	- 81
5	+	1,89	-	0,64	=	+	220	+ 238	+ 79 = +312	- 92
6	+	1,99	+	0,00	=	+	203	+ 251	- 00 = +251	- 48
7	+	1,96	+	0,36	=	+	164	+ 298	- 92 = +206	- 92
8	+	1,71	+	1,02	=	+	297	+ 216	- 119 = + 97	+ 150
9	+	1,95	-	1,36	=	+	157	+ 183	- 158 = + 25	+ 132
								- 562		+ 357
								av		102

$$+21.18 - 1.74 = +2871 \quad +12.57 \Delta$$

$$-1.74 + 17.65 = -1933 \quad -7.92 \Delta$$

$$+1.74 - 0.19 = +236$$

$$+17.51 = -1697$$

$$b = -116.6''$$

$$= -0.23$$

$$+21.18 = +2871 - 203 = +2668$$

$$a = +126.2''$$

$$= +57 \Delta$$

Arc Measured 133°

$$\frac{p}{q} = .19$$

$$\frac{zV}{h} = -22.8$$

$$\text{Im } \gamma \quad R \quad 1.99 \quad -22.8 \quad -228 \quad \Delta R = 2.8$$

$$.10$$

$$-2RC = -1.99$$

$$\text{Corr} +0.2$$

$$\Delta R = 3.0$$

$$\Delta d = +.75'$$

$$\Delta s = +0''.2$$

$$\Delta a = -1''.17$$

$$\Delta \alpha = -0''.09$$

7571

Conditional Equations

17

	10			C			B-C
1	-0.00	-2.00	= + 927	0	+233	= +1233	+34
2	-0.71	-1.86	= - 241	10	+16	= +1306	- 85
3	-1.15	-1.64	= - 411	145	+111	= +1236	+ 70
4	-1.71	-1.02	= - 254	216	+119	= +335	- 41
5	+1.89	-0.64	= + 220	258	+79	= +212	- 12
6	+1.99	0.00	= + 203	251	-00	= +251	- 98
7	+1.96	0.36	= - 109	218	-12	= +206	- 92
8	-1.71	1.02	= + 247	216	-119	= + 97	+150
9	+1.95	1.36	= + 157	183	-158	= + 25	+132
						- 562	+ 357
						ans	102

$$+21.18 - 1.79 = +28.71$$

$$-1.79 + 19.63 = -19.33$$

$$+1.79 - 0.19 = +2.36$$

$$+19.51 = -16.97$$

$$b = -116.6$$

$$+21.18 = 128.71 - 20.3 = +26.65$$

$$a = +126.2$$

Arc Measured 133°

$$\frac{P}{h} = .09$$

$$\frac{E.V.}{h} = -22.8$$

$$\frac{-22.8}{.09} = -253 \text{ dir.} = 38$$

7574 Moon's Mean Position

18

$$\begin{array}{r} \chi_0 = 21.2878'' \\ + 63'' \\ \hline 21.2941'' \end{array}$$

$$\begin{array}{r} \eta_0 = 15.6368'' \\ - 58'' \\ \hline 15.6310'' \end{array}$$

From Plate constants

$$\chi = 21.2882''$$

$$\eta = 15.5315''$$

$$\xi = -.7118''$$

$$\eta = -2.4685''$$

$$\log \xi \quad 9.85236''$$

$$\log \delta \quad 9.98541''$$

$$\underline{8.50724''}$$

$$\log(\chi-A) \quad 1.35971''$$

$$\chi-A \quad -22.89''$$

$$A \quad 13 \quad 28 \quad 20''$$

$$\eta_0 \quad 13 \quad 27 \quad 57.11''$$

$$\text{Red} \quad +0.43''$$

$$\eta' \quad 13 \quad 27 \quad 57.54''$$

$$\log \tan \delta \quad 9.4178''$$

$$\xi'' \quad 9.7047''$$

$$\underline{7.0534''}$$

$$6.1759''$$

$$h_1 = -.0001''$$

$$h_0 = -2.4684''$$

$$\log h_0 \quad 0.39242''$$

$$\underline{7.33113''}$$

$$3.06127''$$

$$-1151.5''$$

$$\delta-D \quad -19 \quad 11.5''$$

$$D \quad -17 \quad 26 \quad 50''$$

$$\delta_0 \quad -17 \quad 46 \quad 01.5''$$

$$\text{Red} \quad -3.9''$$

$$\delta' \quad -17 \quad 46 \quad 05.4''$$

75714 Minor Mean Position

18

$$\begin{array}{r} \chi_0 = 21.2878 \\ + 63 \\ \hline 21.2941 \end{array}$$

$$\begin{array}{r} \eta_0 = 15.6368 \\ - 58 \\ \hline 15.6310 \end{array}$$

From Plate constants

$$\chi = 21.2882$$

$$\eta = 15.5315$$

$$\xi = -0.7118$$

$$\eta = -2.9685$$

$$\log \xi = 9.85236 \text{ h}^{\circ}$$

$$\log \tan \delta = 9.9178 \text{ h}^{\circ}$$

$$\cos \delta = 9.98541$$

$$\xi = 9.7097$$

$$850.729$$

$$1.0539$$

$$\log(1-A) = 1.35971 \text{ h}^{\circ}$$

$$6.1759 \text{ h}^{\circ}$$

$$\chi - A = -22.89$$

$$\eta = 0.001$$

$$\eta_0 = -2.9689$$

$$A = 13 \quad 28 \quad 20$$

$$\log \eta_0 = 0.39292 \text{ h}^{\circ}$$

$$\eta_0 = 13 \quad 27 \quad 57.11$$

$$7.33115$$

$$\text{Red} = +0.40$$

$$3.06127 \text{ h}^{\circ}$$

$$\chi' = 13 \quad 27 \quad 57.59$$

$$\delta - D = -11.515$$

$$\delta - D = 19 \quad 11.5$$

$$D = 19 \quad 26 \quad 50$$

$$1.86 = 19 \quad 46 \quad 01.5$$

$$\text{Red} = -3.9$$

$$\delta' = 19 \quad 46 \quad 05.9$$

y Hydrae

13 14

$$\begin{array}{r}
 18.35 \\
 \underline{17.83} \\
 + 0.52
 \end{array}$$

$$\begin{array}{r}
 -22 \quad 93 \quad 25.9 \\
 \underline{24.10} \\
 - 1.3
 \end{array}$$

α Vir.

13 28

$$\begin{array}{r}
 43.35 \\
 \underline{42.78} \\
 + 0.57
 \end{array}$$

$$\begin{array}{r}
 -10 \quad 43 \quad 10.2 \\
 \underline{4.5} \\
 - 5.7
 \end{array}$$

m Vir

13 37

$$\begin{array}{r}
 9.90 \\
 \underline{8.91} \\
 + .99
 \end{array}$$

$$\begin{array}{r}
 -8 \quad 16 \quad 35.0 \\
 \underline{28.1} \\
 - 6.9
 \end{array}$$

7571

Reduction to Apparent Place.

19

$$\begin{array}{rcl}
 H + \alpha & 12^h & 21^m.1 = 183^{\circ} 16'.5 \\
 H & 22 & 53.2 \\
 \alpha & 13 & 27.9 \\
 G & 19 & 56.9 \\
 G + \alpha & 9^h & 24.8 = 141^{\circ} 12'.0
 \end{array}
 \quad
 \begin{array}{rcl}
 \delta & -14 & 46 \quad 01.5 \\
 \log \cos \delta & 9.9854 \\
 & h & 0.4037 n \\
 & (v) & 0.3891 n
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos(G + \alpha) & 9.8917 n \\
 g & 0.9295 \\
 \sin & 9.7970 \\
 \tan \delta & 9.4209 n \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin \delta & 9.9063 n \\
 \cos(H + \alpha) & 9.9982 n \\
 h & 1.3077 \\
 \sin & 8.9635 n \\
 \sec \delta & 0.0146 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log g' & 0.8212 n \\
 " (g) & 8.9713 n
 \end{array}$$

$$\begin{array}{rcl}
 \log h' & 0.7122 \\
 h & 9.1097 n
 \end{array}$$

$$\begin{array}{rcl}
 f & +.651 \\
 g & -.094 \\
 h & -.129 \\
 \hline
 & +.428 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 g' & -6.626 \\
 h' & +5.155 \\
 i & -2450 \\
 \hline
 & -3.921 \checkmark
 \end{array}$$

7521

Reduction To Apparent Place

19

$$\begin{array}{rcl}
 H + \alpha & 12'' & 21.1 = 185^{\circ} 16.5' \\
 H & 22 & 53.2 \\
 \alpha & 13 & 27.9 \\
 G & 19 & 56.9 \\
 G + \alpha & 9'' & 29.8 = 191^{\circ} 12.0
 \end{array}
 \quad
 \begin{array}{rcl}
 \delta & -19 & 46 \quad 01.5' \\
 \log \cos \delta & & 9.9854 \\
 & & \quad \quad \quad 0.0037 n \\
 & & \quad \quad \quad 0.3891 n
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos(G + \alpha) & & 9.5917 n \\
 g & & 0.9295' \\
 \text{Sum } " & & 9.7970 \\
 \text{true } \delta & & 9.7209 n \\
 & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log g' & & 0.8242 n \\
 " & & 8.9713 n
 \end{array}$$

$$\begin{array}{rcl}
 f & + & 6.51 \\
 g & - & 0.99 \\
 h & - & 1.29 \\
 \hline
 & + & 4.23
 \end{array}$$

$$\begin{array}{rcl}
 \log \sin \delta & & 9.7063 n \\
 \log (\cos + \alpha) & & 9.9982 n \\
 h & & 1.3077 \\
 \text{Sum } " & & 8.9635 n \\
 \text{Sec } \delta & & 0.0146 \\
 & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \log L' & & 0.7122 \\
 h & & 9.1097 n
 \end{array}$$

$$\begin{array}{rcl}
 g' & - & 6.026 \\
 h' & - & 5.155 \\
 i & - & 2.950 \\
 \hline
 & - & 3.921
 \end{array}$$

7571

Lunar Parallax.

$$\begin{array}{rcl}
 \alpha' & 13 & 27 & 57.57'' \\
 \delta & 13 & 09 & 07.20'' \\
 \alpha - \alpha' & -18 & 33.34'' \\
 = & -4^\circ & 43' & 20.15''
 \end{array}$$

$$\begin{array}{rcl}
 \frac{1}{2}(\alpha - \alpha') & -1 & 51.4'' \\
 -\delta & 41 & 28.7''
 \end{array}$$

$$\begin{array}{rcl}
 9.95727'' \\
 0.00000'' \\
 0.00145'' \\
 \hline
 \tan 9.95872''
 \end{array}$$

$$\gamma \quad 42^\circ \quad 16' \quad 52.7''$$

$$\delta \quad -17 \quad 76 \quad 3.9''$$

$$\gamma - \delta + 57 \quad 02 \quad 58.1''$$

$$\begin{array}{rcl}
 9.82670'' \\
 8.23590'' \\
 9.92384'' \\
 0.17213'' \\
 \hline
 \sin(\delta - \delta') & 8.15827''
 \end{array}$$

$$\delta - \delta' \quad + 49 \quad 29.6''$$

$$\delta \quad -13 \quad 56 \quad 35.8''$$

$$\text{arr. Eph } \delta \quad -13 \quad 56 \quad 30.7''$$

$$\begin{array}{rcl}
 0 - c & -5.4 \\
 2^{\text{nd}} \text{ Ord. Ref} & +0.4 \\
 \text{Curv. of Plate} & +0.6
 \end{array}$$

$$\begin{array}{rcl}
 \text{In Corr} & +0.2 \\
 \delta & -13 \quad 56 \quad 35.5'' \\
 0 - c & -5.1
 \end{array}$$

$$\delta' \quad -19^\circ \quad 76' \quad 05.7''$$

$$\pi \quad 59 \quad 10.98''$$

$$\begin{array}{rcl}
 \log & 9.86913'' \\
 & 8.23590'' \\
 & 8.91553'' \\
 & 0.01299'' \\
 \hline
 & 7.03355''
 \end{array}$$

$$\alpha - \alpha' = -3 \quad 42.83''$$

$$= -17.85''$$

$$\alpha \quad 13 \quad 27 \quad 42.68''$$

$$\alpha \quad 13 \quad 27 \quad 41.79''$$

$$0 - c \quad +0.94''$$

$$+0.01$$

$$-0.07$$

$$\alpha \quad 13 \quad 27 \quad 42.67''$$

$$+0.90$$

7579

Lunar Parallax.

$$\begin{array}{rcl}
 \alpha' & 13 & 27 \quad 57.59'' \\
 \alpha & 13 & 09 \quad 29.20'' \\
 \alpha - \alpha' & -18 & 33.39'' \\
 & = & -4^\circ 43' 20.1''
 \end{array}$$

$$\begin{array}{rcl}
 \mu(\alpha - \alpha') & -1 & 51.9 \\
 & -9 & 41 \quad 28.7''
 \end{array}$$

$$9.95727''$$

$$0.00000''$$

$$0.00195''$$

$$\tan \mu 9.95872''$$

$$\delta \quad 12^\circ 16' 52.7''$$

$$\delta \quad -17 \quad 76 \quad 5.7''$$

$$\gamma - \delta + 57 \quad 0.2 \quad 58.1''$$

$$9.82670''$$

$$8.23590''$$

$$9.72384''$$

$$0.17213''$$

$$\sin(\delta - \delta') \quad 8.15827''$$

$$\delta - \delta' \quad +17 \quad 29.6''$$

$$\delta \quad -13 \quad 56 \quad 33.8''$$

$$\text{Ass. Eph. } \delta \quad -13 \quad 56 \quad 30.7''$$

$$\delta - \delta \quad -8.8''$$

$$\text{Curv. of Plate} \quad +0.6$$

$$\delta' \quad -19^\circ 76' 05.9''$$

$$\pi \quad 59 \quad 10.98''$$

log

$$9.86913''$$

$$8.23590''$$

$$8.91553''$$

$$0.01299''$$

$$7.03365''$$

$$\delta - \delta' \quad -3 \quad 42.83''$$

$$-11.86''$$

$$\alpha \quad 13 \quad 27 \quad 42.68''$$

$$\alpha \quad 13 \quad 27 \quad 41.79''$$

$$\alpha - \alpha \quad +4.94''$$

$$+0.01$$

7572.

Star Measures.

21

1	14652	14744	15038	16072
11.9	6070	13378	13942	716263
10.1	6266	5049	4091	6463
	662	58	38	70
	<u>11.8596</u>	<u>11.8602</u>	<u>10.1096</u>	<u>10.1092</u>
2	15948	14930	16308	14280
16.4	12348	8539	10506	1008079
29.6	9878	2929	02	6879
	36	32	10	90
	<u>16.3596</u>	<u>16.3598</u>	<u>29.5809</u>	<u>29.5790</u>
3	17354	15362	16068	15022
32.9	818082	1453033	10525	1053840
15.6	89	36	2927	4240
	52	60	60	08
	<u>32.9170</u>	<u>32.9172</u>	<u>15.5536</u>	<u>15.5590</u>

Moon Measures.

1
21
13.9

2
215
-133

16176	16176
1299497	928087
3000	8887
40	52
<u>13.3148</u>	<u>13.3137</u>
16062	17160
11892	1139236
90096	3036
82	82
<u>13.4179</u>	<u>13.4167</u>

7572.

Star Measures.

21

1	14662	14744	15038	16072
11.9	6070	13348.49	13942.91	71.6263
10.1	6266	50	4091	64
	662	58	38	70
	<u>11.8296</u>	<u>11.8602</u>	<u>10.1096</u>	<u>10.1092</u>
2	12998	14930	16308	19280
16.4	12398	2539.9	10506.9	10080.79
29.6	9878	2929	02	68
	26	32	10	90
	<u>16.3596</u>	<u>16.3598</u>	<u>29.5809</u>	<u>29.5790</u>
3	17354	15362	16068	15012
32.9	218082	14530.33	10525.27	10338.40
15.6	59	36	2927	42
	52	60	60	08
	<u>32.9170</u>	<u>32.9172</u>	<u>15.5537</u>	<u>15.5590</u>

Moon Measures.

1		16196	16196
21		1299997	9280.47
139		3000	68
		90	52
		<u>13.2198</u>	<u>13.2137</u>
3		16062	17160
22		11892	11392.36
13.9		90096	30
		82	82
		<u>13.9179</u>	<u>13.9169</u>

7572

Moon Measures.

22

4

22.9

17

17190

850808

0808

89

22.8678

15909

146020

0001

02

22.8698

16676

1502010

0010

6708

18.1670

17240

892823

1823

50

18.1677

5

23

14.1

6

+23A

-15.3

16562

12908

0009

50

23.3654

16168

9798

7888

69

23.3624

7

23.2

16

16096

13638

3637

50

23.2910

16118

8540

40

30

23.2912

8

23

16.7

15080

10790

8889

82

16.4592

14596

922220

1820

4600

16.4622

9

22.9

17.

15227

10970

5060

30

22.9268

19070

834698

5098

70

22.9278

1572

17.000 100.000000

4	17190	15909
22.9	8508	14602
17	0808	0001
	89	02
	<u>22.8678</u>	<u>22.8698</u>

2	16676	17290
23	10020	8928
19.1	0010	1823
	708	50
	<u>19.1670</u>	<u>19.1679</u>

4	16562	16118
22.9	12908	7798
15.3	0009	7888
	50	69
	<u>23.3659</u>	<u>23.3629</u>

2	16096	16118
23.2	13638	8590
16	3637	90
	50	30
	<u>23.2910</u>	<u>23.2912</u>

15080	19596
10990	9222
88	18
82	9600
<u>16.9592</u>	<u>16.9622</u>

9	15229	19070
22.9	10970	8396
17	50	98
	30	70
	<u>22.9268</u>	<u>22.9278</u>

7572

Times & Etc.

10-9

Jan 8 '15

Exp to Stars	13	16		13	28	
" " Moon	13	22	09.3	13	22	09.4
Clock slow		0	39.6			

H. Sid Time	13	22	43.95	-5 ^m
H. Long	4	44	31.05	
G. Sid Time	18	07	15.00	
Sid T. in Noon	19	7	49.13	
Interval	22	59	25.87	
Reduction		3	45.99	
G.M.T.	22	55	39.88	

From Naut. Alm.	R. A.		Dec.	
Moon 22 ^h	13	26	09.05	-13 46 15.2
Motion in 1 ^m			2.2055	14.627
" " 55.6696		2	2.77	13 34.2
Tabular Place	13	28	11.82	-13 59 49.4

Moon's Age 23 days.

Parallax	59'	11".23
Semidiameter	16'	9".2
R		969.2
Aug.		9.4
Dis. +		-0.6
R.		978.0
R.		2.0965
aR.		-1005
(1+a)R		1.9960
R ²		3.9870

$$937 = 8.75$$

$$\begin{aligned}
 a &= 503.3 \\
 + 27 \\
 &= 479.3
 \end{aligned}$$

7572

Turner & Cte.

10-9

23

Jan 8 '15

Eye to Stars	13	16	13	28"
" Moon	13	22	09.3"	13 22 09.9"
Clock slow		0	39.6"	
			43.95"	
17. Sid time	13	22	43.95"	5.4" - 5m"
14. Long	9	94	31.05"	
9. Sid time	18	07	15.00"	
Sid 1 m. Horn	19	7	99.13"	
Interval	22	59	25.87"	
Reduction		3	75.79"	
9 m. I	22	55	39.88"	

From Hunt Alm.	R A	Dec.
Moon 22"	13 26	09.05" - 13 96 15.2"
Motion in 1 m		14.627"
55.6696	2	11.1" 13 39.2"
Jabular Mass	13 28	11.82" - 13 59 49.4"

Moon's Age 23 days.

Parallax	59'	11.22"
Semidiameter	16'	9.2"
"		969.2"
Aug		99"
Lin		-0.6
R.		978.0"
R.		20965.4"
ak		-1003.4"
11+a)R		19960"
R.		39870"

$$939 = 8.75$$

$$a = -503.3$$

$$+27$$

$$-419.3$$

7572 Plate Center and Constants.

27

X	11.8599	16.3597	32.9171
Y	11.9256	16.5830	39.0167
X-Y	- 657	- 2233	- 10996

Y	10.1094	29.5797	15.5538
Y	9.5871	29.8179	15.9137
Y-Y	+ 5223	- 2382	+ 1401

$$\begin{aligned}
 X-Y &+ 500X & - 47.6Y & + 3.3X & - 4831 \\
 -657 &+ 5930 = +5273 & - 481 & = +4792 & + 39 = +4831 = 0 \\
 -2233 &+ 8180 = +5947 & - 1170 & = +4777 & + 57 = +31 = 0 \\
 -10996 &+ 16959 = +5963 & - 740 & = +4723 & + 109 = +32 = +1 \\
 21.3670'' &+ 10683'' & - 729'' & & + 70'' = 21.8863''
 \end{aligned}$$

$$\begin{aligned}
 Y-Y &+ 500Y & + 997X & + 10.1Y & - 10970 \\
 +5223 &+ 5055 = +10278 & + 589 & = +10867 & + 103 = +10970 = 0 \\
 -2382 &+ 12290 = +9908 & + 813 & = +10721 & + 248 = +69 = -1 \\
 +1401 &+ 7777 = +9178 & + 1635 & = +10813 & + 157 = +70 = 0 \\
 15.3106'' &+ 7655'' & + 1062'' & & + 155'' = 15.1008''
 \end{aligned}$$

$$\begin{aligned}
 \text{Tables } a &= -1 & c &= -7. & a-c &= +6 & b+d &= +.6 \\
 \text{Obs } &= -503.3 & &= -510.1 & &= +6.8 & &= -2.1
 \end{aligned}$$

$$\begin{aligned}
 O-C &= -502.3'' & &= -503.1'' & & & &= -2.6''
 \end{aligned}$$

7512 plate center and constants.

29

X	11.8279	14.3597	32.9171
Y	11.7256	16.5830	34.0167
$X-Y$	-657	-2233	-10996

η	-10.1094	29.5797	15.5538
η	7.5871	29.8179	15.4137
$\eta-\eta$	+5223	-2382	+1901

$$\begin{aligned}
 X-Y &+ 500X & -97.6Y & +3.3X & -9831 \\
 -657 & + 5930 = +5273 & -981 & = +9792 + 39 & = +9831 = 0 \\
 -2233 & + 8180 = +5947 & -1170 & = +9777 + 59 & = +31 = 0 \\
 -10996 & + 16959 = +5963 & -790 & = +9723 + 109 & = +32 = +1 \\
 213670 & + 10683 & -729 & + 70 & = 21.8863
 \end{aligned}$$

$$\begin{aligned}
 \eta-\eta &+ 500Y & +99.7X & +10.1Y & -10970 \\
 +5223 & + 5055 = +10278 & +589 & = +10867 + 103 & = +10970 = 0 \\
 -2382 & + 12290 = +9908 & +813 & = +10721 + 298 & = +69 = -1 \\
 +1901 & + 7777 = +9678 & +1635 & = +10813 + 157 & = +70 = 0 \\
 15.3106 & + 7655 & + 1062 & + 155 & = 15.1008
 \end{aligned}$$

$$\begin{aligned}
 \text{Tables } a &= -1 & c &= -7 & a-c &= +6 & b+d &= +.5 \\
 \text{Obs } &= -503.3 & &= -510.1 & &= +6.8 & &= -2.1
 \end{aligned}$$

$$A = -1.5'$$

$$B = +6.$$

75-72

Moon's Center.

25-

	x	$x-x_0$	Δx	$(x-x_0)^2$	$(x-x_0)^2 + (y-y_0)^2$	$O-C$
2	21.3658	0.0000	+1	0.0000	4.0090	+200
3	22.0000	+0.6342	+1	0.4029	4.0052	+212
4	22.8688	+1.5030	+1	2.2593	3.9877	+37
5	23.0000	+1.6342	+1	2.6710	3.9875	+35
6	+23.3639	+1.9981	+0	3.9924	3.9924	+84
7	23.2411	+1.8753	-0	3.5167	3.9880	+40
8	23.0000	+1.6342	-1	2.6703	3.9870	+30
9	22.9273	+1.0615	-1	1.1265	3.9728	-112

$$R^2 = 3.9890$$

	y	$y-y_0$	Δy	$(y-y_0)^2$	L
2	-13.3141	-1.9998	-12	4.0070	180
3	13.4169	-1.8970	-11	3.6028	161
4	14.0000	-1.3139	-8	1.7281	131
5	14.1672	-1.1467	-7	1.3165	125
6	15.3139	-0.0000	-0	0.0000	90
7	16.0000	+0.6861	+4	0.4713	70
8	16.4607	+1.1468	+7	1.3167	55
9	17.0000	+1.6861	+10	2.8463	32 178

Approximate Center.

$$x = 23$$

$$y = 14.1672$$

$$16.4607$$

$$30.6279$$

$$y_0 = 15.3139$$

$$y_{\min} = 13.3141$$

$$R = 1.9998$$

$$R_m = 1.9981$$

$$x_{\max} = 23.3639$$

$$x_0 = 21.3658$$

Approx. Center

$$\begin{cases} x_0 = 21.3658 \\ y_0 = 15.3139 \end{cases}$$

72-72	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	Σ
2	21.3658	0.0000	+1	0.0000	4.0090	+200
3	22.0000	+0.6342	+1	0.4022	4.0032	+212
4	22.8688	+1.5030	+1	2.2593	3.9877	+37
5	23.0000	+1.6342	+1	2.6710	3.9873	+32
6	+23.3639	+1.9981	+0	3.9924	3.9929	+89
7	23.2911	+1.8153	+0	3.3167	3.9880	+90
8	23.0000	+1.6342	-1	2.6703	3.9870	+30
9	22.9273	+1.0615	-1	1.1265	3.9728	-112

$$R = 3.9890$$

7	$y - y_0$	Δy	$(y - y_0)^2$	Σ	
2	-13.3191	-1.9798	-12	4.0090	180
3	13.4169	-1.8970	-11	3.4028	161
4	14.0000	-1.3139	-8	1.7281	131
5	14.1612	-1.1467	-7	1.3165	123
6	15.3139	-0.0000	-0	0.0000	90
7	16.0000	+0.6861	+9	0.9113	70
8	16.9607	+1.1468	+1	1.3167	55
9	17.0000	+1.6861	+10	2.4763	32 178

Approximate center.

$$x = 23$$

$$y = 14.1672$$

$$16.9607$$

$$30.6279$$

$$y_0 = 15.3139$$

$$y_{\text{mean}} = 13.3191$$

$$3.9998$$

$$1.9981$$

$$x_{\text{mean}} = 23.3639$$

$$x_0 = 21.3658$$

Approp center

$$\left\{ \begin{array}{l} x_0 = 21.3658 \\ y_0 = 15.3139 \end{array} \right.$$

Formation of Normals

2	- 0.00	0 + 0.00	- 400.0
3	- 1.20	+ 133.5	- 403.0
4	- 1.96	+ 55.5	- 48.5
5	- 1.87	+ 57.0	- 40.0
6	- 0.00	+ 168.0	- 00.0
7	+ 1.30	+ 75.0	+ 27.5
8	+ 1.87	+ 79.0	+ 34.5
9	+ 1.79	- 119.0	- 189.0
	+ 4.96	+ 538.0	+ 62.0
	- 5.03	- 119.0	- 1080.5
	- 0.07	+ 419.0	- 1018.5

$$A = 16.64$$

$$B = 15.28$$

	a	b	c	new b-c
a	+10	+ 0	+ 56	+ 40
b	- 28	+ 6	+ 53	+ 43
c	- 16	+ 15	+ 36	+ 33
		+ 16	+ 32	+ 32
		+ 20	+ 0	+ 4
		+ 19	- 29	- 16
		+ 16	- 32	- 32
		+ 11	- 47	- 52

- 140

7572

Conditional Equations

26

			$-b$		c	$b-c$
2	+ 0.00	- 2.00	+ 200	+ 0	+ 133	= +133 + 67
3	+ 0.63	- 1.90	+ 212	+ 16	+ 126	= +142 + 70
4	+ 1.50	- 1.31	+ 37	+ 37	+ 87	= +124 - 77
5	+ 1.63	- 1.15	+ 35	+ 91	+ 76	= +117 - 82
6	+ 2.00	- 0.00	+ 89	+ 50	+ 00	= +50 + 39
7	+ 1.88	+ 0.69	+ 40	+ 47	- 46	= +01 + 39
8	+ 1.63	+ 1.15	+ 30	+ 91	- 76	= -35 + 65
9	+ 1.06	+ 1.69	- 112	+ 26	- 112	= -86 - 26
						-185 + 275
						av = 51

$$+ 16.64 - .04 = + 419 + 10.33 \Delta$$

$$- .04 + 15.28 = -1018.5 - 2.83 \Delta$$

$$+ .04 - 0 = + 1.8$$

$$- 0.18 \Delta$$

$$+ 15.28 = -1016.7$$

$$b = - 66.4$$

$$16.64 = + 419 - 4.6 = 414.4$$

$$a = + 24.9$$

$$+ 0.62 \Delta$$

Arc Measured 148°

$$\frac{p}{h} = .175 \quad \frac{v}{h} = +10$$

$$\text{In } 7 \quad R \ 2.00 \quad + \frac{10}{.175} = + 69$$

$$\Delta R = +0.8$$

$$\text{Corr } +0.2$$

$$-2 R C = - 0.80$$

$$\Delta R = +0.6$$

$$\Delta b = + 1.7$$

$$\Delta s = + 0.7$$

$$\Delta a = - 1.9$$

$$\Delta q = - 0.02$$

7572

Conditional Equations

26

		b	c	$b-c$
2	+ 0.00	- 2.00 + 200	- 0 + 133 = +133	+ 67
3	+ 0.63	- 1.90 + 212	+ 16 + 126 = +142	+ 70
4	+ 1.50	- 1.31 + 37	- 37 + 84 = +47	+ 17
5	+ 1.63	- 1.15 + 35	+ 91 + 76 = +167	+ 82
6	+ 2.00	- 0.00 + 84	+ 50 + 00 = +50	+ 39
7	+ 1.88	+ 0.69 + 40	+ 77 - 46 = +31	+ 39
8	+ 1.63	+ 1.15 + 30	+ 91 - 76 = +15	+ 65
9	+ 1.06	+ 1.69 - 112	+ 26 - 112 = -86	- 26
			- 180 + 270	
			$\Delta = 51$	

$$+ 16.69 - .07 = + 16.62$$

$$- .07 + 15.28 = + 15.21$$

$$+ .07 - 0 = + .07$$

$$+ 15.28 = + 15.28$$

$$16.69 = + 16.69 - 0 = 16.69$$

$$b = - 66.9$$

$$a = + 29.9$$

Arc Measured 198°

$$\frac{P}{h} = .175 \quad \frac{\Sigma V}{h} = +10$$

$$\frac{+10}{.175} = + 57$$

$$\Delta R = +0.8$$

7572

Moor's Mean Position.

27

$$\begin{array}{r} \chi_0 = 21.3658'' \\ \quad + 12'' \\ \hline 21.3670'' \end{array}$$

$$\begin{array}{r} \alpha_0 = 15.3139'' \\ \quad - 33'' \\ \hline 15.3106'' \end{array}$$

From Plate Constants

$$\chi = 21.8863''$$

$$\eta = 15.1008''$$

$$\xi = -.1134''$$

$$\eta = -2.8992''$$

$$\begin{array}{r} \log z = 9.05576'' \\ \cos \delta = 9.98530'' \\ \hline 8.50729'' \\ (S-A) 0.56322'' \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.4178'' \\ \xi^2 = 8.1115'' \\ \hline 7.0539'' \\ 4.5827'' \end{array}$$

$$q-A = -3.66''$$

$$\begin{array}{r} \eta_1 = .0000'' \\ \eta_0 = -2.8992'' \end{array}$$

$$A = 13 \quad 28 \quad 20''$$

$$\begin{array}{r} \log h_0 = 0.96228'' \\ \hline 7.33110'' \\ 3.13113'' = 1352.5'' \end{array}$$

$$q_0 = 13 \quad 28 \quad 16.34''$$

$$S-D = -22 \quad 32.5''$$

$$\text{Red} = +.43$$

$$D = -17 \quad 26 \quad 50''$$

$$q_1 = 13 \quad 28 \quad 16.77''$$

$$S_0 = -17 \quad 49 \quad 22.5''$$

$$\text{Red} = -3.9$$

$$S_1 = -17 \quad 49 \quad 26.4''$$

7572

Mars Mean Position.

27

$$\begin{array}{r} \chi_0 = 21.3658'' \\ + 1.2'' \\ \hline 21.3670'' \end{array}$$

$$\begin{array}{r} \psi_0 = 15.3139'' \\ - 33'' \\ \hline 15.3106'' \end{array}$$

From Plate Constants

$$\chi = 21.8863''$$

$$\eta = 15.1008''$$

$$\gamma = 1.137''$$

$$\eta = 2.8992''$$

$$\log 9.05576''$$

$$\log \tan \delta \quad 9.9178''$$

$$\log 9.98530''$$

$$\gamma = 8.1115''$$

$$8.50729''$$

$$7.0539''$$

$$(\delta A) 0.56322''$$

$$4.5827''$$

x-A

$$- 3.66''$$

$$h_1 = 0.0000''$$

$$h_0 = 2.8992''$$

$$A \quad 13 \quad 28 \quad 20''$$

$$\log h_0 \quad 0.96228''$$

$$7.33113''$$

$$t_0 \quad 13 \quad 28 \quad 16.34''$$

$$3.13113'' = 1352.5''$$

$$\delta - D \quad - 22 \quad 32.5''$$

Red.

$$+ 4.3$$

$$D \quad - 19 \quad 26 \quad 50''$$

$$t' \quad 13 \quad 28 \quad 16.77''$$

$$\delta_0 = 19 \quad 49 \quad 22.5''$$

Red

$$- 3.9$$

$$\delta_1 = 19 \quad 49 \quad 26.9''$$

7572. Reductions at Apparent Place

25

$H + \alpha$ 12 21.5 $\pm 185^\circ 22.2'S$ - 19 99 22.7
 H 22 53.2
 α 13 28.27 π $\log \cos \delta$ 9.9853
 G 19 56.9 μ 0.9037 n
 $G + \alpha$ 9° 25'2 - 191° 18.0 9.849 9.3890 n

$\log \cos (G + \alpha)$ 9.8923 n
 q 0.9295
 $\sin$ " 9.7960
 $\tan \delta$ 9.4226 n
 8.8239

$\log \sin \delta$ 9.9089 n
 $\cos H + \alpha$ 9.9981 n
 μ 1.3077
 $\sin H + \alpha$ 8.9716 n
 $\sec \delta$ 0.0149
 8.8239

$\log q'$ 0.8218 n
 q 8.9720 n

L' 0.7137
 L 9.1179 n

$f +$ 652
 $g -$ 0.094
 $h -$ 0.431

 $+ 929$

$g' -$ 6.635
 $h' +$ 5.173
 $n -$ 2.999

 $- 3.911$

7572

Lunar Parallax

29

$$\begin{array}{rcl}
 \tau' & 13 & 28 & 16.77^{\circ} \\
 \delta & 13 & 22 & 43.95^{\circ} \\
 \delta - \tau' & - & 05 & 32.82^{\circ} \\
 = & -1 & 23 & 12.3^{\circ}
 \end{array}$$

$$\begin{array}{rcl}
 \frac{1}{2} (\delta - \tau') & & -32.8^{\circ} \\
 -1 & 22 & 39.5^{\circ}
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & -14^{\circ} & 49' & 26.9^{\circ} \\
 \pi & & 59 & 11.22^{\circ}
 \end{array}$$

$$\begin{array}{rcl}
 9.86913^{\circ} \\
 8.23593^{\circ} \\
 8.38380^{\circ} \\
 \hline
 9.86913^{\circ}
 \end{array}$$

$$\sin(\delta - \delta') 6.50195^{\circ}$$

$$\begin{array}{rcl}
 9.95727^{\circ} \\
 0.00000^{\circ} \\
 0.00013^{\circ} \\
 \hline
 9.95740^{\circ}
 \end{array}$$

$$\tan 9.95740^{\circ}$$

$$\begin{array}{rcl}
 \delta - \delta' & = & -1 & 05.52^{\circ} \\
 & = & & -4.37^{\circ}
 \end{array}$$

$$\delta \quad 13 \quad 28 \quad 40.7^{\circ}$$

$$\delta - 14 \quad 49 \quad 26.9^{\circ}$$

$$\delta - \delta' \quad 57 \quad 01 \quad 07.1^{\circ}$$

$$\begin{array}{rcl}
 9.82670^{\circ} \\
 8.23593^{\circ} \\
 9.92368^{\circ} \\
 0.17286^{\circ} \\
 \hline
 8.15887^{\circ}
 \end{array}$$

$$\begin{array}{rcl}
 & & 49 & 26.9 \\
 \delta - \delta' & + & 49 & 33.8^{\circ}
 \end{array}$$

$$\delta \quad -13 \quad 59 \quad 52.6^{\circ} \quad \delta' \quad 13 \quad 28 \quad 12.40^{\circ}$$

$$\text{Ann. Eph. } \delta -13 \quad 59 \quad 49.7^{\circ} \quad \text{Ann. Eph. } 13 \quad 28 \quad 11.82^{\circ}$$

$$\begin{array}{rcl}
 U-C & -3.2^{\circ} & U-C & +0.58^{\circ} \\
 2^{\text{nd}} \text{ Ord. Ref.} & +0.1 & & \\
 \text{Curv. of Plate} & +0.6 & & +0.01
 \end{array}$$

$$\begin{array}{rcl}
 \text{In Corr} & +0.7 & & -0.02 \\
 \delta & -13 \quad 59 \quad 51.8 & \delta & 13 \quad 28 \quad 12.38 \\
 U-C = & -2.7 & & +0.56
 \end{array}$$

1572

Lunar Parallax

29

$$\begin{array}{r}
 \tau' \quad 13 \quad 28 \quad 16.77'' \\
 \delta' \quad 13 \quad 22 \quad 43.95'' \\
 \alpha - \delta' \quad -15'' \quad 32.82'' \\
 \epsilon \quad -1 \quad 23 \quad 12.3''
 \end{array}$$

$$\begin{array}{r}
 \lambda (1-4) \quad -30.8'' \\
 \mu \quad -1 \quad 22 \quad 49.7''
 \end{array}$$

$$\delta' \quad -19'' \quad 49' \quad 26.4''$$

$$\pi \quad 59 \quad 11.22''$$

$$9.86913''$$

$$8.23593''$$

$$8.38380''$$

$$008309''$$

$$\text{Sum } (1-4) 6.47195''$$

$$9.95727''$$

$$0.00000''$$

$$000013''$$

$$\text{Sum } 19.95740''$$

$$\lambda - \delta' \quad -1 \quad 05.52''$$

$$-4.37''$$

$$\lambda \quad 82 \quad 11 \quad 40.7''$$

$$\delta \quad -19 \quad 49 \quad 26.4''$$

$$\alpha - \delta \quad 57 \quad 01 \quad 09.3''$$

$$9.82690''$$

$$8.23593''$$

$$9.92368''$$

$$0.17286''$$

$$8.45887''$$

$$\delta - \delta' \quad +99 \quad 33.8''$$

$$\delta \quad -13 \quad 59 \quad 52.6'' \quad \delta \quad 13 \quad 28 \quad 12.48''$$

$$\text{Ann. Ecl. } \delta -13 \quad 59 \quad 49.9'' \quad \text{Ann. Ecl. } 13 \quad 28 \quad 11.82''$$

$$\alpha - \epsilon \quad -3.2'' \quad \alpha - \epsilon \quad +0.38''$$

$$\text{Curv. of Plate} \quad +0.6 \quad +0.01$$

