

KG

11366

n.939

LXIII



2371

2182

2368 (Bergström)



Harvard Lunar Plates

Measures and Reductions

Mary Fowler.

Volume LXIII

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2371

Star - measures

1914 Feb 20

α	δ	α	δ	α	δ	α	δ
9	16850	18750	18049	18425			
6.1	916068	16445	9166	1730304			
14.7	60	4748	5854	69			
	60	63	39	36			
	14.7695	7694	6.1119	1121			
2	16876	17309	14960	18948			
87	1517877	902030	1246270	1143636			
24.2	6977	22	63	35-26			
	79	27	70	58			
	24.1702	11700	8.7502	17518			
2	19289	16565	14303	16680			
17.4	1373031	1212332	755659	1343939			
9.5	40	3032	59	35-29			
	06	68	20	95			
	9.5564	5558	17.3243	3247			
5	very faint image.						
227	18699	17037	18564	18430			
27.1	1454142	821410	1567710	1138374			
	41	21	20	77			
	09	55	60	47			
	27.1759	11162	22.7053	7064			

Grade 4.

Remeasure

1) 24.1706	1705	8.7490	7508
5) 27.1154	1151	22.7076	7060

2371 Star - Lincosner

1914 Feb 20

	d	N
1	16850	18750
61	916068	16445
147	60	4748
	60	63
	<u>147695</u>	<u>7694</u>

	d	N
	18049	18425
	916654	1730304
	5854	09
	39	36
	<u>61119</u>	<u>1121</u>

2	16876	17309
87	1517877	902030
242	6977	22
	79	27
	<u>241702</u>	<u>1700</u>

	14960	18946
	1246270	11436
	63	35-26
	70	58
	<u>87502</u>	<u>7518</u>

3	19289	16565
174	1373031	1212332
95	40	3032
	06	68
	<u>95564</u>	<u>5558</u>

	14303	16650
	755659	13439
	59	35-29
	20	95
	<u>173243</u>	<u>3247</u>

4 very faint image

227	18699	17037
221	1954142	821410
	41	21
	09	55
	<u>271259</u>	<u>1162</u>

	18564	18430
	1568710	1138374
	20	77
	60	47
	<u>227053</u>	<u>7064</u>

Grade 4.

2371 Reason: measures

2

$$\begin{array}{r} 1 \\ 19.2 \\ 20.0^{\pm} \end{array} \begin{array}{r} 1183984 \\ 8561 \\ 11796 \end{array}$$

$$\begin{array}{r} \text{min} \\ \text{in} \\ 1 \end{array} \begin{array}{r} 19.9929 \\ \text{scattered} \end{array}$$

$$\begin{array}{r} 2 \\ 18.4 \\ 20.1 \end{array} \begin{array}{r} 17364 \\ 16010 \\ 0919 \\ 78 \\ 20.1353 \end{array}$$

$$\begin{array}{r} 3 \\ 18.0 \\ 20.4 \end{array} \begin{array}{r} 15457 \\ 1186136 \\ 3633 \\ 70 \\ 20.3620 \end{array}$$

$$\begin{array}{r} 4 \\ 17.5 \\ 21.0 \end{array}$$

$$\begin{array}{r} 5 \\ 17.2 \\ 22.0 \end{array} \begin{array}{r} \text{min} \\ \text{in} \\ 26 \end{array}$$

$$\begin{array}{r} 6 \\ 17.5 \\ 23.0 \end{array}$$

$$\begin{array}{r} 19710 \\ 1106070 \\ 6870 \\ 261 \\ 11342 \end{array}$$

$$\begin{array}{r} 20358 \\ 1398390 \\ 69 \\ 82 \\ 3606 \end{array}$$

$$\begin{array}{r} 18093 \\ 12239 \\ 3939 \\ 96 \\ 18.4142 \end{array}$$

$$\begin{array}{r} 17049 \\ 1120290 \\ 8890 \\ 32 \\ 17.4154 \end{array}$$

$$\begin{array}{r} 16950 \\ 8420 \\ 1114 \\ 64 \\ 17.1453 \end{array}$$

$$\begin{array}{r} 16552 \\ 1061086 \\ 8195 \\ 80 \\ 17.4012 \end{array}$$

$$\begin{array}{r} 20088- \\ 1594847 \\ 457 \\ 90 \\ 4142 \end{array}$$

$$\begin{array}{r} 14830 \\ 1067978 \\ 8278 \\ 50 \\ 4158 \end{array}$$

$$\begin{array}{r} 15879 \\ 1440010 \\ 09 \\ 91 \\ 1474 \end{array}$$

$$\begin{array}{r} 15916 \\ 1192129 \\ 20 \\ 24 \\ 3996 \end{array}$$

only approximate measure.

2371 Person: measures

2

1 1183984
 192 8561
 200 11796

only approximate
measure.

199929
 50000

2 17364
 189 16010
 201 0919
 78
201353

19710
 1106070
 6870
 261
1342

18093
 12239
 3939
 96
184142

20088-
 1594847
 45
 90
4142

3 15457
 180 1186136
 200 3633
 70
203620

20358
 1398390
 69
 82
3606

4
 175
 210

17049
 1120290
 8890
 32
174154

14830
 1067978
 8278
 50
4158

5
 172
 220
 26

16950
 8420
 1114
 64
171453

15879
 1440010
 09
 91
1474

6
 175
 230

16582
 1061886
 8195
 80
174012

15916
 1192129
 20
 24
3996

2371 known measures
 $\begin{array}{r} 2 \\ 18.0 \\ 23.6 \end{array} \begin{array}{r} a \\ 15240 \\ 864819 \\ 2222 \\ 47 \\ \hline 23.6624 \end{array} \begin{array}{r} n \\ 15620 \\ 12229 \\ 2530 \\ 48 \\ \hline .6660 \end{array} \begin{array}{r} d \\ \\ \\ \\ \\ \end{array} \begin{array}{r} n \\ \\ \\ \\ \\ \end{array}$

8 Scratch.
 $\begin{array}{r} 18.5 \\ 23.9 \end{array} \begin{array}{r} 1498880 \\ 69 \\ 14017 \\ \hline 23.9038 \end{array} \begin{array}{r} 12035 \\ 1109581 \\ 89 \\ \hline 9053 \end{array} \begin{array}{r} 20050 \\ 14660 \\ 77 \\ 66 \\ \hline 18.4614 \end{array} \begin{array}{r} 18719 \\ 1411020 \\ 14 \\ 41 \\ \hline 4615 \end{array}$

scratch. betw. points 5 + 6

$\begin{array}{r} 17.3 \\ 22.5 \end{array} \begin{array}{r} 19403 \\ 1292528 \\ 24 \\ 35 \\ \hline 22.6498 \end{array} \begin{array}{r} 18159 \\ 1466068 \\ 60 \\ 80 \\ \hline .6497 \end{array} \begin{array}{r} 19060 \\ 1154140 \\ 43 \\ 80 \\ \hline 17.2466 \end{array} \begin{array}{r} 18107 \\ 1558912 \\ 1410 \\ 04 \\ \hline 2500 \end{array}$

2371

union. measure

4

2

2

2

2	15240	15620
140	864819	1222930.
236	2222	2530.
	47	48
	<u>236624</u>	<u>6600</u>

8 Scratch

185	1498880	12035
239	69	1109581
	14017	89
	<u>23.9038</u>	<u>9053</u>

20050

18719

14660

1411020

77

14

66

41

18.46144615

scratch. later. front 5 + 6

17.3	19403	18159
225	1292528	1466068
	24	60
	35	80
	<u>22.6498</u>	<u>6497</u>

19060

18107

1154140

1558942

43

1410

80

09

1724662500

2371	Times after			
Exhaustion 1912 Dec 19	4 ^h	45 ^m		- 4 ^h 57 ^m
" Moon	4	50	31.2	- 4 50 31.4
clock fast		0	21.6	
H. Sid T.	4	50	097	G-X- + 2 ^h 39 ^m
Khong	4	44	31.05	
G Sid T.	9	34	4075	
Sid T. Moon	17	50	5-1.86	
Interval	15	43	4889	
Reduction		2	34.62	
G. M. T.	15	41	1427	

From Kant Alm	R.A.				Decl.	
Moon 15 ^h	2 ^h	09 ^m	23 ^s 61	+ 15 ^o	26'	5-2"4
Motion in 1 ^m = 2.0640				13.360		
" " 41.238	+ 1		25.12	+ 9	50.9	
Tabular place	2	10	4873	+ 15	36	033

Moon's age 11 days

$$934 = 11.4$$

$$932 = 11.4$$

parallax	56'	55"4
Semidiameter	15	322
R	9322	
Augmentation	+ 114	
Tranradiality	- 0.8	
R	9428	
R	20210	
(1+a)R	20206	
R ²	40828	

$$a = -22$$

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Trans. atar.

Exhibition 1912 Dec 19 4^h 4^m -4^h 57^m
 Moon 4 50 31.2 -4 50 31.4
 Clock fast 0 21.6

H Sid T. 4 50 097 $G-X-+2^h$ 39^m
 H long 4 44 31.05
 G Sid T. 9 34 40.75
 Sid T. Moon 17 50 $5-1.86$
 Interval 15 43 4889
 Reduction 2 34.62
 G. M. T. 15 41 1427

From Trans. Alum. R.A. Decl.
 Moon 15^h 2^h 09^m 23.61 $+15^0$ $26'$ $5-2''4$
 Moon 1^m 2.0640 13.360
 " 41.238 $+1$ 25.12 $+9$ 509
 Tabular place 2 10 4873 $+15$ 36 033

Moon's age 11 days.

parallax $56'$ $55''4$
 Semidiameter $15'$ 32.2
 R 9322
 Augmentation $+11.4$
 Irradiation -0.8
 R 9428
 R 20210
 (1+a)R 20206
 R² 40828
 a = -22

Standard Coordinates

Cape No. 307 ng 75				Cape No. 319 ng 7.4				A.S. 620 ng 81			
mean	2	03	16.11	2	07	56.55		2	10	45.94	
A	2	08	14	2	08	14		2	08	14	
$\alpha - A$	-	4	57.89	-	0	17.45		+	2	31.99	
$\sin(\alpha - A)$		-	297.87		-	17.45			+	151.99	
log		2	47402m		1	24180m			2	18167	
cos		9	98414		9	98782			9	98330	
$\sin \delta$		0	96540m		9	73686m			0	67221	
$\sin \delta$	-	9	2342	-	0	5456		+	4	7012	
$\sin \delta$	-		20	-		2		+		6	
$\sin \delta$		8	7638		1	74542			2	27018	
δ		8	7510		1	73245			2	27058	
$\alpha - \delta$	-	1	28	-	1	297		+		40	

mean δ	+ 15	23	13.6	+ 13	30	20.5	+ 15	47	09.3
δ	+ 15	06	56	+ 15	06	56	+ 15	06	56
$\delta - \delta$	+	16	17.6	- 1	36	35.5	+	40	18.3
$\tan(\delta - \delta)$		+	977.6		-	5797.0		+	2413.4
log		2	99016		3	76320m		3	38263
$\sin \delta$		0	32131		0	9435m		0	71378
$\tan \delta$		9	4396		9	3805		9	4513
δ^2		1	9308		9	5737		1	3444
δ		8	4238		6	0076		7	8491
δ	+	2	0956	-	1	24266	+	5	1734
δ	+		265	+		1	+		71
δ		2	41221		9	5735		2	71805
δ		2	41701		9	5561		2	71160
$\delta - \delta$	+		480		-	174		-	645

2371 Plate Constants

	4	(2)	(2)	(5)
x	6 1 1 20	8.7510	17.3245	22.7058
y	1 1.5337	14 0 6 59	22 5 0 25	27 9 9 50
$x-3$	-54217	-53149	-54780	-52892
y	14.7694	24 17 01	9.5561	27.1160
y	16.7023	26.1328	11.6134	29.2381
$y-7$	-19329	-19627	-20573	-21221

$$\begin{array}{rclcl}
 x-3 & -110.24 & & +2.2x & +5.5813 \\
 -54217 & -1628 & = & -5.5845 & +13 = -5.5832 = -19 \\
 -53149 & -2664 & = & -5.5813 & +19 = -5.5794 = +19 \\
 -54780 & -1053 & = & -5.5833 & +38 = -5.5795 = +18 \\
 -52892 & -2958 & = & -5.5880 & +50 = -5.5830 = -17 \\
 191654 & -2426 & & +42 & = 24.5083
 \end{array}$$

$$\begin{array}{rclcl}
 y-7 & +112.9x & & +1.54 & +1.8610 \\
 -1.9329 & +690 & = & -1.8639 & +22 = -1.8617 = -7 \\
 -1.9627 & +988 & = & -1.8639 & +36 = -1.8603 = +7 \\
 -2.0573 & +1956 & = & -1.8617 & +14 = -1.8603 = +7 \\
 -21221 & +2564 & = & -1.8657 & +41 = -1.8616 = -6 \\
 22.0109 & +2164 & & +33 & = 24.0916
 \end{array}$$

$$\begin{array}{lclcl}
 \text{Tables } a = -0.3 & e = -1.0 & a-e = +0.7 & b+a = -2.5 \\
 \text{Obs } a = -2.2 & e = -1.5 & a-e = -0.7 & b+a = -2.7
 \end{array}$$

$$\begin{array}{rclcl}
 x-3 & -76.94 & & +4.22 & -64 & +1965 \\
 -128 & -1859 & = & -1987 & +37 & = -1950 -13 = -1965 = 0 \\
 -1297 & -735 & = & -2032 & +73 & = -1959 -6 = -1965 = 0 \\
 +40 & -2085 & = & -2045 & +95 & = -1950 -16 = -1966 = -1 \\
 19.1654 & -1693 & & +80 & -13 & = 19.1993 \checkmark
 \end{array}$$

$$\begin{array}{rclcl}
 y-7 & +822x & & +2.34 & -1236 \\
 +480 & +702 & = & +1182 & +56 & = +1238 = 0 \\
 -174 & +1389 & = & +1215 & +22 & = +1237 = -1 \\
 -645 & +1821 & = & +1176 & +62 & = +1238 = 0 \\
 22.0109 & +1537 & & +51 & & = 22.0459 \checkmark
 \end{array}$$

α	δ	R.A.	Decl.	
8.7510	24.1701	2 03 16	+15 23 14	x
17.3245	9.5567	2 07 57	+13 30 20	3
22.7058	27.1160	2 10 46	+15 47 09	x
3 487813	608422	6 20 119	+43 100 43	
16.26	2028	2 07 20	+14 53 34	4
-18	-22	+54	+13 22	2
17.4	1.72	2 08 14	+15 06 56	4
31	465			
54	13' 22"	A = 2 08 14		
		D = +15 06 56		

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Plate Constants

	4	2	2	5
x	6.1120	8.7510	17.3245	22.7058
y	11.5337	14.0659	22.8025	27.9950
x-3	-5.4217	-5.3149	-5.4780	-5.2892
y	14.7694	24.1701	9.5561	27.1160
y	16.7023	26.1328	11.6134	29.2381
y-y	-1.9329	-1.9627	-2.0573	-2.1221

$$\begin{array}{rclcl}
 x-3 & -1.1024 & & +2.22 & +5.5813 \\
 -5.4217 & -1.628 & = & -5.5845 & +1.3 = -5.5832 & : & -19 \\
 -5.3149 & -2.664 & = & -5.5813 & +1.9 = -5.5794 & : & +19 \\
 -5.4780 & -1.053 & = & -5.5833 & +3.8 = -5.5795 & : & +18 \\
 -5.2892 & -2.958 & = & -5.5880 & +5.0 = -5.5830 & : & -17 \\
 19.1654 & -2.426 & & +4.2 & & = & 24.5083
 \end{array}$$

$$\begin{array}{rclcl}
 y-y & +1.1292 & & +1.54 & +1.8610 \\
 -1.9329 & +6.90 & = & -1.8639 & +2.2 = -1.8617 & : & -7 \\
 -1.9627 & +9.88 & = & -1.8639 & +3.6 = -1.8603 & : & +7 \\
 -2.0573 & +1.956 & = & -1.8617 & +1.4 = -1.8603 & : & +7 \\
 -2.1221 & +2.564 & = & -1.8657 & +4.1 = -1.8616 & : & -6 \\
 22.0109 & +2.164 & & +3.3 & & = & 24.0916
 \end{array}$$

$$\begin{array}{lclcl}
 \text{Tables} & a = -0.3 & c = -1.0 & a - c = 7.07 & b + a = -2.5 \\
 \text{Obs} & a = -2.2 & c = -1.5 & a - c = -0.7 & b + a = -2.7
 \end{array}$$

pt	mag. μ	residual
1	201.8	+20
2	21.53	-25
3	240.0	+17
4	270.0	-65
5	283.4	-3
6	299.3	+94
7	324.7	-23
8	339.6	-21

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Moon's Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2$	$o - c$
1	18.4142	-0.7508	-5	0.5644	4.0883	+55
2	18.0000	-1.1650	-4	1.3582	4.0830	+2
3	17.9156	-1.7494	-3	3.0614	4.0855	+27
4	17.1464	-2.0186	-0	4.0748	4.0749	-79
5	17.2483	-1.9167	+2	3.6730	4.0798	-30
6	17.4004	-1.7646	+3	3.1128	4.0889	+61
7	18.0000	-1.1650	+4	1.3563	4.0762	-66
8	18.4614	-0.7036	+5	0.4943	4.0762	-66
9						

$$\text{Comp } R^2 = 4.0825$$

	y	$y - y_0$	$(y - y_0)^2$
1	20.1348	-1.8772	3.5239
2	20.3613	-1.6507	2.7248
3	21.0000	-1.0120	1.0241
4	22.0000	-0.0120	0.0001
5	22.6498	+0.6378	0.4068
6	23.0000	+0.9880	0.9761
7	23.6612	+1.6492	2.7199
8	23.9046	+1.8926	3.5819
9			

Approx. Center

$$x = 18.0 \quad y = 20.3613$$

$$\begin{array}{r} 23.6612 \\ \hline 44.0225 \end{array}$$

$$y_0 = 22.0112$$

$$y = \text{min} = 19.9930$$

$$R = 2.0182$$

$$x = \text{min} = 17.1464$$

$$x_0 = 19.1646$$

$$\text{Center } \left\{ \begin{array}{l} x_0 = 19.1650 \\ y_0 = 22.0120 \end{array} \right.$$

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Moor's Center

	x	$z - x_0$	Δz	$(z - x_0)^2$	$(z - x_0)^2$	$z - z$
1	18.4142	-0.7508	-5	0.5644	4.0483	+55
2	18.0000	-1.1650	-4	1.3582	4.0830	+2
3	17.9156	-1.7494	-3	3.0614	4.0855	+27
4	17.1464	-2.0186	-0	4.0748	4.0749	-79
5	17.2483	-1.9167	+2	3.6730	4.0798	-30
6	17.4004	-1.7646	+3	3.1128	4.0889	+61
7	18.0000	-1.1650	+4	1.3583	4.0762	-66
8	18.4614	-0.7036	+5	0.4943	4.0762	-66
9						

$$\text{Comp } R^2 = 4.0824$$

	y	$y - y_0$	$(y - y_0)^2$
1	20.1398	-1.8772	3.5239
2	20.3613	-1.6507	2.7248
3	21.0000	-1.0120	1.0241
4	22.0000	0.0120	0.0001
5	22.6498	+0.6378	0.4068
6	23.0000	+0.9880	0.9761
7	23.6612	+1.6492	2.7199
8	23.9046	+1.8926	3.5819
9			

Approx. Center

$$\begin{aligned} z &= 18.0 & y &= 20.3613 \\ & & & 23.6612 \\ & & & \hline & & & 44.0225 \\ y_0 &= 22.0112 \\ y - y_0 &= 19.9930 \\ R &= 20.182 \\ z - y_0 &= 17.1464 \\ x &= 19.1646 \end{aligned}$$

$$\text{Center } \left\{ \begin{array}{l} x_0 = 19.1650 \\ y_0 = 22.0120 \end{array} \right.$$

Formation of Normals

	ab	and	bm
1	+ 1.41	- 41.2	- 103.2
2	+ 1.93	- 2.3	- 3.3
3	+ 1.77	- 42.2	- 27.3
4	+ 0.00	+ 159.5	+ 0.8
5	- 1.23	+ 57.6	- 19.2
6	- 1.74	- 107.2	+ 60.4
7	- 1.93	+ 77.2	- 109.0
8	- 1.32	+ 46.2	- 124.8
	- 1.11	+ 147.6	- 325.6

2371 Moon's Center

Conditional Equations

	a	b	0		c	0 - c
1	-0.75	-1.88	= +5.5	-	5 + 40 = +35	+20
2	-1.17	-1.65	= +2	-	8 + 35 = +27	-25
3	-1.75	-1.01	= +27	-	12 + 22 = +10	+17
4	-2.02	-0.01	= -79	-	14 + 0 = -14	-65
5	-1.92	+0.64	= -30	-	13 - 14 = -27	-3
6	-1.76	+0.99	= +61	-	12 - 21 = -33	+94
7	-1.17	+1.65	= -66	-	8 - 35 = -43	-23
8	-0.70	+1.89	= -66	-	5 - 40 = -45	-21

Average: 53

Normal Equation

$$+17.70 - 1.11 = +148$$

$$- 1.11 + 14.96 = -326$$

$$+ 1.11 - 0.07 = +9$$

$$+ 14.89 = -317$$

$$b = -21.3$$

$$+17.70 = +148 - 24 = +124$$

$$a = +7.0$$

$$\text{Am. measure} = 138^\circ \text{ Average}(b-c) = -0.75$$

$$\frac{bc}{m} = 10$$

$$- \frac{0.75}{10} = -0.08$$

$$Az = -0.1$$

$$\begin{array}{rclclcl}
 & 20 - 3 & -110.24 & & + 22 \pi & & + 5.5813 \\
 -5.4217 & -1628 & = & -5.5845 & + 13 & = & -5.5832 & = & -19 \\
 -5.3149 & -2664 & = & -5.5813 & + 19 & = & -5.5794 & = & +19 \\
 -5.4780 & -1053 & = & -5.5833 & + 38 & = & -5.5795 & = & +18 \\
 -5.2892 & -2988 & = & -5.5880 & + 50 & = & -5.5830 & = & -17
 \end{array}$$

$$\begin{array}{rclclcl}
 & 4 - 7 & + 1129 \pi & & + 1.54 & & + 1.8610 \\
 -19829 & + 690 & = & -18639 & + 22 & = & -1.8617 & = & -7 \\
 -19627 & + 988 & = & -18639 & + 36 & = & -1.8608 & = & +7 \\
 -20573 & + 1956 & = & -18617 & + 14 & = & -1.8603 & = & +7 \\
 -21221 & + 2564 & = & -18657 & + 41 & = & -1.8616 & = & -6
 \end{array}$$

z	y	$z - y$	$y - z$
+ 1.153 + 16.70 + 1 =	+ 6		+ 21
- 14.07 + 26.13 + 1 =	+ 20		+ 14
+ 22.80 + 11.61 + 1 =	+ 27		+ 11
+ 28.99 + 29.24 + 1 =	- 52		- 45
+ 12.80 + 21.42 + 1 =	+ 13.00		+ 17.50
+ 25.40 + 20.42 + 1 =	- 12.50		- 17.00
+ 17.16 + 14.16 + 1 =	+ 16.50		+ 16.00
+ 21.04 + 27.68 + 1 =	- 16.00		- 15.50
- 12.60 + 1.00 =	+ 25.50		+ 34.50
- 3.88 - 13.52 =	+ 32.50		+ 31.50
+ 3.88 - 0.31 =	- 78.6		- 10.64
- 13.83 =	+ 24.64		+ 20.86
$b =$	- 1.78		- 1.51

$$-12.60 = +25.50 + 1.78 = +27.28$$

$$a = -2.16$$

$$+34.50 + 1.51 = +36.01$$

$$-2.86$$

+ 13.0	- 12.5	+ 16.5	- 16.5	+ 17.5	- 17.0	+ 16.0	- 15.5
+ 27.7	+ 55.0	+ 37.2	+ 45.6	+ 36.6	+ 72.6	+ 49.0	+ 60.2
+ 38.1	+ 36.5	+ 24.2	+ 49.3	+ 32.3	+ 30.8	+ 21.3	+ 41.7
+ 78.8	+ 79.0	+ 78.9	+ 78.4	+ 86.4	+ 86.4	+ 86.3	+ 86.4

c	o	$o - c$
- 25 - 30 + 79 = + 24	+ 6	- 18
- 30 - 47 + 79 = + 2	+ 20	+ 18
- 49 - 21 + 79 = + 9	+ 27	+ 18
- 61 - 52 + 79 = - 34	- 52	- 18

$$x = 5$$

c	o	$o - c$
- 33 - 25 + 86 = + 28	+ 21	- 7
- 40 - 39 + 86 = + 7	+ 14	+ 7
- 65 - 18 + 86 = + 3	+ 11	+ 8
- 80 - 44 + 86 = - 38	- 48	- 7

$$\begin{array}{r}
 -110 \\
 -2.9 \\
 \hline
 112 \\
 -112.9 \\
 \hline
 1.5 \\
 110.2
 \end{array}$$

$$\begin{array}{llll}
 a = 0 & e = 0 & b = +112 & a = -110 \\
 a = -2.2 & e = -1.5 & b = 110.2 & a = -112.9
 \end{array}$$

2371 Inverse Center
Conditional Equations

7

	a	b	c	0 - c
1	-0.75	-1.88	+5.5	+20
2	-1.17	-1.65	+2	-25
3	-1.75	-1.01	+27	+17
4	-2.02	-0.01	-79	-65
5	-1.92	+0.64	-30	-3
6	-1.76	+0.99	-12	+94
7	-1.17	+1.65	-8	-23
8	-0.70	+1.89	-5	-21

Average: 33

Normal Equations

$$\begin{aligned}
 +17.70 - 1.11 &= +148 \\
 -1.11 + 14.96 &= -326
 \end{aligned}$$

$$\begin{aligned}
 +1.11 - 0.07 &= +9 \\
 +14.89 &= -317
 \end{aligned}$$

$$+17.70 = +148 - 24 - +124$$

$$b = -21.3$$

$$a = +7.0$$

From Plate Constant $k = 19.19954 = 22.0959^{\circ}$

$$\bar{z} = +11993^{\circ}$$

$$\bar{m} = +0.0459$$

$$\begin{aligned} \log \bar{z} &= 0.07893 \\ &= 998470^{\circ} \\ &= 850724 \end{aligned}$$

$$\begin{aligned} \log \tan S &= 9.4316 \\ \bar{z}^2 &= 01599 \\ &= 70534 \\ &= 66449 \end{aligned}$$

$$(\alpha - A) = 158699^{\circ}$$

$$+ 4$$

$$\alpha - A = + 38.64$$

$$m_0 = +0.0455$$

$$A = 2 \ 08 \ 14$$

$$\begin{aligned} \log \eta_0 &= 865801^{\circ} \\ &= 733115^{\circ} \end{aligned}$$

$$\alpha_0 = 2 \ 08 \ 52.64$$

$$(\delta - D) = 132686^{\circ}$$

$$\delta - D = + 21.2^{\circ}$$

$$D = 15 \ 06 \ 56$$

$$\delta^{\circ} = 15 \ 07 \ 17.2^{\circ}$$

$$+ 24.6$$

$$15 \ 07 \ 41.8$$

2371 Moon's Mean Position (1912.0)

$$X_0 = 19.1650^\circ$$

$$Y_0 = 22.0120^\circ$$

$$\frac{1}{2}a = +04^\circ$$

$$\frac{1}{2}b = -11^\circ$$

$$X = 19.1654^\circ$$

$$Y = 22.0109^\circ$$

Jovian Plate Coordinates $X = 24.5083$ $Y = 24.0916$

Cor for tilt = -19

$$X = 24.5074$$

$$Z_1 = +8$$

$$Z_0 = +6.5074$$

$$\eta = +2.0916$$

$$\log Z_0 = 0.81341$$

$$\log S_1 = 9.98470$$

$$\log \text{const} = 8.50724$$

$$\log \tan S = 9.4347$$

$$S^2 = 1.6266$$

$$\log \text{const} = 7.0534$$

$$\eta_1 = 81117$$

$$(\alpha - A) = 232147$$

$$\eta_1 = +129$$

$$\alpha - A = +3 \quad 29.64$$

$$\eta_0 = +2.0787$$

$$A = 2 \quad 05 \quad 23$$

$$d_0 = 2^h \quad 08^m \quad 52.64$$

$$\log \eta_0 = 0.31779$$

$$7.33115$$

$$\text{Red} = + \quad 3.64$$

$$(\alpha - D) = 29.8664$$

$$\alpha' = 2 \quad 08 \quad 56.28$$

$$S - D = +16 \quad 09.7$$

$$D = +14 \quad 51 \quad 08$$

$$S_0 = +15 \quad 07 \quad 17.7$$

$$\text{Red} = + \quad 24.6$$

$$S' = +15 \quad 07 \quad 42.3$$

2371 Mironis Mean Position (1912.0)

$$X_0 = 19.1650$$

$$Y_0 = 22.0120$$

$$a = +04$$

$$b = -11$$

$$X = 19.1654$$

$$Y = 22.0109$$

Jovian Plate Constant $X = 245083$ $Y = 240916$

Cor for tilt = -9

$$Z_1 = +8$$

$$X = 245074$$

$$Z_0 = +65074$$

$$Y = +20916$$

$$\log Z_1 = 0.81344$$

$$\log S_1 = 9.98470$$

$$\log W_1 = 8.50724$$

$$(X-A) = 232147$$

$$X-A = +32964$$

$$A = 20523$$

$$A_0 = 20852.64$$

$$Red = +364$$

$$X' = 2085628$$

$$\log \tan S = 9.4344$$

$$S = 1.6266$$

$$\log W_0 = 7.0534$$

$$W_1 = 81108$$

$$W_1 = +129$$

$$W_0 = +20787$$

$$\log W_0 = 0.31779$$

$$W_0 = 733115$$

$$(S-D) = 298664$$

$$S-D = +16097$$

$$D = +145108$$

$$S_0 = +150717.7$$

$$Red = +246$$

$$S' = +1507423$$

2371

Lunar Parallax

$$\alpha' = 2^h 08^m 56^s.28^v$$

$$\delta = 4 \ 50 \ 09.7^v$$

$$\Theta - \alpha' = +2 \ 41 \ 13.4^v$$

$$= +40^\circ \ 18' \ 21''^v$$

$$+14 \ 08$$

$$+40 \ 04 \ 13^v$$

$$9.91727^v$$

$$0.00000$$

$$0.11619^v$$

$$0.07346^v$$

$$\gamma = 49 \ 49 \ 22^v$$

$$15 \ 07 \ 42$$

$$\gamma - \delta = 34 \ 41 \ 40^v$$

$$9.82640^v$$

$$8.21900^v$$

$$9.75527^v$$

$$0.11688^v$$

$$7.91755^v$$

$$\delta - \delta' = +28 \ 26.0^v$$

$$\delta = +15 \ 36 \ 07.8^v$$

$$\text{Nautical } \delta = +15 \ 36 \ 03.3^v$$

$$O - C$$

$$+4.5$$

$$+0.68$$

$$\delta' = +15^\circ 07' 41''^v$$

$$\pi = 56' 55.4^v$$

$$9.86913^v$$

$$8.21900^v$$

$$9.81081^v$$

$$0.01630^v$$

$$7.91524^v$$

$$\alpha - \alpha' = +28' 16.96^v$$

$$= +1^m \ 53.13^v$$

$$\alpha = 2 \ 10 \ 49.41^v$$

$$\alpha = 2 \ 10 \ 48.73^v$$

2371

Lunar Parallax.

$$\alpha' = 2^h 08^m 56^s.28$$

$$S = +15^\circ 07' 41''$$

$$\delta = 4^\circ 50' 09''$$

$$\alpha - \alpha' = +2^\circ 41' 13.4''$$

$$\pi = 56' 55.4''$$

$$= +40^\circ 18' 21''$$

$$+ 14 08$$

$$140 04 13$$

$$9.91727$$

$$000000$$

$$011619$$

$$007346$$

$$9.86913$$

$$821900$$

$$981081$$

$$001630$$

$$791524$$

$$\alpha - \alpha' = +28' 16.96''$$

$$= +1^\circ 53.13'$$

$$\gamma = 49 49 22$$

$$15 07 42$$

$$\gamma - \delta = 34 41 40$$

$$9.82640$$

$$821900$$

$$975527$$

$$011688$$

$$791755$$

$$\delta - \delta' = +28 26.0$$

$$\delta = +15 36 07.8 \quad \alpha - 2 10 49.41$$

$$\text{Nautical } \delta = +15 36 03.3 \quad \alpha = 2 10 48.73$$

$$O - C \quad + 45 \quad + 0.68$$

2182

9 Stars - Measured

1914 Feb 24.

11

d

N

d^x

N

1 17326
 5.6 10548
 11.6 41⁴⁶
 39
11.6790

17399
 1418998
 99
 04
6794

16670
 12650⁴⁹
 41
 66
5.5989

16286
 1028581
 71
 80
6004

2 15510
 27.6 6790⁹⁴
 13.8 89
 10
13.8719

20346
 19060⁵⁹
 58
 50
8713

16639
 12560⁵⁹
 50
 31
27.5920

16379
 10450⁵⁸
 42
 75
5928

3 1017178
 28.4 71
 32.0 10043
31.9870

14571
 14430³⁰
 31
9859

16331
 9850⁴⁹
 49
 34
28.3516

20140
 16620³⁰
 29
 58
1.3520

Grade 4.

2182

4 Stars - Unnamed

1914 Feb 24.

11

1 17326
 56 10548
 116 41⁴⁶
 39
116790

17399
 1418998
 99
 04
6794

16670
 1265049
 41
 66
55989

16286
 1028581
 71
 80
6004

2 15510
 276 6790
 138 89⁹⁴
 10
138719

20346
 1906059
 58⁵⁹
 50
8713

16639
 12560
 50⁵⁹
 31
275920

16379
 1045058
 42⁵⁸
 75
5925

3 1017178
 284 71
 320 10043
319870

14571
 14430
 31³⁰
9859

16331
 985049
 49
 34
283516

20140
 1662030
 29³⁰
 58
13520

bracket 4.

19
17
2
17
17
2
18
18
4
18
18
5
17
19
6
17
19
in
2

2182 Moon - Measures.

12

	d	y	z	d	z
1	19641		16443		
19.8	14949	48	11143		50
17.5	47		36		
min	50		51		
in					
4	<u>17.4698</u>		<u>4696</u>		

2	19688		17421		
17.0	13749	39	13370	69	
17.6	40		70		
	00		39		
	<u>17.5952</u>		<u>5942</u>		

3	18555		17820		
18.4	14589	08	11752	48	
18.0	92		49		
	65		30		
	<u>18.3963</u>		<u>3924</u>		

5	19001		18566		
17.8	16371	70	11172	76	
19.0	78		65		
	99		70		
	<u>17.7372</u>		<u>7398</u>		

6	18968		18579		
17.7	15761	69	11780	80	
19.5	60		76		
min	71		79		
in					
2	<u>17.6794</u>		<u>6800</u>		

18449
11731
44
46
<u>183293</u>

18449
15165
71
90
<u>3325</u>

19001
16371
78
99
<u>17.7372</u>

18566
11172
65
70
<u>7398</u>

18968
15761
60
71
<u>17.6794</u>

18579
11780
76
79
<u>6800</u>

2182

Known Measures

12

	d	v
1	19641	16443
158	14949	11143
175	47	36
min	50	51
4	<u>17.4698</u>	<u>4696</u>

2	19688	17421
170	13749	13370
176	40	70
	00	39
	<u>17.5952</u>	<u>5942</u>

3	18449	18490
184	11731	15165
180	49	71
	46	90
	<u>18.3293</u>	<u>3325</u>

4	18555	17820
180	14589	11752
189	92	49
	65	30
	<u>18.3963</u>	<u>3924</u>

5	19001	18566
178	16371	11172
190	78	65
	99	70
	<u>17.7372</u>	<u>7398</u>

6	18968	18579
177	15761	11780
195	60	76
min	71	79
7	<u>17.6794</u>	<u>6806</u>

2182 moon-measures.

	d	y	n	d	x		v
2				15935		19584	
17.8				16381		12139	
20.0				7981		2130	
				42		80	
				<u>177444</u>		<u>7451</u>	

8	17531	19930
180	1170915	1573029
20.5	9498	15
	41	3.3
	<u>20.5833</u>	<u>5794</u>

9	16609	16204
184	1017655	1257171
21.0	60	61
	01	07
	<u>18.3560</u>	<u>3637</u>

10	15070	17180
19.0	1127472	1096854
21.4	77	68
	70	80
	<u>21.3796</u>	<u>3783</u>

2182 moon-measures

2
178
200

18931-
16381
7981
42
177444

19584
12139
2130
80
7451

8
180
205
17531
1170915
9498
41
205833

19930
1573029
15-
33
5794

9
184
210

16609
101765-
60
01
183560

16204
1257171
61
07
3637

10
180
214
15070
1127472
77
70
213796

17180
10968.54
68
80
3783

2182 Times etc.

explosion	1912 Nov. 21	0 ^h	39 ^m	✓	-0 ^h	51 ^m	✓
" " moon		0	44	33.7	-0	44	33.4 ✓
clock fast		0	03.2	✓			
		0	30	59.1	✓	0-0	-1 ^h 26 ^m ✓
A. Sid T.		0	44	30.05	✓	0-0	-0 ^h 53 ^m ✓
H. long		4	44	31.05			
G. Sid T.		5	29	01.10	✓		
Sid T. M. Moon		16	00	28.22	✓		
Intural		13	28	32.88	✓		
Reduction			2	12.46	✓		
G. M. T.		13	26	20.42	✓		

From bank alms		R. A.	✓	Decl.	
Moon 13 ^h	1 ^h	36 ^m	49 ^s 54	+11°	31' 22" 7 ✓
Motion in 1 ^m	1.9856			14 37 4	✓
" 26.3403			+52.30	+6	18.6 ✓
Tabular place	1	37	41.84	+11	37 41.3 ✓

Moon's age	13 days
parallax	56' 40" 2 ✓
semidiam	15 28.0 ✓
R	928.1 ✓
Augmentation	+12.8 ✓
Irradiation (4)	-0.8 ✓
R	940.1 ✓
R	20152 ✓
✓ + a/R	2.0151 ✓
R ²	4.0606 ✓

934-13.0
928-12.8

a = -0.3

2182	Times etc.				
explosion	1912 Nov. 21	0 ^h	39 ^m	-0 ^h	51 ^m
moon		0	44	33.7-0	44 33.4
clock fast			0 03.2		
		0	20	59.1	0-2- -1.06
A lid T.		0	44	30.05	0-x- -0 53 ^m
Hong		4	44	31.05	
G. Sid T.		5	29	09.10	
Sid T in moon		16	00	28.22	"
Interval		13	28	32.88	
Reduction			2	12.46	
G. M. T.		13	26	20.42	

from bank alum	R. A.		Decl.	
moon 13'	1 ^h	36 ^m 49 ^s .54	+11°	31' 22.7
location in R	1.9856		14 37.4	
26.3403		+ 52.30	+ 6	48.6
Tabular place	1	37 45.84	+11	37 47.3

moon's age	13 days
parallax	5-6' 40 ^m .2
semidiam	15 28.0
R	928.6
Augmentation	+ 12.8
irradiation (1)	- 0.8
R	940.6
R	2015.2
(1+a)/R	2015.1
R ²	4060.6

934-13.0
928-12.8

a = -0.3

2182

Plate Constants

	1	2	3
x	55996	275924	283518
y	62913	282776	289766
$x-3$	-6917	-6852	-6248
y	116792	138716	319864
y	123894	146482	327678
$y-y$	-7102	-7766	-7814

$x-3$	-3284	-59	+3x	+7300
-6917	-383	-7300	-6+2	-7304 = +1
-6852	455	-7307	-7+8	-7306 = -1
-6248	1049	-7397	-16+9	-7304 = +1
19.6930	-649	+6		= 20.3592
$y-y$	+30.02	+1.44	+6918	
-7102	+168	-6934	+16	-6918 = 0
-7766	+828	-6938	+19	-6919 = -1
-7814	+851	-6963	+45	-6918 = 0
19.4866	+591	+27		= 20.2402

Tables $a = +0.4$ $e = -1.2$ $a-e = +1.6$ $b+a = +1.0$
 Obs $a = -0.3$ $e = -1.4$ $a-e = +1.1$ $b+a = +3.3$

2182

Plate Constants

	1	2	3
x	55996	275924	283518
y	62913	282776	289766
$x-3$	-6917	-6852	-6248
y	116792	138716	319864
y	123894	146482	327678
$y-y$	-7102	-7766	-7814

$x-3$	-3284	-54 + 32	+7305
-6917	-383	-7300 - 6 + 2	-7304 = +1
-6852	-455	-7307 - 7 + 8	-7306 = -1
-6248	-1049	-7397 - 16 + 9	-7304 = +1
146930	-649	+6	= 203592
$y-y$	+30.02	+144	+6918
-7102	+168	-6934 + 16	-6918 = 0
-7766	+828	-6938 + 19	-6919 = -1
-7814	+851	-6963 + 45	-6918 = 0
144866	+591	+27	= 202402

Tables $a = +0.4$ $e = -1.2$ $a-e = +1.6$ $b+a = +1.0$
 Obs $a = -0.3$ $e = -1.4$ $a-e = +1.1$ $b+a = +3.3$

pr	res. 4	resid
1	180.0	+83
2	200.2	-5
3	222.8	+49
4	237.2	-14
5	256.0	-36
6	270.0	-71
7	284.8	-15
8	303.0	+47
9	318.3	+80
10	339.8	+17

2182 Moon - Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 (y - y_0)^2$	$0 - c$
1	19.6960	0.0000	+2	0.0000	4.0663	+57
2	19.0000	-0.6960	+2	0.4841	4.0619	+13
3	18.3309	-1.3651	+1	1.8632	4.0717	+118
4	18.0000	-1.6960	+1	2.8761	4.0679	+73
5	17.7385	-1.9575	0	3.8318	4.0680	+74
6	17.6797	-2.0163	0	4.0655	4.0655	+49
7	17.7448	-1.9512	0	3.8072	4.0714	+108
8	18.0000	-1.6960	-1	2.8767	4.0768	+162
9	18.3598	-1.3362	-1	1.7857	4.0785	+179
10	19.0000	-0.6960	-2	0.4847	4.0689	+83

$$\text{Comp } R^2 = 4.0606$$

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	17.4697	-2.0163	-2	4.0663
2	17.5947	-1.8913	-2	3.5778
3	18.0000	-1.4860	-1	2.2085
4	18.3944	-1.0916	-1	1.1918
5	19.0000	-0.4860	0	0.2362
6	19.4860	0.0000	0	0.0000
7	20.0000	+0.5140	0	0.2642
8	20.5814	+1.0954	+1	1.2001
9	21.0000	+1.5140	+2	2.2928
10	21.3790	+1.8930	+2	3.5842

Alpha Center

$$2 = 19.0 \quad y = 17.5947$$

$$21.3790$$

$$38.9737$$

$$y_0 = 19.4868$$

$$y_{\text{min}} = 17.4697$$

$$R = 2.0171$$

$$x_{\text{min}} = 17.6797$$

$$x_0 = 19.6968$$

$$3 = 18.49 = 18.3944$$

$$20.5814$$

$$38.9758$$

$$y_0 = 19.4879$$

$$17.4697$$

$$20.182$$

$$\text{Center } \left\{ \begin{array}{l} x_0 = 19.6960 \\ y_0 = 19.4860 \end{array} \right.$$

2152 Moon - Center

	x	$x - \bar{x}_0$	Δx	$(x - \bar{x}_0)^2$	$(x - \bar{x}_0) \cdot (y - \bar{y}_0)$	$y - \bar{y}_0$
1	19 69 60	0 0 0 0	+2	0 0 0 0	4 0 6 6 3	+57
2	19 00 00	-0 69 60	+2	0 4 8 4 1	4 0 6 1 9	+13
3	18 33 09	-1 36 51	+1	1 4 6 3 2	4 0 7 1 7	+118
4	18 00 00	-1 69 60	+1	2 8 7 6 1	4 0 6 7 9	+73
5	17 73 85	-1 95 75	0	3 8 3 1 8	4 0 6 8 0	+74
6	17 67 97	-2 01 63	0	4 0 6 5 5	4 0 6 5 5	+49
7	17 74 48	-1 95 12	0	3 8 0 7 2	4 0 7 1 4	+108
8	18 00 00	-1 69 60	-1	2 8 7 6 7	4 0 7 6 8	+162
9	18 35 98	-1 33 62	-1	1 7 8 5 7	4 0 7 8 5	+179
10	19 00 00	-0 69 60	-2	0 4 8 4 7	4 0 6 8 9	+83

Comp R: 4 0 6 6 6

	y	$y - \bar{y}_0$	Δy	$(y - \bar{y}_0)^2$
1	17 46 97	-2 01 63	-2	4 0 6 6 3
2	17 59 47	-1 89 13	-2	3 5 7 7 8
3	18 00 00	-1 48 60	-1	2 2 0 8 5
4	18 39 44	-1 09 16	-1	1 1 9 1 4
5	19 00 00	-0 48 60	0	0 2 3 6 2
6	19 48 60	0 0 0 0	0	0 0 0 0 0
7	20 00 00	+0 51 40	0	0 2 6 4 2
8	20 58 14	+1 09 54	+1	1 2 0 0 1
9	21 00 00	+1 51 40	+2	2 2 9 2 8
10	21 37 90	+1 89 30	+2	3 5 8 4 2

Ceph Center

$$\begin{array}{r}
 \Sigma = 19.0 \quad y = 17.5947 \\
 \hline
 21.3790 \\
 38.9737 \\
 \hline
 Y_0 = 19.4868 \\
 y - \text{mean} = 17.4697 \\
 R = 20.171 \\
 x - \text{mean} = 17.6797 \\
 \hline
 X_0 = 19.6968
 \end{array}$$

$$\begin{array}{r}
 \Sigma = 18.09 = 18.3794 \\
 \hline
 20.5814 \\
 38.9758 \\
 \hline
 Y = 19.4879 \\
 17.4697 \\
 \hline
 20.182
 \end{array}$$

$$\begin{array}{l}
 \text{Center} \left\{ \begin{array}{l} X_0 = 19.6960 \\ Y_0 = 19.4860 \end{array} \right.
 \end{array}$$

Formation of Normals

	ab		amb		bm		am		bm
1	- 0.00	+	0.0		- 131.3	+	0.0		- 115.2
2	+ 1.32	-	4.7		- 39.7	-	9.1		- 24.6
3	+ 2.03	-	142.0		- 177.2	-	151.0		- 165.5
4	+ 1.85	-	137.5		- 88.3	-	129.2		- 79.6
5	+ 0.96	-	160.8		- 40.2	-	145.2		- 36.2
6	- 0.00	-	115.0		+ 0.0	-	99.0	+	0.0
7	- 1.00	-	226.3		+ 59.2	-	210.8	+	55.1
8	- 1.85	-	288.8		+ 187.0	-	275.0	+	128.0
9	- 2.02	-	250.8		+ 282.5	-	240.0	+	270.0
10	- 1.32	-	63.6		+ 172.0	-	58.0	+	157.0
	- 0.03		- 1419.5		+ 224.0		- 1312.3		+ 239.0

2182

Pavonis Center

17

Conditional Equations

	a	b	c		c	0 - c
1	+0.00	-2.02	+57	-	0 - 26 = -26	+83
2	-0.70	-1.89	+13	+	42 - 24 = +18	-5
3	-1.36	-1.49	+111	+	81 - 19 = +62	+49
4	-1.70	-1.09	+73	+	101 - 14 = +87	-14
5	-1.96	-0.49	+74	+	116 - 6 = +110	-36
6	-2.02	+0.00	+49	+	120 - 0 = +120	-71
7	-1.95	+0.51	+108	+	116 + 7 = +123	-15
8	-1.70	+1.10	+162	+	101 + 14 = +115	+47
9	-1.34	+1.51	+179	+	80 + 19 = +99	+80
10	-0.70	+1.89	+83	+	42 + 24 = +66	+17

Average = 48

Normal Equations

$$+22.08 - 0.03 = -1312$$

$$- 0.03 + 18.62 = +239$$

$$+ 0.03 - 0.00 = -1$$

$$+ 18.62 = +238$$

$$b = +12.8$$

$$+22.08 = -1312$$

$$a = -59.4$$

$$\text{Arc Measured} = 160^\circ \text{ Average}(0 - c) + 13.5$$

$$\frac{pc}{n} = 0.20$$

$$\frac{+13.5}{.20} = +0.67 \quad \Delta n = +0.7$$

2182

Moon's Center

17

Conditional Equations

	a	b	c		c	u - c
1	+000	-202	= +57	-	0 - 26 = -26	+83
2	-070	-189	= +13	+	42 - 24 = +18	-5
3	-136	-149	= +11	+	81 - 19 = +62	+49
4	-170	-109	= +73	+	101 - 14 = +87	-14
5	-196	-049	= +74	+	116 - 6 = +110	-36
6	-202	+000	= +49	-	120 - 0 = +120	-71
7	-191	+051	= +108	+	116 + 7 = +123	-15
8	-170	+110	= +162	+	101 + 14 = +115	+47
9	-134	+151	= +179	+	80 + 14 = +94	+80
10	-070	+189	= +83	-	42 + 24 = +66	+17

Average = 42

Normal Equations

$$+2208 - 003 = -1312$$

$$- 003 + 18.62 = +239$$

$$+ 003 - 000 = -1$$

$$+ 18.62 = +238$$

$$b = +12.8$$

$$+2208 = -1312$$

$$a = -59.4$$

Arc Measured = 160° (Average $u - c$) + 13.5

$$\frac{pc}{\sin} = 0.20$$

$$\frac{+13.5}{20} = +0.67 \quad \Delta r = +0.7$$

2182 Moon's Mean Position (1912.0)

18

$$\begin{array}{rcl}
 X_0 & = & 19.6960^\circ \quad Y_0 = 19.4860^\circ \\
 \Delta\alpha & = & -30^\circ \quad \Delta\delta = +6^\circ \\
 \hline
 & & 19.6930^\circ \quad 19.4866^\circ
 \end{array}$$

From Plate Constants $X = 20.3592^\circ \quad Y = 20.2402^\circ$

$$Z = +2.3592^\circ$$

$$\eta = -1.7598^\circ$$

$$\log Z = 0.37277^\circ$$

$$\cos S = 9.99175^\circ$$

$$8.50724$$

$$(Z-A) = 187378^\circ$$

$$X-A = +1 \quad 14.78^\circ$$

$$A = 1 \quad 37 \quad 04^\circ$$

$$X_0 = 1 \quad 38 \quad 18.78^\circ$$

$$Rad = + \quad 3.56^\circ$$

$$\alpha = 1 \quad 38 \quad 22.34^\circ$$

$$\log \tan S = 9.2954^\circ$$

$$0.7455^\circ$$

$$7.0534^\circ$$

$$\eta_1 = 7.0943^\circ$$

$$\eta_2 = +12^\circ$$

$$\eta_0 = -1.7610^\circ$$

$$\log \eta_0 = 0.24576^\circ$$

$$7.33115^\circ$$

$$(H-D) = 2.91461^\circ$$

$$S-D = - \quad 1 \quad 3 \quad 41.5^\circ$$

$$D = +11 \quad 21 \quad 37^\circ$$

$$S_0 = +11 \quad 07 \quad 55.5^\circ$$

$$Rad = + \quad 24.7^\circ$$

$$\delta = +11^\circ \quad 08' \quad 20.2''$$

2182 *Lincoln's Uranus Position (1912.0)* 15

$$\begin{array}{r}
 X_0 = 19.6960 \quad Y_0 = 19.4860 \\
 \quad \quad \quad -30 \quad \quad \quad +6 \\
 \hline
 19.6930 \quad \quad 19.4866
 \end{array}$$

From Plate Constants $X = 20.3592$ $Y = 20.2402$

$$Z = +2.3192$$

$$\eta = -1.7598$$

$$\begin{array}{l}
 \log S = 0.37277 \\
 \cos S = 9.99175 \\
 \quad \quad 8.50724
 \end{array}$$

$$\begin{array}{l}
 \log \tan S = 9.2954 \\
 \quad \quad 0.7455 \\
 \quad \quad 7.0534
 \end{array}$$

$$\eta_1 = 7.0943$$

$$(X-A) = 1.87378$$

$$\eta_2 = +1.2$$

$$X-A = +1.19.78$$

$$\eta_0 = -1.7610$$

$$A = 1.37.09$$

$$\begin{array}{l}
 \log \eta_0 = 0.24576 \\
 \quad \quad 7.33115
 \end{array}$$

$$X_0 = 1.38.18.78$$

$$Red = 3.56$$

$$(H-I) = 2.91461$$

$$X = 1.38.22.34$$

$$S-D = 1.3.41.5$$

$$D = +11.21.37$$

$$S_0 = +11.07.55.5$$

$$Red = 29.7$$

$$S = +11.08.20.2$$

2182

Lunar Parallax.

$$\begin{array}{rcl}
 \alpha' - & 1^{\circ} 38' 22.54'' & \checkmark \\
 \theta - & 0^{\circ} 44' 30.05'' & \checkmark \\
 \delta - \alpha = & 53^{\circ} 52' 3'' & \checkmark \\
 = & 13^{\circ} 28' 04'' & \checkmark
 \end{array}$$

$$- \quad 5^{\circ} 00'' \checkmark$$

$$- \quad 13^{\circ} 23' \checkmark$$

$$9.95727 \checkmark$$

$$0.00000 \checkmark$$

$$001198 \checkmark$$

$$9.96923 \checkmark$$

$$\gamma - 42^{\circ} 58' 20'' \checkmark$$

$$11^{\circ} 08' 20'' \checkmark$$

$$\delta - \delta' = 31^{\circ} 50' 00'' \checkmark$$

$$9.82640 \checkmark$$

$$8.21706 \checkmark$$

$$9.72218 \checkmark$$

$$016644 \checkmark$$

$$7.93208 \checkmark$$

$$\delta - \delta' = + 29^{\circ} 24.0'' \checkmark$$

$$\delta = + 11^{\circ} 37' 44.2'' \checkmark$$

$$1^{\circ} 37' 42.47'' \checkmark$$

$$\text{Hantalan } \delta = + 11^{\circ} 37' 41.3'' \quad \alpha = 1^{\circ} 37' 41.84'' \checkmark$$

$$0 - c \quad + \quad 2.9 \checkmark$$

$$+ \quad 0.63 \checkmark$$

$$\delta = + 11^{\circ} 08' 20.2'' \checkmark$$

$$\Pi = 56' 40.2'' \checkmark$$

$$9.86913 \checkmark$$

$$8.21706 \checkmark$$

$$9.36717 \checkmark$$

$$0.00900 \checkmark$$

$$7.46236 \checkmark$$

$$\alpha - \alpha' = - 19' 58.11'' \checkmark$$

$$= - 39.87'' \checkmark$$

2182

Linear Parallax

$$\begin{array}{rcl}
 \alpha - & 1^{\circ} & 38' 22.54'' \\
 \delta - & 0 & 44' 30.05'' \\
 \alpha - \alpha' - & - & 53' 52.3'' \\
 & - & 13'' 28' 04''
 \end{array}$$

$$- \quad \quad \quad 5 \quad 00$$

$$- \quad 13 \quad 23$$

$$995727$$

$$000000$$

$$001196$$

$$996923$$

$$\gamma - \quad 42 \quad 58 \quad 20$$

$$11 \quad 08 \quad 20$$

$$\gamma - \delta - \quad 31 \quad 50 \quad 00$$

$$982640$$

$$821706$$

$$972218$$

$$016644$$

$$793208$$

$$\delta - \delta' = \quad \quad \quad + 29 \quad 24.0$$

$$S = +11 \quad 37 \quad 44.2$$

$$1 \quad 37 \quad 42.47$$

$$\text{Hartmann } S = +11 \quad 37 \quad 41.3 \quad \alpha - \quad 1 \quad 37 \quad 41.84$$

$$O - C \quad \quad \quad + \quad 2.9$$

$$+ \quad 0.63$$

$$986913$$

$$821706$$

$$936717$$

$$000900$$

$$746236$$

$$\alpha - \alpha' - \quad 9' \quad 55.11$$

$$= - \quad 39.87$$

2368

Remeasures
Stars

1914 Mar. 4.

	d	4	N
L	18135	17419	
13.3	9921	15610	09
15.8	2530	11	
	28	02	
	<u>25.8204</u>	<u>8194</u>	

	d	4	N
2	16109	14938	
21.9	13690	7340	50
11.2	99	41	
	95	31	
	<u>11.2409</u>	<u>2411</u>	

	d	4	N
3	16580	19819	
27.3	8219	18159	54
28.8	1419	62	
	65	35	
	<u>28.8351</u>	<u>8336</u>	

	d	N
	17729	16839
	10650	13860
	41	6061
	15	00
	<u>13.2928</u>	<u>2967</u>

	d	N
	11909	10755
	11260	55
	51	10129
	<u>21.9354</u>	<u>9373</u>

	d	N
	15949	19968
	8380	17504
	7474	0310
	28	78
	<u>27.2442</u>	<u>2464</u>

Grade 2 or 3.

1
10
2

2
1

3
2
1

2368

Remeasures.
Stars

1914 Mar 4

	d	4	n
1	18135	17419	
138	9921	15610	09
258	2530	11	
	28	02	
	<u>258204</u>	<u>8194</u>	

	d	4	n
2	16109	14938	
219	13690	7340	50
112	99	41	
	95	31	
	<u>11.2409</u>	<u>2411</u>	

	d	4	n
3	16580	19819	
273	8219	18159	54
288	1419	62	
	65	35	
	<u>28.8351</u>	<u>8336</u>	

	d	n
	17729	16839
	10650	13860
	41	6061
	15	00
	<u>13.2928</u>	<u>2967</u>

	d	n
	11909	10755
	11260	55
	51	10129
	<u>21.9359</u>	<u>9373</u>

	d	n
	15949	19968
	8380	17504
	7474	0318
	28	78
	<u>27.2442</u>	<u>2464</u>

Grade 2 or 3.

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2368

d

y Moon - Remeasures:

d

N

$$\begin{array}{r} 11 \\ 10.8 \\ 19.9 \\ \hline \end{array}$$

$$\begin{array}{r} 11.4 \quad 14590 \\ 20.0 \quad 1339991 \\ 20.1 \quad 82 \\ \quad 80 \\ \hline 20.1198 \end{array}$$

$$\begin{array}{r} 16630 \\ 783627 \\ \quad 28 \\ \quad 21 \\ \hline 1208 \end{array}$$

y scratch

$$\begin{array}{r} 18.8 \quad 14098 \\ 21.5 \quad 863225 \\ \quad 2825 \\ \quad 78 \\ \hline 21.5460 \end{array}$$

$$\begin{array}{r} 17761 \\ 1322528 \\ \quad 2028 \\ \quad 51 \\ \hline 5468 \end{array}$$

$$\begin{array}{r} 16509 \\ 1421010 \\ \quad 95 \\ \quad 85 \\ \hline 187701 \end{array}$$

$$\begin{array}{r} 18535 \\ 10818 \\ \quad 1911 \\ \quad 09 \\ \hline 7698 \end{array}$$

3

$$\begin{array}{r} 18.9 \\ 32.0 \end{array}$$

$$\begin{array}{r} 13970 \\ 1371909 \\ \quad 10 \\ \hline \end{array}$$

$$\begin{array}{r} 1413930 \\ \quad 4030 \\ 13905 \end{array}$$
18.9743.9769

y scratch

$$\begin{array}{r} 19.9 \quad 19968 \\ 23.8 \quad 1150093 \\ \quad 90 \\ \quad 60 \\ \hline 23.8467 \end{array}$$

$$\begin{array}{r} 18880 \\ 1734530 \\ \quad 4030 \\ \quad 70 \\ \hline 8460 \end{array}$$

$$\begin{array}{r} 16660 \\ 1568592 \\ \quad 8392 \\ \hline \end{array}$$

$$\begin{array}{r} 13299 \\ \quad 8495 \\ 12313 \end{array}$$
29.9027.9020

2368

d

y moon - Remasures.

d 71

N

$$\begin{array}{r} 1 \\ 10.8 \\ 10.1 \\ 10.0 \\ 9.9 \end{array}$$

$$\begin{array}{r} 11.8 \quad 14590 \\ 20.0 \quad 1339991 \\ 20.1 \quad 82 \\ \quad 80 \\ \hline 20.1198 \end{array}$$

$$\begin{array}{r} 16630 \\ 783627 \\ 28 \\ 21 \\ \hline 1208 \end{array}$$

3 scratch

$$\begin{array}{r} 18.8 \quad 14098 \\ 21.5 \quad 8632- \\ \quad 2825- \\ \quad 78 \\ \hline 21.5460 \end{array}$$

$$\begin{array}{r} 17761 \\ 1322528 \\ 2028 \\ 51 \\ \hline 5468 \end{array}$$

$$\begin{array}{r} 16509 \\ 1421010 \\ 95 \\ 85 \\ \hline 18.770.1 \end{array}$$

$$\begin{array}{r} 18535- \\ 10818 \\ 1911 \\ 09 \\ \hline 7698 \end{array}$$

$$\begin{array}{r} 3 \\ 18.9 \\ 23.0 \end{array}$$

$$\begin{array}{r} 13970 \\ 1371909 \\ 10 \\ \hline 18.9743 \end{array}$$

$$\begin{array}{r} 141.3930 \\ 4030 \\ 13905- \\ \hline 9769 \end{array}$$

$$\begin{array}{r} 18.9743 \\ \hline \end{array}$$

$$\begin{array}{r} 9769 \\ \hline \end{array}$$

4 scratch

$$\begin{array}{r} 18.9 \quad 19968 \\ 23.8 \quad 11500 \\ \quad 9093 \\ \quad 60 \\ \hline 23.8467 \end{array}$$

$$\begin{array}{r} 18880 \\ 1734530 \\ 4030 \\ 70 \\ \hline 8460 \end{array}$$

$$\begin{array}{r} 16660 \\ 1568592 \\ 83 \\ \hline 29.9027 \end{array}$$

$$\begin{array}{r} 13299 \\ 8495- \\ 12313 \\ \hline 9020 \end{array}$$

2368 Times etc.
 Sept stem 1912 Dec 19 $3^h 38^m$ $-3^h 50^m$
 Moon $3 43 51.7 - 3 43 52.0$
 clock fast $0 21.5$

Adid T. $3 43 30.35$ $\theta - \alpha = +1^h 35^m$
 H long $4 44 31.05$
 Sid T. $8 28 01.40$
 Sid T. in Moon $17 50 51.86$
 Interval $14 37 09.54$
 Reduction $2 23.70$ ✓
 G.M.T. $14 34 45.84$ ✓

From Kant Alm R.A. Decl.
 Moon 15^h $2^h 09^m 23.61$ $+15^\circ 26'$ 52.4
 Position in 2.0601 13.390
 -25.236 -51.99 -5 37.9
 Tabular place $2 08 31.62$ ✓ $+15 21 14.5$ ✓

Moon's Parallax $56'$ 53.0
 " Semidiam $15'$ 31.5
 R 931.5
 Augmentation $+13.0$
 Irradiation -0.6
 R 943.9
 R 20234
 $a = +1.1$ $(1+a)R$ 20236
 R^2 40950

939.2 13.05
 931.5 13.0

2368

Taurus etc.

Expt. 1912 Dec 19

3^h 38^m-3^h 50^m

Moon

3 43

517-3 43 120

clock fast

0 21.5

Alt. 11

3 43

30.35

6-4-1 35

H. long

4 44

31.05

G. 1.01

8 28

0140

Jed. T. in Moon

17 50

51.86

Internal

14 37

0954

Reduction

2

2370

G. 1.01

14 34

4584

From Hand Clock

R. G.

Recl.

Moon 15^h2^h 09^m

23.61

+15° 26' 52.4

Motion 2.0601

12390

-25236

-

51.99

-5 37.9

Turbula place

2 08

3.162

+15 21 14.5

Moon Parallel

56' 53.0

Meridian

15 31.5

R

931.5

9.34-12.05

Augmentation

+13.0

9.31-12.0

Irradiation

-0.6

R

943.9

R

2023.4

C = 7.1.1

(1+2)R

2023.6

R²

4095.0

2368

Plate center

α	δ	R.A.	Decl.
13.2948	25.8199	2 03 16	+15 23 14
21.9364	11.2410	07 57	+13 30 20
27.2453	28.8344	10 46	+15 47 09
31.6248	16.590	1 20 11.9	+43 100 43
20.83	21.97	2 07 30	+14 53 34
-18	-22	- 1 08	+ 14
2.83	.03	2 06 22	+14 53 48
31	465		
68 ³	14"		

$$A = 2^h 06^m 22^s$$

$$D = +14^\circ 53' 48''$$

α	13.2948	21.9364	27.2453
δ	14.0659	22.8025	27.9950
$\alpha - \delta$	-7711	-8661	-7497

γ	25.8199	11.2410	28.8344
δ	26.1528	11.6534	29.2351
$\gamma - \delta$	-3129	-3724	-4037

$\alpha - \delta$	-65.84	-1.12	+1425
-7711	-1699	-9410	-15 = -9425 = 0
-8661	-740	-9401	-24 = -9425 = 0
-7497	-1897	-9394	-30 = -9424 = +1
20.7394	-1448	-23	= 21.5348

$\gamma - \eta$	+ 65.52	- 1.94	+ 2308
- 3129 + 871	= - 2258	- 49 = - 2307	= + 1
- 3724 + 1437	= - 2287	- 21 = - 2308	= 0
- 4037 + 1784	= - 2253	- 55 = - 2308	= 0
12.0046 + 1358	- 42		= 223670

Tables	$a = +0.7$	$e = -0.5$	$a - e = +1.2$	$b + a = -1.1$
Obs	$a = +1.1$	$e = +1.4$	$a - e = -0.8$	$b + a = +0.3$

2368

Plate center.

R.A.

Decl.

132948	258199	20316	+152314
219364	112410	0957	+133020
272453	288344	1046	+154709
16248	6590	20119	+4310043
2083	2197	20730	+145334
-18	-22	-108	+14
283	03	20622	+145348
31	465		
68	14		

$$A = 2^m 06^m 22^s$$

$$D = +14^\circ 53' 48''$$

2	132948	219364	272453
5	140659	228025	279950
2-3	-7711	-8661	-7497

4	258199	112410	288344
2	261528	116134	292351
4-m	-3129	-3724	-4037

2-3	-6584	-112	+1425
-7711	-1699	-9410	-15 = -9425
-8661	-740	-9401	-24 = -9425
-7497	-1897	-9394	-30 = -9424
207394	-1448	-23	= 215348

4-m	+6552	-197	+2308
-3129	+871	-2258	-49 = -2307
-3724	+1437	-2287	-21 = -2308
-4037	+1784	-2253	-55 = -2308
224046	+11358	-42	= 223670

Tables	a = +0.7	e = -0.5	a - e = +1.2	l + a = -1.1
Obs.	a = +1.1	e = +1.4	a - e = -0.8	l + a = +0.3

2368

Standard coordinates

Cape No. 307 m 7.5

Cape No. 319 m 7.4

A.B. No. 630 m 8.1

C	2	02	36.97	2 ⁿ	07 ⁿ	17.64	2	08	44.80
L			37.03			66			
E			36.98			64			
mean	2	02	36.97	2	07	17.65			
Proc		+	39.12		+	35.90		+2	01.14
δ	2	03	16.11	2	07	56.55	2	10	45.94
θ	2	06	22	2	06	22	2	06	22
$\alpha - A$	-3		05.89	+1		34.55	+4		23.94
			-185						

log.
cos

$\bar{x}_0$
 $\bar{x}_1$
 $\bar{x}_2$
 $\bar{x}$
 $\bar{x} - \bar{x}$

C	+15	19	46.8	+15	26	56.3	+15	36	43.1
L			46.8			56.3			
E			46.9			56.4			
mean	+15	19	46.8	+13	26	56.3			
Proc		+	3		+	3		+	10
δ	+15	23	13.6	+13	30	20.5	+15	47	09.3
θ	+14	53	48	+14	53	48	+14	53	48
$\alpha - A$	+	29	25.6	-1	23	27.5	+53		21.3

log.
 η_0

η_1

η_0
 η_1
 η
 η

2368

standard coordinates

Cape W. 307m 97.5

Cape W. 319m 79

Cape W. 630m 8.1

C	2	02	3697	2	07	17.64	2	08	44.80
L			37.03			66			
Z			3698			64			
mean	2	02	3697	2	07	17.65			
Proc		+	39.12		+	3890		+2	01.14
α	2	03	16.11	2	07	56.55	2	10	45.94
δ	2	06	22	2	06	22	2	06	22
$\alpha - A$		-3	05.89		+1	34.55		+4	23.94
μ			-1.85						

log

5.

5.

5.

5.

x

x-3

C	+15	19	46.8	+15	26	56.3	+15	36	43.1
L			46.8			56.3			
Z			46.9			56.4			
mean	+15	19	46.8	+13	26	56.3			
Proc		+	3		+	3		10	26.2
δ	+15	23	13.6	+13	30	20.5	+15	47	09.3
δ	+14	53	48	+14	53	48	+14	53	48
δ	+	29	25.6	-1	23	27.5		+53	21.3

tan

log

70

tan

57

71

70

71

7

4

4-7

2368

Moon's Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 f(x, y)$	$o - c$
1	20.0000	-0.7410	-2	0.5494	4.0943	-7
2	18.7700	-1.9710	-1	3.8852	4.0936	-14
3	18.9756	-1.7654	+1	3.1163	4.1103	+153
4	19.9024	-0.8386	+2	0.7029	4.1013	+43

Comp R^2 4.0950

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	20.1203	-1.8827	-1	3.5449
2	21.5464	-0.4566	0	0.2084
3	23.0000	+0.9970	0	0.9940
4	23.8464	+1.8434	+1	3.3984

Center from
1st measure $\left\{ \begin{array}{l} x_0 = 20.7410 \\ y_0 = 22.0030 \end{array} \right.$

2368

Moon's Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$
1	20.0000	-0.7410	-2	0.5494	4.0943	-7
2	18.7700	-1.9710	-1	3.8852	4.0936	-14
3	18.9756	-1.7654	+1	3.1163	4.1103	+153
4	19.9024	-0.8386	+2	0.7029	4.1013	+43

Comp R = 4.0950

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	20.1203	-1.8827	-1	3.5449
2	21.5464	-0.4566	0	0.2084
3	23.0000	+0.9970	0	0.9940
4	23.8464	+1.8434	+1	3.3984

Center from
14 measures $\left\{ \begin{array}{l} x_0 = 20.7410 \\ y_0 = 22.0030 \end{array} \right.$

Formation of Normals.

	ab	abm	bm
1	+ 1.39	+ 5.2	+ 13.2
2	+ 0.91	+ 27.6	+ 6.4
3	- 1.77	- 270.8	+ 153.0
4	- 1.54	- 52.8	+ 116.0
	- 1.01	- 290.8	+ 288.6

Residuals.

0		c	0 - c
-7	+ 23 - 59 =	-36	+ 29
-14	+ 62 - 15 =	+47	- 61
+ 153	+ 56 + 32 =	+88	+ 65
+ 63	+ 26 + 58 =	+84	- 21

2368

Moon's Center

Conditional Equations

$$\begin{array}{rcl}
 & a & b & 0 \\
 1 & -0.74 & -1.88 & = -7 \\
 2 & -1.97 & -0.46 & = -14 \\
 3 & -1.77 & +0.00 & = +153 \\
 4 & -0.84 & +1.84 & = +63
 \end{array}$$

Normal Equations

$$\begin{array}{rcl}
 + & 8.25 & - & 1.01 & = & -291 \\
 - & 1.01 & + & 8.15 & = & +289
 \end{array}$$

$$\begin{array}{rcl}
 + & 1.01 & - & 0.12 & = & -36 \\
 & & + & 8.03 & = & +253
 \end{array}$$

$$+ 8.25 = -291 + 32 = -259$$

$$b = +31.5$$

$$a = -31.4$$

2368

Moons Center
Conditional Equations

$$\begin{array}{rcl}
 & \sim & \sim & 0 \\
 1 & -0.74 & -188 & = -7 \\
 2 & -197 & -046 & = -14 \\
 3 & -177 & +000 & = +153 \\
 4 & -084 & +184 & = +63
 \end{array}$$

Normal Equation

$$\begin{array}{rcl}
 + & 825 & - & 1.01 & = & -291 \\
 - & 101 & + & 8.15 & = & +289
 \end{array}$$

$$\begin{array}{rcl}
 + & 101 & - & 0.12 & = & -36 \\
 & & + & 8.03 & = & +253
 \end{array}$$

$$+ 825 = -291 + 32 = -259$$

$$b = +31.5$$

$$a = -314$$

2368. hovers mean Position (1912.0)

$$\begin{array}{r} X = 20.7410 \\ \frac{1}{2} \alpha = -16 \\ \hline 20.7394 \end{array}$$

$$\begin{array}{r} Y_0 = 22.0030 \\ \frac{1}{2} \delta = +16 \\ \hline 22.0046 \end{array}$$

From Plate Constants $X = 21.5348$ $Y = 22.3670$

$$z = +3.5348$$

$$\eta = +0.3670$$

$$\begin{array}{r} \log z = 0.54837 \\ \log 5 = 9.98515 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{r} \log \text{trans} = 9.4250 \\ \log z = 1.0967 \\ \hline \log 5 = 7.0534 \\ \hline 7.5751 \end{array}$$

$$(x-A) = 205598$$

$$\eta_p = +38$$

$$x-A = +15.376$$

$$\eta_0 = +0.3632$$

$$A = 205.23$$

$$\begin{array}{r} \log \eta_0 = 9.56015 \\ \hline 7.33115 \end{array}$$

$$X_0 = 207.676$$

$$\text{Red} = +3.64$$

$$(x-D) = 222900$$

$$X' = 207.2040$$

$$S-D = +249.4$$

$$D = +14.5108$$

$$S_0 = +14.5357.4$$

$$\text{Red} = +24.6$$

$$S_1 = +14.5422.0$$

2368 known known Position (1912.0)

$$\begin{array}{r} X = 20.7410 \\ \quad - 16 \\ \hline 20.7394 \end{array}$$

$$\begin{array}{r} Y_0 = 22.0030 \\ \quad + 16 \\ \hline 22.0046 \end{array}$$

From Plate Constants $X = 21.5348$ $Y = 22.3670$

$$z = +3.5348$$

$$\eta = +0.3670$$

$$\begin{array}{r} \log z = 0.54837 \\ \log 5 = 9.98515 \\ \hline 8.50724 \end{array}$$

$$\begin{array}{r} \log \mu_{\text{trans}} = 9.4250 \\ \quad - 1.0967 \\ \hline 7.0534 \\ \hline 7.5751 \end{array}$$

$$(x-A) = 20.5598$$

$$\eta_1 = +38$$

$$x-A = +1.5376$$

$$\eta_2 = +0.3632$$

$$A = 20.523$$

$$\begin{array}{r} \log \eta_0 = 9.56015 \\ \quad - 7.33115 \\ \hline 2.22900 \end{array}$$

$$x_0 = 20.72676$$

$$Red = +3.64$$

$$(8-D) = 222.900$$

$$x' = 20.72040$$

$$8-D = +2494$$

$$D = +14.5108$$

$$S_0 = +14.53574$$

$$Red = +24.6$$

$$S_1 = +14.5422.0$$

2368.

Lunar Parallax.

$$\alpha' = 2^h 07^m 20^s.40$$

$$\delta = 3 \quad 43 \quad 30.35$$

$$G - \alpha = +1 \quad 36 \quad 10$$

$$= +24^\circ 02' 30''$$

$$+ \quad \quad \quad 8 \quad 53$$

$$\cdot \quad 23 \quad 53 \quad 37$$

$$9.95727$$

$$0.00000$$

$$0.03891$$

$$\hline 99961.8$$

$$\gamma = 44^\circ 44' 53''$$

$$14 \quad 54 \quad 22$$

$$29 \quad 50 \quad 31$$

$$9.82640$$

$$9.21869$$

$$9.69688$$

$$0.15244$$

$$\hline 789441$$

$$\delta - \delta' = +26 \quad 57.5$$

$$\delta = +15 \quad 21 \quad 19.5$$

$$\text{Nautical } \delta = +15 \quad 21 \quad 14.5$$

$$O - C \quad \quad \quad + \quad 5.0$$

$$\delta' = +14^\circ 54' 22''.0$$

$$17 = 56' 53''.0$$

$$9.86913$$

$$821869$$

$$9.61002$$

$$0.01579$$

$$\hline 7.71363$$

$$\alpha - \alpha' = +17' 46''.73$$

$$= +1^\circ 11'.12$$

$$\alpha \quad 2 \quad 08 \quad 31.52$$

$$\alpha \quad 2 \quad 08 \quad 31.62$$

$$-0.10$$

2368

Lunar Parallax

$$\alpha' = 2^h 07^m 20^s 40$$

$$\delta = 3 \quad 43 \quad 30 \quad 35$$

$$G - A + 1 \quad 36 \quad 10$$

$$+ 24^m 02^s 30^s$$

$$+ \quad \quad \quad 8 \quad 53$$

$$23 \quad 53 \quad 37$$

$$9 \quad 9 \quad 5 \quad 7 \quad 2 \quad 7$$

$$0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0$$

$$0 \quad 0 \quad 3 \quad 8 \quad 9 \quad 1$$

$$9 \quad 9 \quad 4 \quad 6 \quad 1 \quad 8$$

$$\gamma = 44^m 44^s 53$$

$$14 \quad 54 \quad 22$$

$$29 \quad 50 \quad 31$$

$$9 \quad 8 \quad 2 \quad 6 \quad 4 \quad 0$$

$$8 \quad 2 \quad 1 \quad 8 \quad 6 \quad 9$$

$$9 \quad 6 \quad 9 \quad 6 \quad 8 \quad 8$$

$$0 \quad 1 \quad 5 \quad 2 \quad 4 \quad 4$$

$$7 \quad 8 \quad 9 \quad 4 \quad 4 \quad 1$$

$$S - S' = + 26 \quad 57.5$$

$$S = + 15 \quad 21 \quad 19.5$$

$$\text{Nautical } S = + 15 \quad 21 \quad 14.5$$

$$O - C \quad \quad \quad + \quad 5.0$$

$$S' = + 14^m 59^s 22^s$$

$$IT = 56 \quad 53 \quad 0$$

$$9.86913$$

$$821.869$$

$$961002$$

$$0.81579$$

$$771363$$

$$\alpha - \alpha' = + 17 \quad 46.73$$

$$= + 1 \quad 11.12$$

$$\times \quad 2 \quad 08 \quad 31.52$$

$$\times \quad 2 \quad 08 \quad 31.62$$

$$- 0.10$$

