

KG
11366
v. 958

LXXXI



4297

4298



Harvard Lunar Plates

Measures and Reductions

Mary Fowler

1
64
18

2
17
12

3
30
2

4297

Star measures 1915 Feb 5

y

x

$\frac{1}{d}$	α	μ	$\frac{1}{d}$	α	μ
64	19414	19929	19506	16472	
185	1516262	1416972	1294051	1301910	
	5966	6972	4051	1510	
	00	36	82	65	
	<u>18.4246</u>	<u>4237</u>	<u>6.3455</u>	<u>3455</u>	
<u>2</u>	17472	20251	18209	19900	
177	1175064	1594550	1609899	1200601	
125	61	48	969	99	
	60	49	96	00	
	<u>12.5707</u>	<u>5695</u>	<u>177884</u>	<u>7895</u>	
<u>3</u>	18383	17740		18068	
303	1334849	1276767	1246060	1543625	
245	45	6067	6060	30	
	50	69	9819	81	
	<u>24.5019</u>	<u>5011</u>	<u>302641</u>	<u>2641</u>	

grade 4

+29.7

Stars measured 1915 Feb. 5.

y

x

1 d
64 19414
185 1516262
5966
00
184246

u
19929
1416972
6972
36
4237

d u
19506 16472
1294051 1301910
4051
82 15
65
63455 3455

2 17472
177 1175064
125 61
60
125707

20251
1594550
48
49
5695

18209 19900
1609899 1200601
9899
96
99
00
177884 7898

3 18383
203 1334849
245 4549
50
275019

17740
1276767
6067
69
5011

1246060 18068
6060 1543625
9819 20
81
302641 2641

Grade 4

4297 moon measures

1915 Feb. 5.

d

4

v

d

v

17.3
17.4
min
w
26

possibly on
phase limb.

16815
9418
0909
09
17.2601

18120
15482
9088
30
.2636

2
17.4
200

16792
10207
0905
00
17.3410

18690
15241
3541
78
.3447

3
18.0
209
932428
20
8800

13358
1281390
96

20.9476.9442

4
18.1
21.0

9770
5969
9020

15090
14280
7889

18.0746.0788

5
19.0 19969
21.3 1673121
1921
79
21.3248

19380
12639
3539
96
3247

6
19.1 18967
21.3 1565559
58
max 79
w 21.3314

19382
1266990
85
89
3294

4297. moon measures

1915 Feb. 5.

possibly on
phase limb.

173
154
12
26

3
174
200

d	n
16815	18120
9418	15482
0909	9088
09	30
<u>17.2601</u>	<u>2636</u>
16792	18690
10207	15241
0905	3541
00	78
<u>17.3410</u>	<u>3447</u>

3	932428	13358
12.0	20	1281390
209	8800	96

20.9476.9442

4
121
210

9770	15070
5969	1428989
9020	7889
<u>18.0746</u>	<u>0788</u>

5	19019969	19380
213	1673121	12633739
	19	32
	79	96
<u>21.3248</u>	<u>.3247</u>	

6	18967	19382
191	1565559	1266990
213	58	85
	79	89
<u>21.3314</u>	<u>.3294</u>	

Conson Measures

1915 Feb 5

3

	α	δ
<u>1</u>	18939	15412
20	1772731	662532
212	50	21
	51	20
	<u>21.1211</u>	<u>1207</u>

8
202
21.0

9
20.9
20.0

10
20.9
19.0

17628	16760
960803	1472948
03	23
12	89
<u>20.1990</u>	<u>2033</u>
13472	997168
12858	77
55-60	9331
<u>20.9386</u>	<u>9359</u>
13501	9695
1312030	9992
15	9320
<u>20.9621</u>	<u>9625</u>

Moon Measures

1915 Feb 5.

3

	α	δ
<u>7</u>	1 59 39	1 54 12
200	177 27 31	66 25 32
212	50	21
	51	20
	<u>21.1211</u>	<u>1207</u>

8
202
210

9
209
200

10
209
190

17628	16760
960803	1472948
63	23
12	89
<u>20.1990</u>	<u>2033</u>
13472	997168
12858	77
55-60	9331
<u>20.9386</u>	<u>9359</u>
13501	9695
1312030	9992
15	9320
<u>20.9621</u>	<u>9625</u>

4297 Times etc
 Exh tclars 1913 Nov. 13 2^h 54^m - 3^h 06^m
 .. moon 2 59 56.3 - 2 59 56.6
 clock fast 0 30.5

H. Sid. T. 2 59 2 59.5 6-X- - 20.2
 H long 4 44 31.05
 G Sid. T. 7 43 57.00
 Sid T in moon 15 27 58.82
 Interval 16 15 58.18
 Reduction 2 39.89
 G.M.T. 16 13 18.29

From hand alim. R.A. Decl.
 Moon 16^h 3^h 19^m 36^s 19 + 22° 56' 58.4
 Motion in ^m 2.1612 9.313
 .. 13.305 + 28.75 + 2 039
 Tabular place 3 20 04.94 + 22 59 02.3

Moon's age 15 days (5 hr. after full)

parallel 55' 27.1
 semidiameter 15 08.2^v

R: 908.2^v

Augmentation + 14.0^v

Irradiation (4) - 0.6^v

R 921.6^v

R: 1975.6^v

at R: - 94.1^v

(1+a)R: 1.8815^v

R²: 3.5400^v

9340 14.75^v

9080 14.0^v

a = 500.2

24.

476.2

H 297 Times etc.
 Ex. station 19.3 Nov. 13 2^h 54^m - 3^h 06^m
 Moon 2 59 56.3 - 2 59 56.6
 Clock fast 0 30.5

H Sid T. 2 59 2 59.5 0-x = 20.2
 H long 4 44 31.05
 G Sid T. T 43 57.00
 Sid T in room 15 27 58.82
 Interval 16 15 58.18
 Rectitude 2 39.89
 G in T. 16 13 18.29

From bank Albu. R.A. Decl.
 Moon 16^h 3^h 19^m 36^s 19 + 22° 56' 58.4
 Motion in 2.1612 9.313
 13.305 + 25.75 + 2 03.9
 Tabular place 3 20 04.94 + 22 59 02.3

Moon's age 15 days (5 hrs. after full)

parallel 55' 27.1

semidiam 15' 08.2

R: 908.2

Augmentation - 14.0

Irradiation (4) - 0.6

R 921.6

R: 1.9756

dkR - 941

(1+a)R: 1.8815

R²: 3.5400

934 = 14.75

908 = 14.0

a = 1700.2

876.5

4297	Plate Center			RA	Dec.			5
x	y							
6.3455	18.4242	3	1	2	41	+22	30	52
17.7891	12.5702		19	31		21	43	57
30.2641	24.5015		26	53		23	21	06
35440	55.50		57	129			94	115
18.13	18.50	3	19	43	+22	31	58	
	27			4			27	10
1.3	350	3	19	39	-22	59	08	
31	465							
45	1630							
	27' 10"	Center { A = 3 ^h 19 ^m 40 ^s						
		D = +22° 59' 10"						

$$\begin{array}{rclclclcl}
 x-3 & +500x & -3827 & +02x & -7029 & & & \\
 +6558 & +3173 & +9731 & -704 & +9027 & -2 & +9028 & = -1 \\
 +613 & +8895 & +9105 & -420 & +9025 & +4 & -9029 & = 0 \\
 -5173 & +12132 & +9919 & -936 & +9023 & +6 & -9029 & = 0 \\
 19.1294 & +9570 & -743 & +4 & & & & = 19.1196
 \end{array}$$

$$\begin{array}{rclclclcl}
 y-71 & +100y & +2682 & +3y & -9412 & & & \\
 -69 & +9212 & +9143 & +234 & +9377 & +15 & +9432 & = 0 \\
 +2454 & +6285 & +9739 & +611 & +9370 & +38 & -9432 & = 0 \\
 -4006 & +12357 & +8245 & +1114 & +9329 & -70 & +9432 & = +1 \\
 19.4441 & +9724 & +704 & +58 & & & & = 19.5235
 \end{array}$$

$$\begin{array}{rclclclcl}
 \text{Tables } a & = 0.0 & a & = 0.0 & a & = 2 & 0.0 & b + a & = 0.0 \\
 \text{also } a & = -500.2 & & -503.0 & & & +2.8 & b & = 0 & + 1.4
 \end{array}$$

Curvature of Plate

	ξ	η	$\Delta \xi$	-75	$0-C$
1	-12.31	-3.68	-89	+79	0
2	-0.27	-9.68	-1	+1	0
3	+12.78	+2.82	+52	+5.1	+1
Moon	+1.12	-2.45	0	+7	<u>-7</u>

$\Delta \eta$	$+3 \eta$	-75	-2
-16	+11 = -5	+5	0 -2
-23	+29 = +6	-0	+6 +9
+13	-18 = +5	-5	0 -2
0	+7	-0	<u>+5</u>

4297 Standard Coordinates

6

Cape No. 476 m 975 Cape No. 498 m 6.9 Cape No. 513 m 978

C	3	12	00.37	3	18	45.69	3	26	07.03
L						69			03
E						65			04
mean		4		3	18	45.68	3	26	07.03
Proc		4	45.29			45.22			+45.82
X	3	12	45.66	3	19	30.90	3	26	52.85
A	3	19	40	3	19	40	3	19	40
X-A		-6	54.34			9.10		+7	12.85
sin(X-A)			-414.28			9.10			+432.78
log "		2.6	1729			0.95904		2.6	3627
cos		9.9	6557			9.96798		9.9	6289
$\frac{1}{\cos}$		1.0	9010			9.43476		1.1	0640
$\frac{1}{\sin}$		-12.3	054			-0.2728		+12.7	762
$\frac{1}{\tan}$			49			1			52
$\frac{1}{\sec}$		5.6	897			17.7284		30.7	814
$\frac{1}{\csc}$		6.3	455			17.7891		30.2	641
X-3		+6	558			+610		-5	173

C	+22	27	57.93	+21	41	09.5	+23	18	23.9
L						08.9			24.2
E						08.9			23.8
mean				+21	41	09.1	+23	18	24.0
Proc		2	54.1		2	48.2		2	41.8
S	+22	30	52.0	+21	43	57.3	+23	21	05.8
D	+22	59	10	22	59	10	22	59	10
S-D		-28	180	-1	15	12.7		21	55.8
sin(S-D)			-1698.0			-4513.4			+1315.8
log "		3.2	2994			3.65451		3.1	1919
$\frac{1}{\cos}$		0.5	6109			0.98566		0.4	5034
tan S		9.6	175			9.6005		9.6	352
$\frac{1}{\tan}$		2.1	802			88695		2.2	128
$\frac{1}{\sec}$		8.8	511			55234		8.9	114
$\frac{1}{\csc}$		-3.6	3.99			-9.6752		+2.8	206
$\frac{1}{\sec}$			710			0			815
$\frac{1}{\tan}$		18.4	311			12.3248		24.9	021
$\frac{1}{\csc}$		18.4	242			12.5702		24.5	015
X-3			69			+2454		-4	006

4297 Standard Coordinates.

6

Cape No. 476 mag 2.5				Cape No. 498 mag 6.9				Cape No. 513 mag 7.8			
C	3	12	00.37	3	18	45.69		3	26	07.03	
L						69				03	
E						65				04	
mean	+ 4			3	18	45.68		3	26	07.03	
Proc	+ 45.29					45.22		+ 45.82			
X	3	12	45.66	3	19	30.90		3	26	52.85	
A	3	19	40	3	19	40		3	19	40	
X-A	- 6 54.34					9.10		+ 7 12.85			
sin(X-A)	- 414.28					9.10		+ 432.78			
log	2.61729					0.95908		2.63627			
WSD	9.96157					9.96798		9.96289			
Σ	1.09010					9.43476		1.10640			
Σ_0	- 12.3054					- 0.2728		+ 12.7762			
Σ_1	- 49					1		+ 52			
Σ	56897					17.7288		30.7814			
Σ_2	6.3455					17.7891		30.2641			
X- Σ	+ 6558					+ 610		- 5173			

C	+ 22° 27' 57.93			+ 21	41	09.5		+ 23	18	239	
L						089				242	
E						089				238	
mean				+ 21	41	09.1		+ 23	18	240	
Proc	+ 2 54.1					48.2		+ 2 41.8			
δ	+ 22	30	52.0	+ 21	43	57.3		+ 23	21	058	
D	+ 22	59	10	22	59	10		22	59	10	
$\delta-D$	- 28 18.0			- 1	15	12.7		+ 21 55.8			
tan($\delta-D$)	- 1698.0					- 4513.4		+ 1315.8			
log	3.22994					3.65451		3.11919			
η_0	0.56109					0.98566		0.45034			
trans	9.6175					9.6005		9.6352			
Σ^2	21802					88695		22128			
η_1	88511					55234		89114			
η_0	- 3.6399					- 9.6752		+ 2.8206			
η_1	+ 710					0		+ 815			
η	18.4311					12.3248		24.9021			
η	18.4242					12.5702		24.5015			
$\eta - \eta$	- 69					+ 2454		- 4006			

-1
2
3
4
5
6
7
8
9
10

1
2
3
4
5
+6
7
8
9
10

4297

Ponovis Center

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
-1	17.2618	-1.8782	3.5276	3.5276	-1.24
2	17.3428	-1.7972	3.2299	3.5302	-98
3	18.0000	-1.1400	1.2996	3.5313	-87
4	18.0767	-1.0633	1.1306	3.5269	-131
5	19.0000	-0.1400	0.0196	3.5270	-130
6	19.1400	0.0000	0.0000	3.5284	-116
7	20.0000	+0.8600	0.7396	3.5249	-151
8	20.2012	+1.0612	1.1261	3.5224	-176
9	20.9372	+1.7972	3.2299	3.5302	-98
10	20.9623	+1.8223	3.3208	3.5251	-149
				3.5400	

	y	$y - y_0$	$(y - y_0)^2$	
1	19.4520	0.0000	0.0000	270
2	20.0000	+0.5480	0.3003	287
3	20.9459	+1.4939	2.2317	3.22 323
4	21.0000	+1.5480	2.3963	3.25
5	21.3248	+1.8728	3.5074	3.56
6	21.3304	+1.8784	3.5284	3.60
7	21.1209	+1.6689	2.7853	27
8	21.0000	+1.5480	2.3963	34
9	20.0000	+0.5480	0.3003	73
10	19.0000	-0.4520	0.2043	104
				Range 194.

Approx. Center

$$y = 20.0 \quad x = 17.3428$$

$$20.9372$$

$$38.2800$$

$$X = 19.1400$$

$$x - \text{max} = 17.2618$$

$$R = 1.8782$$

$$y - \text{max} = 21.3304$$

$$Y = 19.4522$$

$$y = 21.0 \quad x = 18.0767$$

$$20.2012$$

$$38.2779$$

$$19.1390$$

$$\text{Center} \begin{cases} X_0 = 19.1400 \\ Y_0 = 19.4520 \end{cases}$$

4297

Known Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	17.2618	-1.8782	3.5276	3.5276	-1.24
2	17.3428	-1.7972	3.2299	3.5302	-98
3	18.0000	-1.1400	1.2996	3.5313	-87
4	18.0767	-1.0633	1.1306	3.5269	-131
5	19.0000	-0.1400	0.0196	3.5270	-130
6	19.1400	0.0000	0.0000	3.5284	-116
7	20.0000	+0.8600	0.7396	3.5249	-151
8	20.2012	+1.0612	1.1261	3.5224	-176
9	20.9372	+1.7972	3.2299	3.5302	-98
10	20.9623	+1.8223	3.3208	3.5251	-149
3.5400					

	y	$y - Y_0$	$(y - Y_0)^2$	
1	19.4520	0.0000	0.0000	270
2	20.0000	+0.5480	0.3003	287
3	20.9459	+1.4939	2.2317	323
4	21.0000	+1.5480	2.3963	325
5	21.3248	+1.8728	3.5074	356
6	21.3304	+1.8784	3.5284	360
7	21.1209	+1.6689	2.7853	27
8	21.0000	+1.5480	2.3963	34
9	20.0000	-0.5480	0.3003	63
10	19.0000	-0.4520	0.2043	104
Range 194				

Approx Center

$$y = 20.2012 \quad x = 17.3428$$

$$20.9372$$

$$3.52800$$

$$y = 19.1400$$

$$17.2618$$

$$1.8782$$

$$y = 20.9372$$

$$y = 19.4522$$

$$\text{Center } \left\{ \begin{array}{l} X_0 = 19.1400 \\ Y_0 = 19.4520 \end{array} \right.$$

Formation of Normals.

	$a-b$	$a-b$	$b-c$
1	-0.00	+233.3	-0.0
2	-0.99	+176.3	-54.0
3	-1.70	+99.2	-129.8
4	-1.64	+139.0	-203.0
5	-0.26	+18.2	-243.0
6	+0.00	-0.0	-218.0
7	+1.43	-130.0	-252.0
8	+1.64	-186.5	-273.0
9	+0.99	-176.3	-54.0
10	-0.82	-271.0	+67.1
	-1.35	-97.8	-1359.7

$-a$	$-b$	-15 $+ \Delta C$
+ 1	+ 0	- 14 $\checkmark$
+ 1	+ 5	- 9 $\checkmark$
+ 0	+ 13	- 2 $\checkmark$
+ 0	+ 14	- 1 $\checkmark$
+ 0	+ 16	+ 1 $\checkmark$
+ 0	+ 17	+ 2 $\checkmark$
- 0	+ 15	+ 0 $\checkmark$
- 0	+ 14	- 1 $\checkmark$
- 1	+ 5	- 11 $\checkmark$
- 1	- 4	- 20 $\checkmark$

7297 Ononis Center - Conditional Equations.

	0		c	0-c	Corr
1	-1.58 + 0.00 = -1.58	+22-	0 = +22	-146	-160
2	-1.50 + 0.55 = -0.95	+21-	43 = -22	-76	-85
3	-1.14 + 1.49 = -0.65	+13-	116 = -103	+16	+14
4	-1.06 + 1.55 = -0.49	+12-	121 = -109	-22	-23
5	-0.14 + 1.87 = -1.73	+2-	146 = -144	+14	+15
6	0.00 + 1.88 = -1.88	-0-	146 = -146	+30	+32
7	+0.86 + 1.67 = -0.81	-10-	130 = -140	-11	-11
8	+1.06 + 1.55 = -0.49	-12-	121 = -133	-43	-44
9	+1.50 + 0.55 = -0.95	-21-	43 = -64	-34	-45
10	+1.52 - 0.45 = -1.07	-21+	35 = +14	-163	-183
				+60-495	

Normal Equations.

Average = 56

$$+17.62 - 135 = -98 - 0.48$$

$$-1.35 + 17.65 = -1360 + 10.66$$

$$+135 - 010 = -8$$

$$+17.55 = -1368$$

$$b = -780 + 0.61$$

$$+17.62 = -98 - 105 - 203$$

$$a = -115 - 0.02$$

Arc Measured = 194° Average (0-c) = -73.5

$$\frac{pc}{m} = 41$$

$$-73.5$$

$$-10.6 \Delta a = -1.3$$

$$-2R = -3.76 \quad -2RC = -0.75 \quad 41$$

$$-9$$

$$-15$$

$$\text{Corr} + 0.2$$

$$\Delta b = -0.45$$

$$\Delta \delta = -0.2$$

$$\Delta a = +0.02$$

$$\Delta \alpha = +0.00$$

$$\Delta R = -1.5$$

7297 Various Center Conditional Equations

8

	0		C	0-C
1	$-1.58 + 0.002 = -1.24$	$+22 -$	$0 - +22$	-1.46
2	$-1.50 + 0.15 = -1.98$	$+21 -$	$43 - -22$	-76
3	$-1.14 + 1.49 = -87$	$+13 -$	$116 - -103$	$+16$
4	$-1.06 + 1.55 = -1.31$	$+12 -$	$121 - -109$	-22
5	$-0.14 + 1.87 = -1.30$	$+2 -$	$146 - -144$	$+14$
6	$0.00 + 1.88 = -1.16$	$-0 -$	$146 - -146$	$+3.0$
7	$+0.86 + 1.67 = -1.51$	$-10 -$	$130 - -140$	-11
8	$+1.06 - 1.55 = -1.76$	$-12 -$	$121 - -133$	-43
9	$+1.50 - 0.55 = -98$	$-21 -$	$43 - -64$	-34
10	$+1.52 - 0.45 = -1.49$	$-21 +$	$35 - +14$	-163

Normal Equations.

$$+17.62 - 135 = -98$$

$$-135 + 17.65 = -1360$$

$$+135 - 0.10 = 8$$

$$+17.55 = -1368$$

$$b = -780$$

$$+17.62 = -98 - 105 = -203$$

$$a = -11.5$$

4297 Moon's Mean Position (1913.0)

9.

$$X_0 = 191400 \quad Y_0 = 194520$$

$$\Delta X = -6 \quad \Delta Y = -39$$

$$191394$$

$$194481$$

From plate constants $X = 19.1196 \quad Y = 19.5535$

$$\bar{z} = +1.1196$$

$$\eta = -24465$$

$$\log \bar{z} = 0.04906$$

$$\log \bar{z}^2 = 0.0981$$

$$8.50724$$

$$\log \tan \delta = 9.6278$$

$$\log \bar{z}^2 = 0.0981$$

$$7.0534$$

$$\alpha - A = 157676$$

$$\eta_1 = 6.7793$$

$$\eta_2 = +6$$

$$\alpha - H = 37.74$$

$$\eta_0 = -2.4491$$

$$A = 3 \quad 19 \quad 40$$

$$\log \eta_0 = 0.38865$$

$$7.33115$$

$$3.05750$$

$$\alpha_0 = 3 \quad 20 \quad 17.74$$

$$\text{Red} = +440$$

$$\delta - D = -19 \quad 01.6$$

$$\alpha' = 3 \quad 20 \quad 22.14$$

$$D = +22 \quad 59 \quad 10$$

$$\delta_0 = +22 \quad 40 \quad 08.4$$

$$\text{Red} = +234$$

$$\delta' = +22 \quad 40 \quad 31.8$$

4297 Moon's Mean Position (1913.0)

9.

$$X_0 = 19.1400 \quad Y_0 = 19.4520$$

$$\begin{array}{r} 19.1400 \\ - 0.0006 \\ \hline 19.1394 \end{array} \quad \begin{array}{r} 19.4520 \\ - 0.0079 \\ \hline 19.4441 \end{array}$$

From plate constants $X = 19.1196 \quad Y = 19.5535$

$$Z = +1.1196$$

$$y = -2.4465$$

$$\log S = 0.04906$$

$$\begin{array}{r} 9.96506 \\ 8.50724 \end{array}$$

$$\log 10 S = 9.6278$$

$$\begin{array}{r} 0.0981 \\ 7.0534 \end{array}$$

$$(2-A) \quad 1.57676$$

$$y_1 = 6.7793$$

$$y_1 = +6$$

$$x - A \quad 37.74$$

$$y_0 = -2.4471$$

$$A = 3 \quad 19 \quad 40$$

$$x = 3 \quad 20 \quad 17.74$$

$$\log y_0 = 0.38865$$

$$\begin{array}{r} 7.33115 \\ 3.05750 \end{array}$$

$$Red = + 440$$

$$x = 3 \quad 20 \quad 22.14$$

$$S - D = - \quad 19 \quad 06.6$$

$$D = + 22 \quad 59 \quad 10$$

$$S_0 = + 22 \quad 40 \quad 08.4$$

$$Red = + 234$$

$$S = + 22 \quad 40 \quad 31.8$$

4297 Reductio ad locum apt.

$$\begin{array}{rcl}
 H + \alpha & 5 & 45.8 = 86^{\circ} 27' \\
 H & 2 & 25.5 \\
 \alpha & 3 & 20.3 \\
 G & 22 & 14.4 \\
 G + \alpha & 25 & 34.7 = 23^{\circ} 40'
 \end{array}$$

$$S = +22 \quad 40 \quad 33$$

$$\begin{array}{rcl}
 \sin S & 9.9651 \\
 \sin L & 10.7076 \\
 (L) & 0.6727
 \end{array}$$

$$\begin{array}{rcl}
 \cos(G + \alpha) & 9.9618 \\
 \sin \delta & 1.2989 \\
 \sin \delta & 9.6036 \\
 \tan \delta & 9.6210 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \sin S & 9.5860 \\
 \cos(H + \alpha) & 8.7918 \\
 \sin h & 1.2972 \\
 \sin \delta & 9.9992 \\
 \sec S & 0.0349 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & 1.2607 \\
 \delta & 9.3475
 \end{array}$$

$$\begin{array}{rcl}
 h' & 9.6750 \\
 h & 0.1552
 \end{array}$$

$$\begin{array}{rcl}
 f & +2.75 \\
 \delta & +0.22 \\
 h & +1.43 \\
 \hline
 & +4.40
 \end{array}$$

$$4.38$$

$$\begin{array}{rcl}
 \delta' & +1.823 \\
 h' & +0.47 \\
 i & +4.71 \\
 \hline
 & +23.41
 \end{array}$$

4247 Reductio ad locum ahp.

$$\begin{array}{rcl}
 H+G & 5 & 37.9 = 84^{\circ} 30' \\
 H & 2 & 17.6 \\
 G & 3 & 20.3 \\
 G & 22 & 16.4 \\
 G+H & 25 & 36.7 = 24^{\circ} 10'
 \end{array}$$

$$\begin{array}{rcl}
 \log(G+H) & & 9.9602 \\
 \log & & 1.3015 \\
 \log & & 9.6121 \\
 \log & & 9.6210 \\
 \log & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 8' & & 1.2617 \\
 8 & & 9.3585
 \end{array}$$

$$\begin{array}{rcl}
 f & + & 2.77 \\
 8 & + & 0.63 \\
 h & + & 1.43 \\
 \hline
 & & 4.83
 \end{array}$$

$$S = +22 + 0 33$$

$$\begin{array}{rcl}
 \log S & & 9.9651 \\
 \log & & 9.6878 \\
 (L) & & 0.6529
 \end{array}$$

$$\begin{array}{rcl}
 \log S & & 9.5860 \\
 \log(H+G) & & 8.9816 \\
 h & & 1.2984 \\
 \log & & 9.9980 \\
 \log & & 0.0349 \\
 \log & & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 R' & & 9.8660 \\
 R & & 0.1552
 \end{array}$$

$$\begin{array}{rcl}
 8' & + & 1.827 \\
 R & + & 0.73 \\
 i & + & 4.50 \\
 \hline
 & & 7.057
 \end{array}$$

4297

Human Parallax.

11

$$\alpha' = 3^h 20^m 22^s.14$$

$$\delta = 2 \ 59 \ 25.95''$$

$$\alpha - \alpha' = - \ 20 \ 56.22$$

$$= - \ 5^{\circ} \ 14' \ 03''$$

$$- \ 2 \ 02$$

$$- \ 5 \ 12 \ 01$$

$$9.95727$$

$$0.00000$$

$$0.00179$$

$$9.95906$$

$$\mu = 42^{\circ} \ 18' \ 12''$$

$$22 \ 40 \ 57$$

$$19 \ 37 \ 15$$

$$9.82640$$

$$8.20762$$

$$9.52607$$

$$0.17195$$

$$7.73204$$

$$S - S' = +18 \ 32.9$$

$$\delta = +22 \ 59 \ 04.7$$

$$\text{Ann. Eph. } S = +22 \ 59 \ 02.3''$$

$$O - C = +2.4$$

$$\text{Cur. of Plate} +0.2$$

$$\text{2nd ord ref} \ 0.0$$

$$\text{Irr} \ 0.2$$

$$\delta \ +22 \ 59 \ 04.5$$

$$O - C = +2.2$$

$$\delta' = +22^{\circ} \ 40' \ 31.8''$$

$$\Pi \ 55' \ 27.1$$

$$9.86913$$

$$8.20762$$

$$8.96012m$$

$$003592$$

$$707279m$$

$$\alpha - \alpha' = - \ 4' \ 03.90$$

$$= - \ 16.26$$

$$\alpha = 3 \ 20 \ 05.88$$

$$\alpha = 3.20 \ 04.94$$

$$+0.94$$

$$\text{Cur} \ -0.01$$

$$\text{Irr} \ -0.0$$

$$\alpha \ 3 \ 20 \ 05.88$$

$$O - C \ +0.94$$

4297

hmm Parallax.

11

$$\begin{array}{r}
 \lambda: 3^{\circ} 20' 22.14 \\
 0: 2 59 25.91 \\
 \alpha: - 20 56.22 \\
 - 5^{\circ} 14' 05'' \\
 - 2 02 \\
 - 5 12 01
 \end{array}$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 \hline
 995727 \\
 795906
 \end{array}$$

$$f = 42^{\circ} 18' 12''$$

$$22 40 07$$

$$19 37 15$$

$$\begin{array}{r}
 982640 \\
 820762 \\
 982607 \\
 \hline
 017195 \\
 773204
 \end{array}$$

$$S-S' = +18 32.9$$

$$S: 722 59 049$$

$$\text{Amph. } S = +22 59 02.3$$

$$\begin{array}{r}
 0-C = + 2.4 \\
 \text{Corr. of Plate} + 0.2
 \end{array}$$

$$\text{2nd ord. ref. } 0.0$$

$$\begin{array}{r}
 S \\
 +22 59 045
 \end{array}$$

$$0-C = + 2.2$$

$$S = +22^{\circ} 40' 31.8$$

$$\pi \quad 55' 27.1$$

$$\begin{array}{r}
 986913 \\
 820762 \\
 896012 \\
 \hline
 003593 \\
 707279
 \end{array}$$

$$\alpha - \alpha' = 4' 03.90$$

$$- 16.26$$

$$\alpha \quad 3 \quad 20 \quad 0588$$

$$\alpha \quad 3 \quad 20 \quad 0494$$

$$\begin{array}{r}
 +094 \\
 \text{Corr} \quad +.01 \\
 \text{2nd} \quad - .00
 \end{array}$$

$$\alpha \quad 3 \quad 20 \quad 0588$$

$$0-C \quad + 0.44$$

4298 Stars - Measures

1915 Feb 15

12

	α	α	α	α
$\frac{1}{54}$	18807	16622	18966	13390
183	16220	9222	12760	9595
	09 ²⁰	21 ²⁷	60 ⁶⁰	7197
	07	24	62	
	<u>18.2591</u>	<u>.2599</u>	<u>5.3797</u>	<u>3504</u>
$\frac{2}{16.8}$	18085	17480	18163	16088
12.5	13650 ⁵⁵	11930 ²⁰	16600	7645
	48	26	89 ⁸⁸	3940
	95	79	60	76
	<u>12.4438</u>	<u>.4446</u>	<u>16.8429</u>	<u>8436</u>
$\frac{3}{29.3}$	18931	15400	17219	16107
24.5	14762 ⁶²	9574 ⁷⁸	9981 ⁸⁸	13321 ²⁰
	62	70	88	12
	21	00	15	05
	<u>24.4165</u>	<u>.4174</u>	<u>29.2770</u>	<u>2788</u>

Grade 4

4298 Stars - Measur

1915 Feb 15

12

α	α	α	α
1 18807	16622	18966	13390
54 16220	9222	12760	9595
183 09 ²⁰	21 ²⁷	60	7197
07	24	62	
<u>182591</u>	<u>2599</u>	<u>53797</u>	<u>2804</u>
2 18085	17480	18163	16083
168 13650 ⁵⁵	11930 ²⁰	16600 ⁸⁸	7645
12.5 48	26	89	3940
95	79	60	70
<u>124438</u>	<u>4446</u>	<u>168429</u>	<u>8436</u>
3 18931	15400	17219	16107
213 14762	9574 ⁷⁸	9981 ⁸⁸	13321 ²⁰
245 62 ⁶²	70	88	12
21	00	15	05
<u>244165</u>	<u>4174</u>	<u>292770</u>	<u>2788</u>

Group 4

4298 Snow Measurer

1915 Feb 15.

13

$$\begin{array}{r} 1 \\ 17.05 \\ 20.0 \end{array}$$

$$\begin{array}{r} 2 \\ 17.5 \\ 21.0 \end{array}$$

$$\begin{array}{r} 3 \\ 18.0 \\ 21.4 \end{array}$$

$$\begin{array}{r} 4 \\ 18.9 \\ 21.5 \\ 22.2 \\ 22.5 \end{array}$$

$$\begin{array}{r} 5 \\ 19.0 \\ 21.5 \end{array}$$

$$\begin{array}{r} 6 \\ 20.0 \\ 21.2 \end{array}$$

$$\begin{array}{r} 15927 \\ 1248389 \\ 85-89 \\ 25- \\ \hline 21.3440 \end{array}$$

$$\begin{array}{r} 16657 \\ 1119090 \\ 97 \\ 49 \\ \hline 21.5461 \end{array}$$

$$\begin{array}{r} 16661 \\ 1125768 \\ 7058 \\ 48 \\ \hline 21.5390 \end{array}$$

$$\begin{array}{r} 15741 \\ 14150 \\ 3040 \\ 28 \\ \hline 21.1500 \end{array}$$

$$\begin{array}{r} 19183 \\ 1260015 \\ 05-15 \\ 70 \\ \hline 3432 \end{array}$$

$$\begin{array}{r} 19198 \\ 1464050 \\ 35-50 \\ 91 \\ \hline 5447 \end{array}$$

$$\begin{array}{r} 16207 \\ 11580 \\ 6077 \\ 00 \\ \hline 5375 \end{array}$$

$$\begin{array}{r} 16231 \\ 770009 \\ 0209 \\ 19 \\ \hline 1483 \end{array}$$

$$\begin{array}{r} 9133 \\ 9079 \\ 7881 \\ \hline 16.9946 \\ 15460 \\ 1073943 \\ 27 \\ 63 \\ \hline 17.5275 \end{array}$$

$$\begin{array}{r} 14364 \\ 65-76 \\ 14340 \\ \hline 9972 \\ 18350 \\ 1307659 \\ 6159 \\ 48 \\ \hline 5284 \end{array}$$

4298 Moore Measures

1915 Feb 15.

13

$$\begin{array}{r} 1 \\ 1787 \\ 200 \end{array}$$

$$\begin{array}{r} 9133 \\ 9079 \\ 7881 \end{array}$$

$$\begin{array}{r} 14364 \\ 6576 \\ 14340 \end{array}$$
1699469972

$$\begin{array}{r} 2 \\ 175 \\ 21.0 \end{array}$$

$$\begin{array}{r} 15460 \\ 10739 \\ 2743 \\ 63 \end{array}$$
175275

$$\begin{array}{r} 18350 \\ 13076 \\ 6159 \\ 48 \\ 5284 \end{array}$$

$$\begin{array}{r} 3 \\ 150 \\ 214 \end{array}$$

$$\begin{array}{r} 15927 \\ 1278359 \\ 8589 \\ 20 \end{array}$$
213440

$$\begin{array}{r} 19183 \\ 1260015 \\ 0515 \\ 70 \end{array}$$
3432

$$\begin{array}{r} 4 \\ 159 \\ 215 \\ 200 \end{array}$$

$$\begin{array}{r} 16657 \\ 1119090 \\ 97 \\ 49 \end{array}$$
215461

$$\begin{array}{r} 19198 \\ 1464050 \\ 3550 \\ 91 \end{array}$$
5447

$$\begin{array}{r} 5 \\ 150 \\ 215 \end{array}$$

$$\begin{array}{r} 16661 \\ 1125768 \\ 7068 \\ 48 \end{array}$$
215390

$$\begin{array}{r} 16207 \\ 11180 \\ 6077 \\ 00 \end{array}$$
5375

$$\begin{array}{r} 6 \\ 200 \\ 212 \end{array}$$

$$\begin{array}{r} 15741 \\ 14150 \\ 3040 \\ 28 \end{array}$$
211500

$$\begin{array}{r} 16231 \\ 7700 \\ 0209 \\ 19 \end{array}$$
1483

4298 *noona measures.*

1915 Feb. 15

$$\begin{array}{r} 7 \\ w2 \\ 210 \end{array}$$

$$\begin{array}{r} 15287 \\ 6983 \\ 9080 \\ 78 \\ \hline 20.1704 \end{array}$$

$$\begin{array}{r} 16740 \\ 15035 \\ 4645 \\ 35 \\ \hline 1697 \end{array}$$

$$\begin{array}{r} 8 \\ w.7 \\ w.0 \end{array}$$

$$\begin{array}{r} 15321 \\ 12309 \\ 0809 \\ 19 \\ \hline 20.6989 \end{array}$$

$$\begin{array}{r} 16725 \\ 9729 \\ 2428 \\ 10 \\ \hline 6987 \end{array}$$

$$\begin{array}{r} 9 \\ w.7 \\ 19.1 \\ max \\ in \\ x \end{array}$$

$$\begin{array}{r} 15322 \\ 12550 \\ 7576 \\ 4330 \\ \hline 20.7253 \end{array}$$

$$\begin{array}{r} 16700 \\ 945854 \\ 5654 \\ 12 \\ \hline 7252 \end{array}$$

$$\begin{array}{r} 10 \\ 20.6 \\ 19.0 \end{array}$$

$$\begin{array}{r} 19009 \\ 15050 \\ 6758 \\ 18 \\ \hline 20.6045 \end{array}$$

$$\begin{array}{r} 17700 \\ 11640 \\ 3545 \\ 94 \\ \hline 6056 \end{array}$$

4298 *proton measures*

1915 Feb. 15

$$\begin{array}{r} 2 \\ 20.2 \\ 21.0 \end{array}$$

$$\begin{array}{r} 15287 \\ 6985 \\ 9080 \\ 72 \\ \hline 20.1704 \end{array}$$

$$\begin{array}{r} 16740 \\ 15035 \\ 4645 \\ 35 \\ \hline 1697 \end{array}$$

$$\begin{array}{r} 8 \\ 20.7 \\ 20.0 \end{array}$$

$$\begin{array}{r} 15321 \\ 12309 \\ 0809 \\ 19 \\ \hline 20.6989 \end{array}$$

$$\begin{array}{r} 16725 \\ 9729 \\ 2428 \\ 10 \\ \hline 6987 \end{array}$$

$$\begin{array}{r} 2 \\ 20.7 \\ 19.5 \\ \text{max} \\ 2 \end{array}$$

$$\begin{array}{r} 15322 \\ 12550 \\ 7576 \\ \hline 20.7253 \end{array}$$

$$\begin{array}{r} 16700 \\ 945854 \\ 5654 \\ 12 \\ \hline 7252 \end{array}$$

$$\begin{array}{r} 14 \\ 20.6 \\ 19.0 \end{array}$$

$$\begin{array}{r} 19009 \\ 15050 \\ 6758 \\ 18 \\ \hline 20.6045 \end{array}$$

$$\begin{array}{r} 17700 \\ 11640 \\ 3545 \\ 74 \\ \hline 6056 \end{array}$$

4298 Times etc.
 Eph. tables 1913 Nov. 13 2^h 1 1^m - 3^h 28^m
 Moon 3 17 05.6 - 3 17 06.0
 clock fast 0 30.5

W. sid T. 3 16 35.3 0-α- - 0^h 4^m
 H. long. 4 44 31.05
 G. sid T. 8 01 06.35
 sid T. in hour 15 27 58.82
 Interval 16 33 07.53
 Red 2 42.70
 G. in T. 16 30 24.83

Transit alt. R. A. Dec.
 Moon 16 3^h 19^m 36^s.19 + 22° 56' 58".4
 Motion in 2.1621 9.350
 .. 30.414 + 1 05.76 + 4 44.4
 Tabular place 3 20 41.95 + 23 01 42.8

Moon's age 15 days (5^h 19^m after full)
 " parallax 55' 27".44
 " semidiameter 15 08.3

934 = 14.8
 908 = 14.0

R 908.3
 Augmentation 14.0
 Irradiation 4 - 0.6
 R 921.7
 R 1975.8
 αR - 941
 (1+α)R 18817
 R² = 35407

α = -500.3
 - 24
 - 476.3

4298 Times etc.
 Expt. before 1913 Nov. 13 3^h 1 1^m - 3^h 23^m
 Moon 3 17 05.63 17 06.0
 clock fast 0 30.5

H. lid T. 3 16 35.3 0 - x - - 0^h 4^m
 H. temp. 4 44 31.05
 G. lid T. 8 01 06.31
 lid T. & Moon 15 27 15.52
 Interval 16 33 07.53
 Rich. 2 42.70
 G. M. T. 16 30 24.83

Frankank Alum. R. A. place L.
 Moon 16 3^h 19^m 36.19 + 22 56' 58.4
 Moon in 2.1621 9.350
 30^m 414 1 1 05.76 + 4 444
 Tabular place 3 20 41.95 + 23 01 42.8

Moon's age 15 days (5^h 19^m after full)
 parallax 5^h 27.41
 semidiameter 15 08.3

934 = 14.8
 118 = 14.2

R 908.3
 Augmentation 14.0
 Irradiation + - 0.6
 R 921.7
 R 1975.8
 AR - 971
 11+21R 18817
 R² 35407

2 = -100.3

2^m

476.3

4298 Plate Constants

X	5.3800	16.8432	29.2779
Y	5.6897	17.7281	30.7814
X-S	-3097	-8849	-15035

Y	18.2595	12.4442	24.4170
Y	18.4311	12.3248	24.9021
Y-S	-1716	+1194	-4851

2-S	+5008	-34	+34	+460
-3097 + 2690 = -407	-55 = -462	+2 = -460	= 0	
-8849 + 8422 = -427	-37 = -464	+5 = -459	= +1	
-15035 + 14639 = -396	-73 = -469	+9 = -460	= 0	
18.8460 + 9423	-59	+6	= 19.8290	

Y-Y	+5004	+1.64	+34	+29	-7482
-1716 + 9130 = +7414	+9 = +7423	+55 = +7478	+4 = +7482	= 0	
+1194 + 6222 = +7416	+27 = +7443	+37 = +7480	+2 = +7482	= 0	
-4851 + 12208 = +7357	+47 = +7404	+73 = +7477	+5 = +7482	= 0	
19.6631 + 9832	+30	+59	+4 = 19.9074		

$\text{files } a = 0.0 \quad e = 0.0 \quad a - e = 0.0 \quad b + d = 0.0$
 $\text{obs } a = -500.3 \quad e = -503.2 \quad a - e = +2.9 \quad b + d = +1.4$

$a - e = -500.3'' \quad -503.2'' \quad +1.4''$

4298 plate constants

$$\begin{array}{rclcl}
 x & 5.3800 & 168432 & 29.2779 & \\
 y & 5.6897 & 177281 & 30.7817 & \\
 x-s & -3097 & -8849 & -15035 &
 \end{array}$$

$$\begin{array}{rclcl}
 y & 182595 & 124442 & 244170 & \\
 y & 184311 & 123248 & 249021 & \\
 y-s & -1716 & 1194 & -4851 &
 \end{array}$$

$$\begin{array}{rclclclcl}
 2-s & +500x & -34 & +3x & +440 & & \\
 -3097 + 2690 & = -407 & -35 & = -462 & +2 & = -460 & : 0 \\
 -8849 + 8422 & = -427 & -37 & = -464 & +5 & = -459 & : +1 \\
 -15035 + 14639 & = -396 & -73 & = -469 & +9 & = -460 & : 2 \\
 188460 + 9423 & & -59 & & +6 & & = 198290
 \end{array}$$

$$\begin{array}{rclclclcl}
 y-y & +500y & +16x & +3y & +2y & -7422 & \\
 -1716 + 9130 & = 7414 & +9 & = 7423 & +55 & = 7478 & +51 = 7422 \\
 +1194 + 6222 & = 7416 & +27 & = 7443 & +37 & = 7480 & +2 = 7482 \\
 +440 + 12208 & = 12648 & +47 & = 12695 & +73 & = 12768 & +5 = 12773 \\
 196631 + 9832 & & +30 & & +59 & & +4 = 199674
 \end{array}$$

$$\begin{array}{rclclclcl}
 \text{Title } a = & 0.0 & x = 0.0 & a - x = 0.0 & b = 0.0 & c = 0.0 & \\
 \text{Obs } a = & -5003 & b = -5032 & a - b = +29 & b - c = & +14 &
 \end{array}$$

1
2
3
4
5
6
7
8
9
10

1
2
3
4
5
6
7
8
9
10

4298

Onion's Center -

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	16.9959	-1.8531	3.4340	3.5436	+29
2	17.5280	-1.3210	1.7450	3.5166	-241
3	18.0000	-0.8490	0.7208	3.5351	-56
4	18.8490	0.0000	0.0000	3.5209	-198
5	19.0000	+0.1510	0.0228	3.5167	-240
6	20.0000	+1.1510	1.3248	3.5158	-249
7	20.1700	+1.3210	1.7450	3.5166	-241
8	20.6988	+1.8498	3.4218	3.5314	-93
9	20.7252	+1.8762	3.5201	3.5201	-206
10	20.6050	+1.7560	3.0835	3.5311	-96

3.5407

	y	$y - y_0$	$(y - y_0)^2$	
1	20.0000	+0.3310	0.1096	280 ✓
2	21.0000	+1.3310	1.7716	315 ✓
3	21.3466	+1.6776	2.8143	333 ✓
4	21.5454	+1.8764	3.5209	360 ✓
5	21.5382	+1.8692	3.4939	5 ✓
6	21.1492	+1.4802	2.1910	38 ✓
7	21.0000	+1.3310	1.7716	45 ✓
8	20.0000	+0.3310	0.1096	80 ✓
9	19.6690	+0.0000	0.0000	90 ✓
10	19.0000	-0.6690	0.4476	111 ✓

Range 191

Approximate Center.

$$y = 21.0 \quad x = 17.5280$$

$$20.1700$$

$$37.6980$$

$$x = 18.8490$$

$$y - \max = 20.7252$$

$$R = 1.8762$$

$$y - \min = 21.5454$$

$$y = 19.6692$$

$$y = 20.0 \quad x = 16.9959$$

$$20.6988$$

$$37.6947$$

$$18.8472$$

$$\text{Center } \begin{cases} x_0 = 18.8490 \\ y_0 = 19.6690 \end{cases}$$

4298

Known Center -

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	16.9959	-1.8531	3.4340	3.5436	+29
2	17.5280	-1.3210	1.7450	3.5166	-241
3	18.0000	-0.8490	0.7208	3.5351	-56
4	18.8490	0.0000	0.0000	3.5209	-198
5	19.0000	+0.1510	0.0228	3.5167	-240
6	20.0000	+1.1510	1.3248	3.5158	-249
7	20.1700	+1.3210	1.7450	3.5166	-241
8	20.6988	+1.8498	3.4218	3.5314	-93
9	20.7252	+1.8762	3.5201	3.5201	-206
10	20.6050	+1.7560	3.0835	3.5311	-96

3.5407

	y	$y - Y_0$	$(y - Y_0)^2$	
1	20.0000	+0.3310	0.1096	280
2	21.0000	+1.3310	1.7716	315
3	21.3466	+1.6776	2.8143	333
4	21.5454	+1.8764	3.5209	360
5	21.5382	+1.8692	3.4939	5
6	21.1492	+1.4802	2.1910	38
7	21.0000	+1.3310	1.7716	45
8	20.0000	+0.3310	0.1096	80
9	19.6690	+0.0000	0.0000	90
10	19.0000	-0.6690	0.4476	111

Range 191

Approximate Center

$$y = 22.10 \quad x = 17.5280$$

$$\frac{20.1700}{37.6980}$$

$$x = 18.8490$$

$$x_{\text{max}} = 20.7252$$

$$R = 1.8762$$

$$y_{\text{max}} = 21.5454$$

$$y = 19.6692$$

$$\text{Center } \left\{ \begin{array}{l} X_0 = 18.8490 \\ Y_0 = 19.6690 \end{array} \right.$$

$$y = 20.0 \quad x = 16.9959$$

$$\frac{20.6958}{37.6947}$$

$$18.8472$$

Formation of Normals.

1	- 0.61	- 53.6	+ 9.6
2	- 1.76	+ 318.2	- 321.0
3	- 1.42	+ 47.6	- 94.0
4	+ 0.00	- 0.0	- 372.2
5	+ 0.28	- 36.0	- 449.0
6	+ 1.70	- 286.2	- 368.5
7	+ 1.76	- 318.2	- 321.0
8	+ 0.61	- 172.0	- 30.7
9	+ 0.00	- 387.5	- 0.0
10	- 1.18	- 169.0	+ 64.3
	- 0.62	- 1056.7	

- a	- b	- 15	+ ΔC
- 5	+ 3	- 17	✓
- 4	+ 12	- 7	✓
- 2	+ 15	- 2	✓
- 0	+ 17	+ 2	✓
+ 0	+ 17	+ 2	✓
+ 3	+ 13	+ 1	✓
+ 4	+ 12	+ 1	✓
+ 6	+ 3	- 6	✓
+ 6	+ 0	- 9	✓
+ 5	- 6	- 16	✓

H298 Moon's Center - Conditional Equations.

	0	c	0-c	Corr
1	$-1.85 + 0.33 = +29$	$+110 - 39 = +71$	-4.2	$-59''$
2	$-1.32 + 1.33 = -241$	$+7.8 - 157 = -79$	-16.2	$-169''$
3	$-0.85 + 1.68 = -56$	$+51 - 198 = -147$	$+9.7$	$+89''$
4	$+0.00 + 1.88 = -198$	$-0 - 222 = -222$	$+2.4$	$+26''$
5	$+0.15 + 1.87 = -240$	$-9 - 221 = -230$	-1.0	$-8''$
6	$+1.15 + 1.48 = -249$	$-68 - 175 = -243$	-6	$-5''$
7	$+1.32 + 1.33 = -241$	$-78 - 157 = -235$	-6	$-5''$
8	$+1.85 + 0.33 = -93$	$-110 - 39 = -149$	$+5.6$	$+56''$
9	$+1.88 + 0.00 = -206$	$-112 - 0 = -112$	-9.4	$-103''$
10	$+1.76 - 0.67 = -96$	$-105 + 79 = -26$	-7.0	$-86''$
H			$+17.1$	-39.0

Average = 56

Normal Equations.

$$\begin{aligned}
 +19.02 - 0.62 &= -1057 & +4.09 \\
 -0.62 + 16.23 &= -1882 & +9.56 \\
 +0.62 - 0.02 &= -34 & +0.33 \\
 +16.21 &= -1916 & +9.89 \\
 +19.02 &= -1057 - 73 = -1130 & \\
 a &= -59.5 + 0.23
 \end{aligned}$$

Arc measured = $19\phi^\circ$ Average 0-c = -21.9

$$\frac{pc}{m} = .40$$

$$\frac{-21.9}{42} = -0.52 \quad \Delta n = -0.7$$

$$-2RC = -0.75 - 15$$

Corr + 0.2

$$\Delta \delta = -0.45 \quad \Delta \delta = -0.2$$

$$\Delta a = -0.17 \quad \Delta \alpha = -0.01$$

$$\Delta R = -0.9$$

4294 Moons Center Conditional Equations

	0		C	0-C
1	$-185 + 033 = +29$		$+110 - 39 = +71$	-42
2	$-132 + 133 = -241$		$+78 - 157 = -79$	-162
3	$-085 + 168 = -56$		$+51 - 198 = -147$	$+91$
4	$+000 + 188 = -198$		$-0 - 272 = -272$	$+24$
5	$+015 + 187 = -240$		$-9 - 221 = -230$	-10
6	$+115 + 148 = -249$		$-64 - 175 = -239$	-6
7	$+132 + 133 = -241$		$-78 - 157 = -235$	-6
8	$+185 + 033 = -92$		$-110 - 39 = -149$	$+56$
9	$+188 + 000 = -206$		$-112 - 0 = -112$	-94
10	$+176 - 067 = -96$		$-105 + 79 = -26$	-70
11				<u>$+171 - 390$</u>

Average = 56

Normal Equations.

$$+1902 - 062 = -1057$$

$$-062 + 1623 = -1882$$

$$+062 - 002 = -34$$

$$+1621 = -1916$$

$$a = 118.$$

$$+1902 = -1057 - 73 = -1130$$

$$a = 59.5$$

Obs measured = 190°

Average = 0-C = -21.9

$$\frac{pc}{w} = 42$$

$$= \frac{-21.9}{42} = -0.52 \quad \Delta a = -0.6$$

4298

Moon's Mean Position (1983.0)

$$X_0 = 18.8490$$

$$\frac{1}{2}a = -30$$

$$18.8460$$

$$Y_0 = 19.6690$$

$$\frac{1}{2}b = -59$$

$$19.6631$$

From plate constant $X = 19.8290$ $Y = 19.9074$

$$z = +1.8290$$

$$\log z = 0.26221$$

$$\cos z = 9.96494$$

$$8.50724$$

$$(d-A) 179003$$

$$\alpha - A \quad +1 \quad 0170$$

$$A = 3 \quad 19 \quad 40$$

$$\alpha_0 = 3 \quad 20 \quad 41.70$$

$$Red = \quad + \quad 4.40$$

$$\alpha' = 3 \quad 20 \quad 46.10$$

$$\eta = -2.0926$$

$$\log \tan \delta = 9.6280$$

$$0.5244$$

$$7.0534$$

$$7.2058$$

$$\eta_1 = \quad + 16$$

$$\eta_0 = -2.0942$$

$$\log \eta_0 = 0.32102$$

$$7.33115$$

$$2.98987$$

$$\delta - D = -16 \quad 17.0$$

$$D = \quad 22 \quad 59 \quad 10$$

$$\delta = \quad 22 \quad 42 \quad 53.0$$

$$Red = \quad + 23.4$$

$$\delta' = \quad 22 \quad 43 \quad 16.4$$

4298

Mount Wilson Position (1973.0)

$$X_0 = 18.8490$$

$$Y_0 = 19.6690$$

$$Z_0 = \quad -30$$

$$Z_0 = \quad -59$$

$$18.8460$$

$$19.6631$$

From plate constant $X = 19.8290$ $Y = 19.9074$

$$Z = +18290$$

$$\eta = -2.0926$$

$$\log Z = 0.26221$$

$$\log \eta = 9.6280$$

$$\cos = 9.96494$$

$$0.5244$$

$$8.50729$$

$$7.0534$$

$$A - A = 179003$$

$$7.2058$$

$$+16$$

$$A - A = +10170$$

$$\eta =$$

$$\eta = -2.0942$$

$$A = 31940$$

$$\log \eta = 0.32102$$

$$X_0 = 32041.70$$

$$7.33115$$

$$2.98987$$

$$Red = +440$$

$$S - D = -1617.0$$

$$X' = 32046.10$$

$$D = 225910$$

$$S = 224253.0$$

$$Red = +23.4$$

$$S' = 224316.4$$

4298

Red ad locum apt.

$$S = +22^{\circ} 43'$$

$$\begin{array}{rcl} H + \alpha & 5 & 46.2 = 86^{\circ} 33' \\ H & 2 & 25.5 \\ a & 3 & 20.7 \\ G & 22 & 14.1 \\ G + \alpha & 1 & 34.8 = 23^{\circ} 42' \end{array}$$

$$\begin{array}{rcl} \log \cos(G + \alpha) & 9.9617 & \\ \log \sin & 1.2989 & \\ \log \cos & 9.6042 & \\ \log \tan S & 9.6218 & \\ & 8.8239 & \end{array}$$

$$\begin{array}{rcl} \delta' & 1.2606 & \\ \delta & 9.3488 & \end{array}$$

$$\begin{array}{rcl} f & + 2.75 & \\ g & + 0.22 & \\ h & + 1.43 & \\ & + 4.40 & \end{array}$$

$$\begin{array}{rcl} \log \cos S & 9.9649 & \\ \log i & 0.7076 & \\ (i) & 0.6725 & \end{array}$$

$$\begin{array}{rcl} \log \sin S & 9.5868 & \\ \log \cos(H + \alpha) & 8.7794 & \\ \log h & 1.2972 & \\ \log \sin(H + \alpha) & 9.9992 & \\ \log \sec S & 0.0351 & \\ & 8.8239 & \end{array}$$

$$\begin{array}{rcl} h' & 9.6634 & \\ h & 0.1554 & \end{array}$$

$$\begin{array}{rcl} \delta' & + 1.822 & \\ h' & + 0.46 & \\ i & + 4.70 & \\ & + 23.38 & \end{array}$$

4298

Red and brown spots.

$$\begin{array}{rcl}
 H + \alpha & 5 & 462 = 86^\circ 33' \\
 H & 2 & 255 \\
 \alpha & 3 & 207 \\
 G & 2 & 141 \\
 G + \alpha & 1 & 348 = 83^\circ 42'
 \end{array}$$

$$\begin{array}{rcl}
 \cos(G + \alpha) & 9 & 9617 \\
 \sin & 1 & 2989 \\
 \cos & 9 & 6042 \\
 \tan \delta & 9 & 6218 \\
 & 8 & 8239
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & 1 & 2606 \\
 \delta & 9 & 3488
 \end{array}$$

$$\begin{array}{rcl}
 \alpha & + & 275 \\
 \delta & + & 022 \\
 h & + & 143 \\
 \hline
 & = & 440
 \end{array}$$

$$S = 122^\circ + 3'$$

$$\begin{array}{rcl}
 \cos S & 9 & 9649 \\
 i & \underline{0} & 7076 \\
 (u) & 0 & 6725
 \end{array}$$

$$\begin{array}{rcl}
 \cos S & 9 & 5868 \\
 \cos(H + \alpha) & 8 & 7794 \\
 h & 1 & 2972 \\
 \sin(H + \alpha) & 9 & 9992 \\
 \cos \delta & 0 & 0351 \\
 & 8 & 8239
 \end{array}$$

$$\begin{array}{rcl}
 h' & 9 & 6634 \\
 h & 0 & 1554
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & + & 1822 \\
 h' & + & 046 \\
 i & + & 470 \\
 \hline
 & = & 2338
 \end{array}$$

4298

Lunar Parallax

$$\begin{array}{rcl}
 \alpha' & = & 3^h 20^m 46.10 \\
 \theta & = & 3 \quad 16 \quad 35.3 \\
 \alpha - \alpha' & = & - \quad 4 \quad 10.8 \\
 & & - \quad 1^0 \quad 02' \quad 12'' \\
 & & - \quad \quad \quad 24 \\
 & & - \quad 1 \quad 01 \quad 48
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.00007 \\
 \hline
 9.95734
 \end{array}$$

$$\gamma = 42^\circ 11' 26''$$

$$\delta = 22 \quad 43 \quad 16$$

$$19 \quad 28 \quad 10$$

$$\begin{array}{r}
 9.82640 \\
 8.20767 \\
 9.52284 \\
 0.17289 \\
 \hline
 7.72980
 \end{array}$$

$$\delta - \delta' = 718 \quad 27.2$$

$$\delta = +23 \quad 01 \quad 43.6$$

$$\text{Ann Eph } \delta = +23 \quad 01 \quad 42.8$$

$$\begin{array}{rcl}
 O-C & = & + \quad 0.8 \\
 \text{Cur. of Plate} & & + 0.2 \\
 \text{Inv.} & & - 0.2 \\
 \text{Ind. ord. ref} & & 0.0 \\
 \delta & = & +23 \quad 01 \quad 43.4 \\
 O-C & & + 0.6
 \end{array}$$

$$\delta' = +22^\circ 43' 16''4$$

$$\Pi \quad 55' 27.44$$

$$\begin{array}{r}
 9.86913 \\
 8.20767 \\
 8.25749 \\
 0.03606 \\
 \hline
 6.37035
 \end{array}$$

$$\alpha - \alpha' = -0 \quad 48.40$$

$$= - \quad 3.23$$

$$\alpha: \quad 3 \quad 20 \quad 42.89$$

$$\gamma = 3 \quad 20 \quad 41.95$$

$$\begin{array}{rcl}
 & & + 0.92 \\
 \text{Cur} & & - 0.01 \\
 \text{Inv.} & & - 0.01
 \end{array}$$

$$\alpha \quad 3 \quad 20 \quad 42.86$$

$$O-C \quad + 0.91$$

4298

human Pyralis

$$\begin{array}{r}
 \alpha' : 3^h 20^m 46.10 \\
 \delta : 3 \quad 16 \quad 35.3 \\
 \theta - \alpha : - \quad 4 \quad 10.8 \\
 \quad \quad - \quad 1 \quad 02 \quad 12'' \\
 \quad \quad - \quad \quad \quad 24 \\
 \quad \quad - \quad 1 \quad 01 \quad 48
 \end{array}$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 000007 \\
 \hline
 995734
 \end{array}$$

$$\gamma = 42^\circ 11' 26''$$

$$\delta = 2 \quad 43 \quad 16$$

$$19 \quad 28 \quad 10$$

$$\begin{array}{r}
 982640 \\
 320767 \\
 952280 \\
 \hline
 017289 \\
 772980
 \end{array}$$

$$\delta - \delta = 718 \quad 27.2$$

$$\delta + 23 \quad 01 \quad 43.6$$

$$\text{Cur Ephe } \delta = +23 \quad 01 \quad +28$$

$$\theta - \alpha = \quad \quad \quad +0.8$$

$$\text{Cur of Plate} \quad +0.2$$

$$\text{Inv} \quad -0.2$$

$$\text{3rd ord. up} \quad -0.0$$

$$\delta + 23 \quad 01 \quad +34$$

$$\theta - \alpha \quad +0.6$$

$$\delta = +22^\circ 43' 16''$$

$$\Pi \quad 55' = 7.4$$

$$\begin{array}{r}
 986913 \\
 820767 \\
 825749 \\
 \hline
 003626 \\
 637025
 \end{array}$$

$$\alpha - \alpha' = 0 \quad 48.49$$

$$= - \quad 3.23$$

$$\alpha \quad 3 \quad 20 \quad 42.87$$

$$\gamma = 3 \quad 20 \quad 41.95$$

$$+0.92$$

$$\text{Cur} \quad -0.01$$

$$\text{Inv} \quad -0.11$$

$$\alpha \quad 3 \quad 21 \quad 42.86$$

$$\theta - \alpha \quad +0.91$$

