

KG

#1366

n933

Vol. LVII



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2234

Harvard Lunar Plates

Measures and Reductions

Mary Fowler

Volume L VII

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Stars - Measures

1914 January 16

	d	4	
✓	19538	19510	✓
12.4	1191000	17120	
19.7	0501	1512	
	23	88	
	19.7622	7611	

$\begin{array}{r} x \\ d \end{array}$

19475	19435
13250	15635
50	45
60	25
123783	3791

$\frac{2}{21.3} \quad 1210210 \quad 12514$
 $31.9 \quad 0300 \quad 1212621$
 $11740 \quad 20$
 $31.9635 \quad .9608$

17996	18344
10890	15430
88	32
90	20
212899	2903

$$\begin{array}{r} 3 \\ 29.8 \\ 14.5 \end{array} \quad \begin{array}{r} 15278 \\ 104219 \\ 20 \\ 230 \\ 144834 \end{array}$$

$$\begin{array}{r} 16228 \\ 1369300 \\ 9500 \\ 90 \\ \hline 29.7477 \end{array}$$

Grade 4

1914 January 16.

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Star - measures

	d	4	v
1	19538	19510	
124	1191000	1712012	
197	0501	1512	
	23	88	
	<u>19.7622</u>	<u>.7611</u>	

213	1210210	12514
319	0300	1212621
	11740	20
	<u>31.9635</u>	<u>.9608</u>

29.8	15278	15818
145	1042119	1063341
	20	36
	230	12
	<u>14.4834</u>	<u>4822</u>

Grade 4.

	d	2	v
	19475	19435	
	13250	15635	
	5047	4540	
	60	25	
	<u>12.3783</u>	<u>.3791</u>	
	17996	18344	
	10890	15430	
	8895	3240	
	90	20	
	<u>21.2899</u>	<u>.2903</u>	
	16228	17026	
	1369300	953015	
	91	2826	
	90	13	
	<u>29.7477</u>	<u>.7492</u>	

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moon-measures.

2

	d	n
1	19600	15485
21.0	17859.57	7250.45
183	60	40
	80	80
	<u>18,1737</u>	<u>1764</u>

possibly on
termination

2
22.1
19.0

15165	13432
70.59	1287260
14620	70

22.0545.0565

3 scratch.

22.3	18968	17014
19.5	13830.30	12130.50
	30	50
	58	14
	<u>19.5133</u>	<u>1129</u>

19662	18498
1252240	1459580
45-30	8690
40	88
<u>22.2888</u>	<u>2907</u>

4
22.4
20.2
max
20

18575	17530
12510.05	1453124
05-05	30
47	12
<u>22.3949</u>	<u>3995</u>

5
22.3
21.0

18495	19558
10690.55	1737808
6170	8010
80	40
<u>22.2187</u>	<u>2160</u>

6	17350
22.0	1348810
21.4	6598
	40
	<u>21.3856</u>

18817
12598
85-82
00
<u>3782</u>

oblique

2184 Moon-measures.

	d	n
$\frac{1}{1}$	19600	15485
210	1785957	7250
183	60	40 45-
	80	80
	<u>181737</u>	<u>1764</u>

possibly on
termination.

$$\frac{2}{22.1}$$

$$19.0$$

$$\frac{151655}{7059}$$

$$14620$$

$$\frac{13432}{1287260}$$

$$70$$

22.0545

.0565

 $\frac{3}{3}$ scratch.

223	18968	17014
19.5	13830	1213050
	30	50
	58	14
	<u>19.5133</u>	<u>1129</u>

19662	18998
1252240	1455580
45-30	8690
40	88
<u>22.2888</u>	<u>2907</u>

$$\frac{4}{22.9}$$

$$21.2$$

$$21.0$$

18575	17530
12510	1453124
05-05	30
47	12
<u>22.3949</u>	<u>.3995</u>

$$\frac{5}{22.3}$$

$$21.0$$

18495	19588
1069055	1737808
6170	8010
80	40
<u>22.2187</u>	<u>2160</u>

$\frac{6}{22.0}$	17350	18817
21.4	1348810	12598
	6598	85-82
	40	00
	<u>21.3856</u>	<u>.3782</u>

oblique

2184 Moon-measures

	d	y	z	d	x	w
2	15570			20215		
21.0	14295			11457	65	
22.2	7175			60		
	48			10		
	<u>22.1288</u>			<u>1250</u>		

8	15600			15715		
20.2	13130	11		18175	70	
22.2	10			70		
max	85			96		
	<u>22.2480</u>			<u>2470</u>		

9	14608			15700		
21.0	12350	35		7970	51	
22.2	41			7055		
	00			90		
	<u>22.2264</u>			<u>2270</u>		

Moon not very clear
Reseau lines wide & blurry.

2184 Moon measures

	d	y	r	d	x	v
2	15570		20215			
21.0	14295		11457	65		
22.2	7175		60			
	48		10			
	<u>221288</u>		<u>1250</u>			

8	15600		15715			
20.2	13130	11	18175	70		
22.2	10		70			
max	85		96			
	<u>222480</u>		<u>2470</u>			

9	14608		15700			
21.0	12350	35	7970	51		
22.2	41		70	55		
	00		90			
	<u>222264</u>		<u>2270</u>			

Moon not very clear
Pecan lines wide + blurry.

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Times etc. ✓

Exh. station 1912 Nov. 25 1^h 29^m ✓ - 1^h 41^m ✓
 Moon 1 35 22.4 ✓ 1 35 22.6 ✓
 clock fast 0 05.8 ✓

H. Sid. T. 1 35 16.7 ✓ G - d = - 3^h 48^m
 Long 4 44 31.05 ✓
 G. Sid. T. 6 19 47.75 ✓
 Sid. T. known 16 16 14.46 ✓
 Interval 14 03 33.29 ✓
 Red. 2 18.20 ✓
 G. M. T. 14 01 15.09 ✓

Snow Hunt. Alm. R. A. Dec.
 Moon 14^h 5^m 23^s 20.63 ✓ + 28° 00' 19.2 ✓
 Motion in 1^m 2.6716 ✓ 3.296 ✓
 " 1.2515 ✓ + 3.34 ✓ + 4.1 ✓
 Tabular place. 5 23 23.97 ✓ + 28 00 23.3 ✓

Moon's age 17 days. ✓

parallax. 59' 10.3 ✓
 semidiameter 16 08.9 ✓
 934 = 10.55["] R 968.9 ✓
 969 = 11.3 R + 11.3 ✓
 Augmentation - 0.8 ✓
 Irradiation (4) R 979.4 ✓
 R 2099.5 ✓
 (1+a) R 2099.4 ✓
 R² 4407.5 ✓
 a - - 0.7

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Times etc.

Exp. time 1912 Nov. 25 $1^h 29^m$ $-1^h 41^m$
 Moon 1 35 22.4 - 1 35 22.6
 clock fast 0 05.8

H Sid T 1 35 16.7 $G - x = -3^h 48$
 Long 4 44 31.05
 G Sid T 6 19 47.75
 Sid T h. Moon 16 16 14.46
 Internal 19 03 33.29
 Red. 2 18.20
 G h T. 14 01 15.09

Snow Kant. Alm. R. A. Decl.
 Moon 14^h $5^h 23^m 20.63$ $+28^{\circ} 00'$ 19.2
 Motion in 1^m 2.6716 3.296
 1.2515 $+ 3.34$ $+ 4.1$
 Tabular place $5^h 23^m 23.97$ $+28^{\circ} 00'$ 23.3

Moon's age 17 days.

parallax 59' 10.3
 semidiameter 16 08.9
 934 = 10.5 R 968.9
 969 = 11.3
 Augmentation + 11.3
 Irradiation (4) - 0.8
 R 979.4
 R 2099.5
 (1+a) R 2099.4
 R² 4407.5
 a = 0.7

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Plate Constants

5

α	δ	$\mu. \alpha$	$\mu. \delta$
12 37 87	19 76 16	5 21 30	+ 27 32 04
21 29 01	31 96 22	26 39	+ 29 07 50
29 74 84	14 48 28	31 39	+ 26 52 13
3 63 42	66 21	78 108	+ 82 91 67
21 14	22 07	5 26 36	+ 27 50 42
- 18	- 22	- 1 36	- 32
3.14	.07	5 ^h 25 ^m 00 ^s	+ 27 50 10
31	46 5		
97 ^s	32"		

$$A = 5^h 25^m 00^s$$

$$D = +27^\circ 50' 10''$$

$$\begin{aligned} \alpha - \delta &= -122.64 & +0.7 & -11243 \\ +3657 & -24232 & +1234 & +9 = +1243 = 0 \\ +5147 & -3919 & +1228 & +15 = +1243 = 0 \\ +2997 & -1776 & +1221 & +21 = +1242 = -1 \\ 20.2981 & -2470 & +14 & = 19.9282 \checkmark \end{aligned}$$

$$\begin{aligned} \mu - m &+ 117.82 & -34 & +22 & -2084 \\ +683 & +1458 & +2141 & -59 & +2082 & +2 = +2084 = 0 \\ -332 & +2508 & +2176 & -96 & +2080 & +4 = +2084 = 0 \\ -1382 & +3504 & +2122 & -43 & +2079 & +6 = +2085 = +1 \\ W.1499 & +2395 & -60 & & & = 20.1745 \checkmark \end{aligned}$$

$$\begin{aligned} \text{Tables } a &: -2.8 & e &: -1.8 & a - e &: -1.0 & b + d &: +3.1 \\ \text{Obs } a &: -0.7 & e &: +3.0 & a - e &: -3.7 & b + d &: +4.6 \end{aligned}$$

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Plate Constants

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x	y	R	C	Recl.
12.3787	197616	5	21 30	+27 32 04
21.2901	319622		26 39	+29 07 50
29.7484	144828		31 39	+26 52 13
3 6342	6621		78 108	+42 91 67
2114	2207	5	26 36	+27 50 42
-18	-22		-1 36	- 32
3.14	.07	5"	25 00	+27 50 10
31	465			
97	32			

$$A = 5^h 25^m 00^s$$

$$D = +27^\circ 50' 10''$$

$$\begin{aligned}
 2 - \xi &= -12264 & +0.7 & & -1243 \\
 +3657 - 2423 &= +1234 & +9 &= +1243 & = 0 \\
 +5147 - 3919 &= +1228 & +15 &= +1243 & = 0 \\
 +2997 - 1776 &= +1221 & +21 &= +1242 & = -1 \\
 w. 2981 - 2269 & & +14 & & = 19.9282
 \end{aligned}$$

$$\begin{aligned}
 1 - m &+ 117.8x & -34 & & +2x & & -2084 \\
 +683 + 1458 &= +2141 & -59 &= +2082 & +2 &= +2084 & = 0 \\
 -332 + 2508 &= +2176 & -96 &= +2080 & +4 &= +2084 & = 0 \\
 -1382 + 3504 &= +2122 & -43 &= +2079 & +6 &= +2085 & = +1 \\
 w. 1499 + 2395 & & -60 & & & = 201745
 \end{aligned}$$

$$\begin{aligned}
 \text{bles } a &: -28 & v &: -1.8 & a - v &: -1.0 & v + a &: +31 \\
 \text{les } a &: -07 & z &: +30 & a - z &: -37 & v + a &: +4.6
 \end{aligned}$$

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Standard Coordinates

Cape No. 777 mag 8.1 Cape No. 787 mag 8.4 Cape No. 798 mag 5.7

C	5	20	44.92	5	25	53.05	5	30	54.10
L			96			16			11
E			92			08			11
Mean	5	20	44.93	5	25	53.10	5	30	54.11
Proc		+	45.10		+	45.71		+	44.93
X	5	21	30.03	5	26	38.81	5	31	39.04
A	5	25	00	5	25	00	5	25	00
A-A	-	3	29.97	+	1	38.81	+	6	39.04
sin(A-A)		-	209.96		+	98.81		+	398.98
log "	2	3	22.14	1	9	94.80	2	6	00.95
"cos S	9	9	47.79	9	9	41.27	9	9	50.38
"S ₀	0	7	77.17	0	4	43.31	1	0	58.57
S ₀	-	5	98.64	+	2	77.53	+	1	1.4437
S ₁	-		6	+		1	+		50
S	1	2	01.30	2	0	7.754	2	9	44.87
α	1	2	37.87	2	1	29.01	2	9	74.84
α-3	+	3	65.7	+	5	14.7	+	2	99.7

C	+	27	31	23.5	+	29	07	16.7	+	26	51	42.9
L				23.1				16.1				42.7
E				23.8				16.7				43.1
Mean	+	27	31	23.5	+	29	07	16.5	+	26	51	42.9
Proc			+	40.6				33.3			+	30.1
S	+	27	32	04.1	+	29	07	49.8	+	26	52	13.0
D	+	27	50	10	+	27	50	10	+	27	50	10
d+D	-	18		05.9	+	1	17	39.8	-		57	57.0
tan(G-D)		-	10	85.9		+	4	65.6		-	34	77.3
log "	3	0	35	79	3	6	68	44	3	5	41	24
"γ ₀	0	3	66	94	0	9	99	59	0	8	72	39
tan S	9	7	17	1	9	7	46	1	9	7	04	7
S ₂	1	5	54	3	0	8	86	6	2	1	17	1
"γ ₁	8	3	24	8	7	6	86	1	8	8	75	2
γ ₀	-	2	32	78	+	9	99	05	-	7	45	40
γ ₁	+		21	1	+		49		+		75	0
γ	1	9	69	33	3	1	99	54	1	4	62	10
γ	1	9	76	16	3	1	96	22	1	4	48	28
γ-γ	+		68	3	-		33	2	-		13	82

2184 Standard Coordinates

Cape No. 777 mag 8.1 Cape No. 787 mag 8.4 Cape No. 798 mag 5.7

C	5	20	44.92	5	25	53.05	5	30	54.10
L			96			16			11
E			92			08			11
mean	5	20	44.93	5	25	53.10	5	30	54.11
Pnc			+ 45.10			+ 45.71			+ 44.93
α	5	21	30.03	5	26	38.81	5	31	39.04
A	5	25	00	5	25	00	5	25	00
A-A	-	3	29.97	+	1	38.81	+	6	39.04
$\sin(\alpha-A)$			- 209.96			+ 98.81			+ 398.98
$\log \dots$	2	32	2.14	1.9	94	80	2	60	0.95
$\cos$	9	94	7.79	9	94	1.27	9	95	0.38
T_e	0	77	7.17	0	44	3.31	-	1	05.857
$\bar{z}_1$	-	5	98.64	+	2	77.53	+	1	1.4437
$\bar{z}_2$	-		6	+		1	-		50
$\bar{z}_3$	1	2	0.130	2	0	7.754	2	9	4.487
$\bar{z}_4$	1	2	3.787	2	1	2.901	2	9	7.484
$\bar{z}_5$	+	3	6.57	+	5	1.47	+	2	9.97

C	+ 27	31	23.5	+ 29	07	16.7	+ 26	51	42.9
L			23.1			16.1			42.7
E			23.8			16.7			43.1
mean	+ 27	31	23.5	+ 29	07	16.5	+ 26	51	42.9
Pnc			+ 40.6			+ 33.3			+ 30.1
δ	+ 27	32	04.1	+ 29	07	49.8	+ 26	52	13.0
D	+ 27	50	10	+ 27	50	10	+ 27	50	10
$\delta-D$	-	18	05.9	+	1	17.39.8	-	57	57.0
$\sin(\delta-D)$			- 10.859			+ 46.506			- 34.773
$\log \dots$	3	03	5.79	3	66	8.44	3	54	1.24
γ	0	36	6.94	0	99	9.59	0	87	2.39
δ	9	7	1.71	9	7	4.61	9	7	0.47
δ^2	1	55	4.3	0	88	6.6	2	1	1.71
γ_1	8	32	4.8	7	68	6.1	8	87	5.2
γ_2	-	2	3.278	+	9	9.905	-	7	4.540
γ_3	+		2.11	+		4.9	-		7.50
γ_4	1	9	6.933	3	1	9.954	1	4	6.210
γ_5	1	9	7.616	3	1	9.622	1	4	4.828
γ_6	+		6.83	-		3.32	-		1.382

Formation of normal.

pt.	res. L	resid
1	160.5	-164
2	123.2	+37
[3]		
4	90.0	-12
5	66.2	0
6	54.1	+63
7	19.5	-63
8	0.0	-67
9	351.8	-43

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Throon's Center

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	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 y_j^2$	$0 - c$
1	21.0000	+0.7000	+7	0.4910	4.3947	-128
2	22.0555	+1.7555	+5	3.0835	4.4081	+6
3	22.2898	+1.9898	+2	3.9601	69	
4	22.3972	+2.0972	+0	4.3982	4.3982	-93
5	22.2178	+1.9178	+3	3.6758	4.3974	-101
6	22.0000	+1.7000	-4	2.8886	4.4032	-43
7	21.0000	+0.7000	-7	0.4890	4.3920	-155
8	20.3000	0.0000	-7	0.0000	4.3940	-135
9	20.0000	-0.3000	-7	0.0904	4.3977	-98

$$\text{Comp } R^2 = 4.4075$$

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	18.1750	-1.9760	+3	3.9037
2	19.0000	-1.1510	+1	1.3246
3	19.5131	-0.6379	+1	0.4068
4	20.1510	0.0000	+0	0.0000
5	21.0000	+0.8490	-1	0.7206
6	21.3819	+1.2309	-2	1.5146
7	22.1269	+1.9759	-3	3.9030
8	22.2475	+2.0965	-3	4.3940
9	22.2267	+2.0757	-3	4.3073

Approx. Center:

$$x = 21.0000 \quad y = 18.1750$$

$$22.1269$$

$$403019$$

$$\text{mean } y = 20.1510$$

$$y - \text{mean} = 22.2475$$

$$R = 20965$$

$$x - \text{mean} = 22.3972$$

$$x_0 = 20.3007$$

$$\text{Center} \left\{ \begin{array}{l} x_0 = 20.3000 \\ y_0 = 20.1510 \end{array} \right.$$

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	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)(y - y_0)^2$	$y - y_0$
1	21.0000	+0.7000	+7	0.4910	4.3947	-128
2	22.0555	+1.7555	+5	3.0835	4.4081	+6
3	22.2898	+1.9898	+2	3.9601	6.9	
4	22.3972	+2.0472	+0	4.3982	4.3982	-93
5	22.2178	+1.9178	+3	3.6768	4.3974	-101
6	22.0000	+1.7000	-4	2.8886	4.4032	-43
7	21.0000	+0.7000	-7	0.4890	4.3920	-135
8	20.3000	0.0000	-7	0.0000	4.3940	-135
9	20.0000	-0.3000	-7	0.0904	4.3977	-98

Comp R = 4.4075

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	18.1750	-1.9760	+3	3.9037
2	19.0000	-1.1510	+1	1.3246
3	19.5131	-0.6379	+1	0.4068
4	20.1510	-0.0000	+0	0.0000
5	21.0000	+0.8490	-1	0.7206
6	21.3819	+1.2309	-2	1.5146
7	22.1269	+1.9759	-3	3.9030
8	22.2475	+2.0965	-3	4.3940
9	22.2267	+2.0757	-3	4.3073

Approx. Center

$$x = 21.0000 \quad y = 18.1750$$

$$22.1269$$

$$4.03019$$

$$\text{mean } y = 20.1510$$

$$y - \text{mean} = 22.2475$$

$$R = 2.0965$$

$$y - \text{mean} = 22.3972$$

$$x_0 = 20.3000$$

$$\text{Center } \begin{cases} x = 20.3000 \\ y = 20.1510 \end{cases}$$

Formative Normals.

	ab	an	bu
1	- 1.38	- 89.5	+ 253.5
2	- 2.02	+ 10.6	- 6.9
4	+ 0.00	- 195.5	- 0.0
5	+ 1.63	- 194.0	- 85.9
6	+ 2.09	- 13.0	- 53.0
7	+ 1.38	- 108.5	- 307.0
8	+ 0.00	- 0.0	- 283.5
9	- 0.62	+ 29.4	- 204.0
	+ 1.08	- 620.5	- 686.8

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Moon's Center Conditional Equations

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	a	b	0	c	0=c
1	+0.70	-1.98	= -128	-28 + 64	= +36 - 164
2	+1.76	-1.15	= +6	-68 + 37	= -31 + 37
3	-				
4	+2.10	+0.00	= -93	-81 - 0	= -81 - 12
5	+1.92	+0.85	= -101	-74 - 27	= -101 0
6	+1.70	+1.23	= -43	-66 - 40	= -106 + 63
7	+0.70	+1.98	= -155	-28 - 64	= -92 - 63
8	+0.00	+2.10	= -135	-0 - 68	= -68 - 67
9	-0.30	+2.08	= -98	+12 - 67	= -55 - 43
					Average = 56

Normal Equations

$$\begin{aligned}
 +15.12a + 1.08b &= -620 \\
 +1.08a + 20.97b &= -687
 \end{aligned}$$

$$\begin{aligned}
 -1.08a - 0.08b &= +44 \\
 +19.99b &= -643
 \end{aligned}$$

$$b = -32.2$$

$$+15.12a = -620 + 35 = -585$$

$$a = -38.6$$

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known center

Conditional Equations

	a	b	0	c	0-c
1	+0.70	-1.98	= -128	-28 + 64	= +36 - 164
2	+1.76	-1.15	= +6	-68 + 37	= -31 + 37
3	-				
4	+2.10	+0.00	= -93	-81 - 0	= -81 - 12
5	+1.92	+0.85	= -101	-74 - 27	= -101 0
6	+1.70	+1.23	= -43	-66 - 40	= -106 + 63
7	+0.70	+1.98	= -155	-28 - 64	= -92 - 63
8	+0.00	+2.10	= -135	-0 - 68	= -68 - 67
9	-0.30	+2.08	= -98	+12 - 67	= -55 - 43

Average = 56

Normal Equations

$$+15.12a + 1.08b = -620$$

$$+1.08a + 20.07b = -687$$

$$-1.08a - 0.08b = +44$$

$$+19.99b = -643$$

$$b = -32.2$$

$$+15.12a = -620 + 35. -585$$

$$a = -38.6$$

Red ad. l. aph.

$$H + \alpha \quad 6 \quad 64 = 106^\circ$$

$$H \quad 1 \quad 38$$

$$\alpha = 5 \quad 26$$

$$G \quad 22 \quad 10$$

$$G + \alpha \quad 3 \quad 36 = 54^\circ$$

$$\cos(G + \alpha) = 9.7692$$

$$g = 1.2689$$

$$\sin(G + \alpha) = 9.9080$$

$$\tan S = 9.7183$$

$$\frac{1}{\tan} = 8.8239$$

$$\log(g') = 1.0381$$

$$(g) = 9.7196$$

$$\begin{array}{r} f \\ g \\ h \\ \hline + 2.53 \\ + 0.52 \\ + 1.46 \\ \hline + 4.51 \end{array}$$

$$S = +27^\circ 36'$$

$$\cos S = 9.9475$$

$$L = 0.5589$$

$$(L) = 0.5066$$

$$\sin S = 9.6659$$

$$\cos(H + \alpha) = 9.4403$$

$$h = 1.3042$$

$$\sin \alpha = 9.9828$$

$$\sec S = 0.0525$$

$$\frac{1}{\sec} = 8.8239$$

$$\log(h') = 0.4104$$

$$(h) = 0.1634$$

$$\begin{array}{r} g \\ h \\ i \\ \hline + 10.92 \\ - 2.57 \\ + 3.21 \\ \hline + 71.56 \end{array}$$

2184 Morris Mean Position (1912.0)

$$X_0 = 20.3000^\circ \quad Y_0 = 20.1510^\circ$$

$$\begin{array}{r} 20.3000 \\ - 19 \\ \hline 20.2981 \end{array} \quad \begin{array}{r} 20.1510 \\ - 16 \\ \hline 20.1494 \end{array}$$

From Plate Constants $X = 19.9282^\circ \quad Y = 20.1745^\circ$

$$\bar{z} = +1.9282^\circ$$

$$\log \bar{z} = 0.28515^\circ$$

$$\begin{array}{r} 994753 \\ 8.50724 \end{array}$$

$$(X-A) = 183038$$

$$\alpha - A = +107.67$$

$$A = 52500^\circ$$

$$\alpha_0 = 52607.67$$

$$\text{Red} = +4.51^\circ$$

$$\alpha' = 52612.18$$

$$\eta = -1.8255^\circ$$

$$\log \sin \delta = 9.7257 \quad 9.7183^\circ$$

$$\begin{array}{r} 05793 \\ 0.5703 \end{array}$$

$$\eta_1 = 7358.4 \quad 7.3420$$

$$\eta_2 = +22$$

$$\eta_0 = -1.8279$$

$$\log \eta_0 = 0.26191^\circ$$

$$7.33115$$

$$(U-D) = 293076^\circ$$

$$S-D = -1412.6^\circ$$

$$D = +275010^\circ$$

$$S_0 = +273557.4^\circ$$

$$\text{Red} = +11.6^\circ$$

$$S' = +273609.0^\circ$$

2184

Lunar Parallax

$$\alpha = 5^h 26^m 12.18^s \quad S = +27^\circ 36' 09.0''$$

$$\delta = 1^\circ 35' 16.7'' \checkmark$$

$$-3 \quad 50 \quad 55.5'' \checkmark$$

$$- \quad 57^\circ 43' 52''$$

$$- \quad 20 \quad 58'' \checkmark$$

$$- \quad 57 \quad 22 \quad 54'' \checkmark$$

$$9.95727''$$

$$9.99999''$$

$$0.26838''$$

$$0.22564''$$

$$f = 59.015 \quad 23''$$

$$27.36 \quad 09$$

$$31.139 \quad 74''$$

$$9.82640''$$

$$8.23582''$$

$$9.71999''$$

$$0.06577''$$

$$7.84798''$$

$$S - S' = +24 \quad 13.5''$$

$$S + 28 \quad 00 \quad 22.5'' \quad \alpha = 5 \quad 23 \quad 24.48''$$

$$\text{True Altitude } S = +28 \quad 00 \quad 23.3'' \quad \alpha = 5 \quad 23 \quad 23.97''$$

$$b - c$$

$$- 0.8$$

$$+ 0.51$$

$$H = 59 \quad 10.3'' \checkmark$$

$$9.86913''$$

$$8.23582''$$

$$9.92714''$$

$$0.05409''$$

$$8.08618''$$

$$a - \alpha' = -41 \quad 55.47'' \checkmark$$

$$= 2 \quad 47.70''$$

$$P \quad 3 \quad 4 \quad 5 \quad 6$$

$$f = 20$$

$$f = 20$$

$$f = 20$$

2184 Mean Position (1912.0)

$$X_0 = 203000$$

$$Y_0 = 201510$$

$$\quad - 19$$

$$\quad - 16$$

$$202981$$

$$201494$$

True Plate Constants $X = 199282$ $Y = 201745$

$$\bar{z} = +19282$$

$$\eta = -18255$$

$$\log \bar{z} = 0.28515$$

$$\cos \quad 994753$$

$$850724$$

$$(X-A) = 183038$$

$$\alpha - A = +107.67$$

$$A = 52500$$

$$\alpha_0 = 52607.67$$

$$\text{Red} = +4.51$$

$$\alpha = 52612.18$$

$$\log \tan S = 9.7257 \quad 9.7183$$

$$\quad 0.5793$$

$$\eta = 73584$$

$$\eta_1 = +22$$

$$\eta_0 = -18279$$

$$\log \eta_0 = 0.261911$$

$$733115$$

$$(S-D) = 293076$$

$$S-D = -1412.6$$

$$D = +275010$$

$$S_0 = +2735574$$

$$\text{Red} = +11.6$$

$$S' = +2736090$$

1
11.7
20

3
m
37

3
29
14

2185

Stan. measures

1944 Jan. 17.

10

	d	N
1	15702	19087
11.7	1379084	1096060
20.3	87	60
	85	60
	<u>20.1912</u>	<u>.1895</u>

	d	N
2	19144	15709
20.6	1489091	933030
32.5	90	30
	18	89
	<u>3.24244</u>	<u>.4233</u>

	d	N
3	1210920	10490
29.1	11	1023945
15.0	11868	43
	<u>14.9755</u>	<u>.9752</u>

	d	N
	14661	18301
	1240201	1052020
	02	28
	51	84
	<u>11.7743</u>	<u>.7764</u>

	d	N
	19350	17340
	1573040	1090910
	42	10
	30	10
	<u>20.6395</u>	<u>.6411</u>

	d	N
	19210	15560
	1079807	1392925
	00	20
	85	52
	<u>29.1613</u>	<u>.1634</u>

Grade 4.

2185 Alan - micromes

1914 Jan. 17.

10

<u>1</u>	15702	19087
117	13790 ⁸⁴	1096060
203	87	60
	85	60
	<u>20.1912</u>	<u>1895</u>

<u>2</u>	19144	15709
206	14890 ⁹¹	933030
325	90	30
	18	89
	<u>324244</u>	<u>4233</u>

<u>3</u>	12109 ²⁰	10490
29.1	11	10239 ⁴⁰
110	11868	43
	<u>149755</u>	<u>9752</u>

Grade 4.

<u>1</u>	14661	18301
12402 ⁰¹	10520 ²⁰	28
02	84	
51		
<u>11.7743</u>	<u>7764</u>	

19350	17340
15730 ⁴⁰	10969 ¹⁰
42	10
30	10
<u>20.6395</u>	<u>6411</u>

19210	15560
10798 ⁰⁷	13979 ²⁰
00	20
85	52
<u>29.1613</u>	<u>1634</u>

2185

Moon-measures.

	d		n		d		n
<u>1</u>	16958		19650				
22.0	1405545-		1253543				
19.8	58		28				
	41		30				
	<u>19.2900</u>		<u>12900</u>				

$$\begin{array}{r} 2 \\ 22.5 \\ 20.0 \end{array}$$

$$\begin{array}{r} 3 \\ 22.6 \\ 20.8 \\ \text{may} \\ \text{in} \\ \text{Dec} \end{array}$$

$$\begin{array}{r} 4 \\ 22.6 \\ 21.0 \end{array}$$

$$\begin{array}{r} 5 \\ 22.4 \\ 22.0 \end{array}$$

$$\begin{array}{r} 6 \\ 22.0 \quad 19.776 \\ 22.4 \quad 16010 \\ \quad 98^{12} \\ \quad 55 \\ \hline 22.3761 \end{array}$$

$$\begin{array}{r} 16390 \\ 1008996 \\ \quad 05 \\ \quad 78 \\ \hline 3711 \end{array}$$

$$\begin{array}{r} 15520 \\ 10500 \\ \quad 1509 \\ \quad 00 \\ \hline 22.4998 \end{array} \quad \begin{array}{r} 13925 \\ 887802 \\ \quad 9800 \\ \quad 10 \\ \hline 15026 \end{array}$$

$$\begin{array}{r} 15469 \\ 1223039 \\ \quad 31 \\ \quad 55 \\ \hline 22.6767 \end{array} \quad \begin{array}{r} 13729 \\ 6949 \\ \quad 4949 \\ \quad 22 \\ \hline 6775 \end{array}$$

$$\begin{array}{r} 14453 \\ 1112131 \\ \quad 29 \\ \quad 41 \\ \hline 22.6678 \end{array} \quad \begin{array}{r} 14730 \\ 8049 \\ \quad 4839 \\ \quad 20 \\ \hline 6678 \end{array}$$

$$\begin{array}{r} 14446 \\ 764040 \\ \quad 38 \\ \quad 30 \\ \hline 223204 \end{array} \quad \begin{array}{r} 15785 \\ 12576 \\ \quad 75-85 \\ \quad 60 \\ \hline 3198 \end{array}$$

2185

known-measures.

11

	ch	n	d	n
<u>1</u>	16958	19650		
220	140554-	1253543		
198	5845-	28		
	41	30		
	<u>19.2900</u>	<u>2900</u>		

2
225
200

3
226
208
may
2

4
226
210

5
224
220

6
220 19776
224 16010
98¹²
55
22.3761

16390
1008996
05-85
78
3711

15520 13925
14400 887802
15509 9860
00 10
22.4998 17026

15465 13729
12230 6949
3139 4949
55 22
22.6767 6775

14453 14730
1112131 8049
29 4839
41 20
22.6678 6678

14446 15785
7640 12576
3840 75-85
30 60
22.3204 3198

2185 Moon measures.

	α	γ	μ	δ	η
2	18815		16350		
21.0	990100		15215		
22.9	9500		0712		
	97		35		
	<u>22.8900</u>		<u>.8863</u>		

8	1356570	13895
20.6	6870	1318100
22.9	12860	95
max		
μ	<u>22.9292</u>	<u>.9295</u>
γ		
9	18445	16975
20.0	990899	1551508
22.8	98	08
	27	59
	<u>22.8540</u>	<u>.8537</u>

02507	12221
11221	11099
10	10099
10	10099
0000	000000
12221	12221
12221	12221
10	10
10	00000
10	10099
12221	12221
12221	12221
10	10099
10	10
10	10
12221	12221
12221	12221
10	10099
10	10
10	10

2185 Moon - Lincennes.

	d	r	d	r
2	18818	16350		
210	990100	15215		
229	9500	0712		
	97	35		
	<u>22.8900</u>	<u>.8863</u>		

8	1356570	13895
206	6870	1318100
229	12860	95

22.9292	9295
---------	------

8	18445	16975
200	990899	1551508
228	98	0808
	27	59
<u>22.8540</u>	<u>.8537</u>	

2185	Trines etc					
Expt. time	1912 Nov. 25	1 ^h 43 ^m		- 1 ^h 55 ^m		
moon		1 49	22.2 ^v	1 49	22.4 ^v	
clock fast		0	05.8 ^v			
H Sid T.		1 49	16.5 ^v	0-4 = -3 ^l 35 ^m		
to hour		4 44	31.05 ^v			
G Sid T.		6 33	47.55 ^v			
Sid T. h. moon		16 16	14.46 ^v			
Interval		14 17	33.09 ^v			
Reduction		2	20.49 ^v			
G. h. T.		14 15	12.60 ^v			

True hant. alt.		R.A.		Decl.	
moon 14 ^h	5 ^h 23 ^m	20.63 ^v	+ 28° 00'	19.2 ^v	
Motion 1 ^h 2.672 ^v		3.273 ^v			
" 15.210 ^v		+ 40.64 ^v		+ 49.8 ^v	
Tabular place.	5 24	01.27 ^v	+ 28 01	09.0 ^v	

moon's age 17 days

934 = 11.0 ^v	parallel	59' 10.5 ^v
969 = 11.8 ^v	semidiam	16 09.0 ^v
	R	969.0 ^v
	Compenstation	+ 11.8 ^v
	Inadiation (4)	- 0.8 ^v
	R	980.0 ^v
	R	2100.8 ^v
a = 2.4	(1+a) R	2.1003 ^v
	R ²	4.4113 ^v

2185 Times etc.
 Exp. station 1912 Nov. 25 1^h 43^m - 1^h 55^m
 moon 1 49 222 - 1 49 224
 clock fast 0 05.8

H Sid T. 1 49 16.5 $\theta - \alpha = -3^{\circ} 35'$
 H long 4 44 31.05
 G Sid T. 6 33 47.55
 Sid T. h. moon 16 16 14.46
 Interval 14 17 33.09
 Reduction 2 20.49
 G. h. T. 14 15 12.60

From Kant alms R. A. Decl.
 moon 19^h 5^h 23^m 20.63 + 28^o 00' 19.2
 Motion 132.6721 3.273
 " 15.210 + 40.64 + 49.8
 Tabular place 5 24 01.27 + 28 01 09.0

moon's age 17 days:

934 = 11.0
 969 = 11.8

parallel 59' 10.5
 semidiam 16 09.0
 R 969.0
 Compensation + 11.8
 Inadial (4) - 0.8
 R 980.0
 R 2100.8
 (1+9) R 2100.3
 R² 4.4113

a - 24

2185

Plate Constants

14

	1	2	3
x	11.7754	20.6403	29.1624
y	12.0130	20.7754	29.4487
$u = x - y$	-2376	-1351	-2863
u	20.1904	32.4238	14.9754
v	19.6933	31.9954	14.6210
$u - v$	+4971	+4284	+3544

$$\begin{array}{rclcl}
 u - x & -85.54 & & +2.42 & +4074 \\
 -2376 - 1726 & = -4102 + 28 & = -4074 & = & 0 \\
 -1351 - 2772 & = -4123 + 49 & = -4074 & = & 0 \\
 -2863 - 1280 & = -4143 + 70 & = -4073 & = & +1 \\
 20.5743 - 1781 & & +49 & & = 20.8085 \checkmark
 \end{array}$$

$$\begin{array}{rclcl}
 u - v & +81.22 & & -2.84 & -5870 \\
 +4971 + 956 & = +5927 - 57 & = +5870 & = & 0 \\
 +4284 + 1676 & = +5960 - 91 & = +5869 & = & -1 \\
 +3544 + 2368 & = +5912 - 42 & = +5870 & = & 0 \\
 20.8314 + 1671 & & -58 & & = 20.4057 \checkmark
 \end{array}$$

$$\begin{array}{llll}
 \text{Tables. } a = -2.4 & a = -1.5 & a - c = -0.9 & b + a = +2.6 \\
 \text{Obs } a = -2.4 & c = +2.8 & a - c = -5.2 & b + a = +4.3
 \end{array}$$

2185

Plate Constants

14

	1	2	3
x	11.7754	20.6403	29.1624
y	12.0130	20.7754	29.4487
$x-y$	-2376	-1351	-2863
u	20.1904	32.4238	14.9754
v	19.6933	31.9954	14.6210
$u-v$	+4971	+4284	+3544

$$\begin{array}{rclclcl}
 x-y & -8554 & & +242 & & +4074 \\
 -2376 & -1726 & = & -4102 & +28 & = -4074 & = 0 \\
 -1351 & -2772 & = & -4123 & +49 & = -4074 & = 0 \\
 -2863 & -1280 & = & -4143 & +70 & = -4073 & = +1 \\
 w & 5743 & -1781 & & +49 & & = 20.8085
 \end{array}$$

$$\begin{array}{rclclcl}
 u-v & +8122 & & -284 & & -5870 \\
 +4971 & +956 & = & +5927 & -57 & = +5870 & = 0 \\
 +4284 & +1676 & = & +5960 & -94 & = +5869 & = -1 \\
 +3544 & +2368 & = & +5912 & -42 & = +5870 & = 0 \\
 w & 8314 & +1671 & & -58 & & = 20.4057
 \end{array}$$

$$\begin{array}{lclclcl}
 \text{Tables. } a & = -2.4 & b & = -1.5 & a-b & = -0.9 & b+a & = +2.6 \\
 \text{Cells } a & = -2.4 & c & = +2.8 & a-c & = -5.2 & b+a & = +4.3
 \end{array}$$

pt.	hrs L	newd.
1	137.0	-20
2	113.4	-64
3	90.0	+105
4	85.9	0
5	56.1	+9
6	43.0	-21
7	11.8	-11
8	0.0	-101
9	344.2	+84

2155

Moon's Center.

15

	x	$x - X_0$	Δx	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$O - C$
1	22.0000	+ 1.4300	+ 4	2.0461	4.4202	+ 89
2	22.5012	+ 1.9312	+ 2	3.7303	4.4207	+ 94
3	22.6771	+ 2.1071	0	4.4398	4.4398	+ 285
4	22.6678	+ 2.0978	- 0	4.4008	4.4294	+ 181
5	22.3201	+ 1.7501	- 3	3.0618	4.4282	+ 169
6	22.0000	+ 1.4300	- 4	2.0437	4.4227	+ 114
7	21.0000	+ 0.4300	- 6	0.1844	4.4156	+ 43
8	20.5700	0.0000	- 6	0.0000	4.4029	- 84
9	20.0000	- 0.5700	- 6	0.3256	4.4165	+ 52

Comp R^2 4.4113

	y	$y - Y_0$	Δy	$(y - Y_0)^2$
1	19.2900	- 1.5410	+ 2	2.3741
2	20.0000	- 0.8310	+ 1	0.6904
3	20.8310	0.0000	0	0.0000
4	21.0000	+ 0.1690	- 0	0.0286
5	22.0000	+ 1.1690	- 1	1.3664
6	22.3736	+ 1.5426	- 2	2.3790
7	22.8882	+ 2.0572	- 2	4.2312
8	22.9295	+ 2.0985	- 2	4.4029
9	22.8538	+ 2.0228	- 2	4.0909

Approx. Center

$$x = 22.0 \quad y = 19.2900$$

$$22.3736$$

$$41.6636$$

$$Y = 20.8318$$

$$y_{\text{max}} = 22.9295$$

$$R = 2.0977$$

$$x_{\text{max}} = 22.6678$$

$$X = 20.5701$$

$$\text{Center } \begin{cases} X_0 = 20.5700 \\ Y_0 = 20.8310 \end{cases}$$

1
2
3
4
5
6
7
8
91
2
3
4
5
6
7
8
9

2155

Moon's Center

15

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0) + (y - y_0)$	$O - C$
1	22 00 00	+ 1.4300	+ 4	2 04 61	4 42 02	+ 89
2	22 50 12	+ 1 93 12	+ 2	3 73 03	4 42 07	+ 99
3	22 67 71	+ 2 10 71	0	4 43 98	4 43 98	+ 285
4	22 66 78	+ 2 09 78	- 0	4 40 08	4 42 94	+ 181
5	22 32 01	+ 1 75 01	- 3	3 06 18	4 42 82	+ 169
6	22 00 00	+ 1 43 00	- 4	2 04 37	4 42 27	+ 114
7	21 00 00	+ 0 43 00	- 6	0 18 44	4 41 56	+ 43
8	20 57 00	0 00 00	- 6	0 00 00	4 40 29	- 84
9	20 00 00	- 0 57 00	- 6	0 32 56	4 41 65	+ 52

Comp R^2 44113

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	19 29 00	- 1 54 10	+ 2	2 37 41
2	20 00 00	- 0 83 10	+ 1	0 69 04
3	20 83 10	0 00 00	0	0 00 00
4	21 00 00	+ 0 16 90	- 0	0 02 86
5	22 00 00	+ 1 16 90	- 1	1 36 69
6	22 37 36	+ 1 54 26	- 2	2 37 90
7	22 88 82	+ 2 05 72	- 2	4 23 12
8	22 92 95	+ 2 09 85	- 2	4 40 29
9	22 85 38	+ 2 02 28	- 2	4 09 09

Approx. Center

$$x = 220 \quad y = 192900$$

$$223736$$

$$416636$$

$$y = 208318$$

$$y_{\text{max}} = 229295$$

$$R = 20977$$

$$x_{\text{max}} = 226678$$

$$x = 205701$$

$$\text{Center } \begin{cases} x_0 = 205700 \\ y_0 = 208310 \end{cases}$$

Formation of Normals.

	ab	am	bm
1	- 2,20	+ 127,2	- 137,1
2	- 1,60	+ 181,5	- 78,0
3	+ 0,00	+ 602,5	+ 0,0
4	+ 0,36	+ 380,0	+ 30,8
5	+ 2,05	+ 295,5	+ 198,0
6	+ 2,20	+ 163,0	+ 175,8
7	+ 0,89	+ 18,5	+ 88,7
8	+ 0,00	- 0,0	- 176,5
9	- 1,15	- 29,6	+ 105,0
	+ 055	+ 17386	+ 2067

2185

Moon's Center

16

Conditional Equations.

	a	b	c		c	0-c
1	+1.43	-1.54	=	+89	+122 - 13 = +109	-20
2	+1.93	-0.83	=	+94	+165 - 7 = +158	-64
3	+2.11	0.00	=	+285	+180 0 = +180	+105
4	+2.10	+0.17	=	+181	+180 + 1 = +181	0
5	+1.75	+1.17	=	+169	+150 + 10 = +160	+9
6	+1.43	+1.54	=	+114	+122 + 13 = +135	-21
7	+0.43	+2.06	=	+43	+37 + 17 = +54	-11
8	+0.00	+2.10	=	-84	+0 + 17 = +17	-101
9	-0.57	+2.02	=	+52	-49 + 17 = -32	+84
						Hough = 46

Normal Equations

$$\begin{aligned}
 +20.23 + 0.55 &= +1739 \\
 +0.55 + 19.56 &= +207 \\
 -0.55 - 0.01 &= -47 \\
 +19.55 &= +160 \\
 +20.232 &= +1739 - 4 = +1735
 \end{aligned}$$

$$b = +8.2$$

$$a = +85.5$$

2185

Moons Center

16

Conditional Equations

	a	b	0	c	c-c
1	+1.43	-1.54	+89	+122 - 13 = +109	-20
2	+1.93	-0.83	+94	+165 - 7 = +158	-64
3	+2.11	0.00	+285	+180 0 = +180	+105
4	+2.10	+0.17	+181	+180 + 1 = +181	0
5	+1.75	+1.17	+169	+150 + 10 = +160	+9
6	+1.43	+1.54	+114	+122 + 13 = +135	-21
7	+0.43	+2.06	+43	+37 + 17 = +54	-11
8	+0.00	+2.10	-84	+0 + 17 = +17	-101
9	-0.57	+2.02	+52	-49 + 17 = -32	+84
					<u>+84</u>
					Arithmetic = 46

Normal Equations

$$\begin{aligned}
 +20.23a + 0.55b &= +1739 \\
 +0.55a + 19.56b &= +207 \\
 -0.55a - 0.01b &= -47 \\
 +19.55b &= +160 \\
 +20.23a &= +1739 - 4 = +1735
 \end{aligned}$$

$$b = +8.2$$

$$a = +85.5$$

2185

Moon's mean Position (1912.0)

$$\begin{array}{rcl}
 X_0 & = & 20.5700 \checkmark \\
 \Delta \alpha & = & + 43 \checkmark \\
 \hline
 & & 20.5743 \checkmark
 \end{array}
 \qquad
 \begin{array}{rcl}
 Y_0 & = & 20.8310 \checkmark \\
 \Delta \delta & = & + 4 \checkmark \\
 \hline
 & & 20.8314 \checkmark
 \end{array}$$

From Plate constants $X = 20.8085 \checkmark$ $Y_1 = 20.4057 \checkmark$

$$\bar{z} = +2.8085 \checkmark$$

$$\eta = -1.5943 \checkmark$$

$$\log \bar{z} = 0.44847 \checkmark$$

$$\cos \delta = 9.94742 \checkmark$$

$$\sin \delta = 8.50724 \checkmark$$

$$\log \tan \delta = 9.7196 \checkmark$$

$$0.8970 \checkmark$$

$$7.0534 \checkmark$$

$$7.6700 \checkmark$$

$$(\alpha - A) = 1.99381 \checkmark$$

$$\eta_1 = +47 \checkmark$$

$$\alpha - A = +1.3858 \checkmark$$

$$\eta_0 = -1.5990 \checkmark$$

$$A = 5.2500 \checkmark$$

$$\log \eta_0 = 0.20385 \checkmark$$

$$7.33115 \checkmark$$

$$\alpha_0 = 5.263858 \checkmark$$

$$(\delta - D) = 2.87270 \checkmark$$

$$\text{Red.} = +4.51 \checkmark$$

$$\delta - D = -12.259 \checkmark$$

$$\delta' = 5.2643.09 \checkmark$$

$$D = +27.5010 \checkmark$$

$$\delta_0 = +27.37441 \checkmark$$

$$+11.6 \checkmark$$

$$\delta' = +27.3755.7 \checkmark$$

2185

17

Moon's mean Position (1912.0)

$$X_0 = 20.5700$$

$$Y_0 = 20.8310$$

$$\begin{array}{r} + 43 \\ \hline 20.5743 \end{array}$$

$$\begin{array}{r} + 4 \\ \hline 20.8314 \end{array}$$

$$\text{True Plate Constant } \lambda = 20.8085 \quad \gamma = 20.4057$$

$$\bar{z} = +2.8085$$

$$\eta = -1.5943$$

$$\log \bar{z} = 0.44847$$

$$\log \eta = 9.94742$$

$$\dots 8.50724$$

$$\log \tan \delta = 9.7196$$

$$0.8970$$

$$7.0534$$

$$7.6700$$

$$(\alpha - A) = 199384$$

$$\eta = +47$$

$$\lambda - A = +138.58$$

$$\gamma_0 = -1.5990$$

$$A = 525.00$$

$$\log \gamma_0 = 0.20385$$

$$7.33115$$

$$\alpha_0 = 526.3858$$

$$(\delta - 0) = 287270$$

$$\text{Red.} = +451$$

$$\delta - 0 = -12259$$

$$\delta' = 526.4309$$

$$D = +275010$$

$$S_0 = +273799.1$$

$$+11.6$$

$$S_8 = +273755.7$$

$$\begin{array}{r}
 21.85 \\
 \alpha' = 5^h 26^m 43^s.09 \\
 \delta = 1 \quad 49 \quad 16.5 \\
 -3 \quad 37 \quad 26.6 \\
 - \quad 54 \quad 21 \quad 40 \\
 - \quad \quad 20 \quad 09
 \end{array}$$

$$54 \quad 01 \quad 30$$

$$\begin{array}{r}
 9.95727 \\
 9.99999 \\
 0.23105 \\
 \hline
 0.18831
 \end{array}$$

$$y = 57 \quad 03 \quad 00$$

$$27 \quad 37 \quad 56$$

$$29 \quad 25 \quad 04$$

$$\begin{array}{r}
 9.82640 \\
 8.23584 \\
 9.69123 \\
 0.07616 \\
 \hline
 7.82963
 \end{array}$$

$$\delta - \delta' = +23 \quad 13.4$$

$$\delta = +28 \quad 01 \quad 09.1$$

$$\text{Nant Ann } \delta = +28 \quad 01 \quad 09.0$$

$$O-C \quad + \quad D.1$$

$$\delta' = +27^\circ \quad 37' \quad 55''$$

$$\pi = 59' \quad 10.5''$$

$$\begin{array}{r}
 9.86913 \\
 8.23584 \\
 9.90993 \\
 0.25414 \\
 \hline
 8.06904
 \end{array}$$

$$\alpha - \alpha' = -40' \quad 18.11''$$

$$= -2'' \quad 41.21''$$

$$\alpha \quad 5 \quad 24 \quad 01.88$$

$$\alpha = 5 \quad 24 \quad 01.27$$

$$+ 0.61$$

21.85 Lunar Parallax
 $\alpha = 5^h 26^m 43^s.09$
 $\delta = 1^{\circ} 49' 16.5''$
 $- 3 \quad 37 \quad 26.6$
 $- \quad 54 \quad 21' 40''$
 $- \quad \quad 20 \quad 09$

$$54 \quad 01 \quad 31$$

$$\begin{array}{r} 9.95727 \\ 9.99999 \\ 0.23105 \\ \hline 0.18831 \end{array}$$

$$y = 57 \quad 03 \quad 00$$

$$27 \quad 37 \quad 57$$

$$29 \quad 25 \quad 03$$

$$\begin{array}{r} 9.82640 \\ 8.23584 \\ 9.69123 \\ 0.07616 \\ \hline 7.82963 \end{array}$$

$$\delta - \delta' = +23 \quad 13.9$$

$$S = -28 \quad 01 \quad 09.1$$

$$\text{Nant Allen } S = +28 \quad 01 \quad 09.0$$

$$O-C \quad + \quad 0.1$$

$$S = +27^{\circ} 37' 55''$$

$$\pi = 59' 10.5''$$

$$\begin{array}{r} 9.86913 \\ 8.23584 \\ 9.90993 \\ 0.45414 \\ \hline 8.06904 \end{array}$$

$$\alpha - \alpha' = 40' 18.11$$

$$= -2' 41.21$$

$$\alpha \quad 5^h 24 \quad 01.88$$

$$\alpha = 5^h 24 \quad 01.27$$

$$+ 0.62$$

2234

Stars - measures.

1914 Jan. 19.

20

	d	n
1	19940	18390
138	1287370	1547570
30.7	75	7070
	57	92
	<u>30.7079</u>	<u>7081</u>

	d	n
	18912	18495
	1870905	1070000
	22	98
	<u>13.7791</u>	<u>7797</u>

	d	n
2	18245	16070
224	11709	1260099
336	0309	06
	40	70
	<u>33.6555</u>	<u>6532</u>

	d	n
	19225	17411
	1307085	135205
	8280	20
	09	11
	<u>22.3864</u>	<u>3889</u>

	d	n
3	18106	14980
225	909090	1401100
149	98	00
	20	76
	<u>14.9025</u>	<u>9024</u>

	d	n
	17625	16212
	13225	10610
	2930	1018
	20	20
	<u>22.5606</u>	<u>5603</u>

Grade 4 or 5

Risean lines very thick and blurry.

2234

Stars - measure

1914 Jan. 19.

20

	d	n
L	19940	18390
138	12873	15475
307	75-70	7070
	57	92
	<u>307079</u>	<u>7081</u>

	d	n
	18912	18495
	1870905	1070000
	0105	0000
	22	98
	<u>137791</u>	<u>7797</u>

	d	n
E	18245	16070
224	11709	1260099
236	0309	06
	40	70
	<u>336555</u>	<u>6532</u>

	d	n
	19225	17411
	1307085	1352025
	8280	20
	09	11
	<u>223864</u>	<u>3889</u>

	d	n
E	18106	14980
225	9090	1401100
139	9890	00
	20	76
	<u>149025</u>	<u>9024</u>

	d	n
	17625	16212
	13228	1061018
	2930	10
	20	20
	<u>125606</u>	<u>5603</u>

Grade 4 or 5

Russian lines very thick and blurry.

2234

Moon-measures

	d	4	2	d	x	2
1	16406	19560				
18.4	1020310	1576055				
19.6	01	53				
min	09	58				
in	19.6203	.6197				

possibly in terminator

2	14635	19605
19.0	722030	1701821
19.7	30	21
	32	00
	<u>19.7406</u>	<u>.7416</u>

14929	15841
1005050	1071828
5050	0118
41	37
<u>19.5115</u>	<u>.5123</u>

3	20218	16708
20.0	1551411	1146579
20.5	3212	8081
	22	18
	<u>20.4703</u>	<u>.4763</u>

remeasured/gives 4703

5	19402	18132
20.3	1225249	1529081
21.0	5449	8081
	12	35
	<u>20.2843</u>	<u>.2850</u>

6	19340	18192
20.4	1346170	1405062
21.6	70	80
max	60	80
in	<u>20.4119</u>	<u>.4130</u>

2234

known-measures

	d	4	2
1	16406	19560	
18.4	1020310	1576055	
19.6	01	58	
min	09	58	
in	19.6203	6197	
4			
2	14635	19605	
19.0	722030	1701821	
19.7	30	21	
	32	00	
	19.7406	7416	

possibly in
terminator3
19.5
20.0

14929	15841
10050	1071828
5050	0118
41	37
19.5115	5123

4	10218
20.0	
20.1	1551411
	3212
	22
	20.4703

16708
1146579
8081
18
4763

remeasured/gives 4703

5
21.0

19402	18132
1225249	1529081
54	80
12	35
20.2843	2850

6
21.6
max
x

19340	18192
1346170	14050
70	5862
60	80
20.4119	4130

2234

moon - measures.

$$\begin{array}{r} 2 \\ 20.4 \\ 220 \end{array}$$

a

4

n

d x

v

18315

19165

12270

15219 1/2

77

18

25

70

20.3951.3951

$$\begin{array}{r} 8 \\ 20.0 \\ 229 \end{array}$$

1401000

8795

10

856851

13848

62

22.9841.9765

9 Scratch

9.6

17125

16278

16908

15340

23.4

1241020

1100920

1175041

1053550

20

00

5141

31

30

85

08

50

23.4710472819.4839.4806

Scratch - may be used instead of (8)

20.1 19834

20025

1358090

14760

22.8 1181520

1807989

8090

1364030

17

80

12436

37

50

30

22.8030.805720.1147.1124

2234

moon - measures

$$\begin{array}{r} 2 \\ w4 \\ 220 \end{array}$$

	d	x	v
	18315		19165
	12270	69	15219
	77		18
	25		70
	<u>203951</u>		<u>3951</u>

$$\begin{array}{r} 8 \\ w0 \\ 229 \end{array}$$

$$\begin{array}{r} 14010 \\ 1000 \\ 13848 \end{array}$$

$$\begin{array}{r} 8795 \\ 8568 \\ 62 \end{array}$$
22.9841.9765

9 scratch

$$\begin{array}{r} 196 \\ 234 \end{array}$$

$$\begin{array}{r} 17125 \\ 12410 \\ 20 \\ 30 \end{array}$$
23.4710

$$\begin{array}{r} 16278 \\ 11009 \\ 00 \\ 85 \end{array}$$
4728

$$\begin{array}{r} 16908 \\ 11750 \\ 5141 \\ 08 \end{array}$$
19.4839

$$\begin{array}{r} 15340 \\ 10535 \\ 31 \\ 50 \end{array}$$
4806

Scratch - may be used instead of (8)

$$\begin{array}{r} w.179834 \\ 22.811815 \\ 17 \\ 50 \end{array}$$
22.8030

$$\begin{array}{r} 20025 \\ 18079 \\ 80 \\ 30 \end{array}$$
8057

$$\begin{array}{r} 13580 \\ 80 \\ 12436 \end{array}$$
20.1177

$$\begin{array}{r} 14760 \\ 13640 \\ 37 \end{array}$$
.1124

2234 Times etc.

Eph to star	1912 Nov. 30	9 ^h 48 ^m ✓	- 10 ^h 00 ^m ✓
" Moon		9 53 51.8 ✓	9 53 51.9 ✓
clock fast		0 09.1 ✓	
H. I. T.		9 53 42.75 ✓	G-X - 0 ^h 50 ^m ✓
Whong		4 44 31.05 ✓	
G. I. T.	14	38 13.80 ✓	
Sid T. in Moon	16	35 57.25 ✓	
Interval	22	02 16.55 ✓	
Reduction		3 36.62 ✓	
G. M. T.	21	58 39.93 ✓	

From Kant. Alm.	R.A.	Decl.
Phion 22 ^m	10 ^h 43 ^m 51.87 ✓	+ 11 ^h 00' 20.8 ✓
Motion in 1 ^m = 2.1410 ✓		15.672 ✓
" " = 1.3345 ✓	- 2.86 ✓	+ 20.9 ✓
Tabular place	10 43 49.01 ✓	+ 11 00 41.7 ✓

Moon's age 22 days

934 = 13.2 ✓	parallax	59' 06.3 ✓
968 = 14.2 ✓	semidiam	16 07.9 ✓
	R	967.9 ✓
	Augmentation	+ 14.2 ✓
	Irradiation (4 MS)	- 0.9 ✓
	R	981.2 ✓
	R	21033 ✓
a = - 3.0	(1+a) R	21027 ✓
	R ²	44213 ✓

2234

Times etc

Sph to tan 1912 Nov. 30

9' 48

- 10' 00"

Moon

9 53

51.8

9

53

51.9

clock fast

0

09.1

H. J. d. T.

9 53

42.75

G-X- - 0' 50"

H. J. d. T.

4 44

31.05

G. J. d. T.

14 38

13.80

Sid T. to Moon

16 35

57.25

Inclined

22 02

16.55

Reduction

3

36.62

G. J. d. T.

21 58

39.93

From Kant Alman.

R.A.

Decl.

Moon 22"

10' 43

51.87

+ 11'

00'

20'8"

Moon 1" = 2.1410

15.672

" = 1.3345"

- 286

+

20.9

Tabular place

10 43

49.01

+ 11'

00'

41.7

Moon's age 22 days.

parallax

59' 06.3

semidiam

16 07.9

R

967.9

Augmentation

+ 14.2

Irradiation (4 MS)

- 0.9

R

981.2

R

2103.3

(1+a) R

2102.7

R²

4421.3

934 = 13.2

948 = 14.2

a = - 3.0

2234

Plate Constant.

x	y	$R.A.$	$Decl.$
13.7794	30.7080	10 41 59	+11 39 03
22.3876	33.6534	46 31	+12 02 46
22.5604	14.9024	46 43	9 37 00
3 58.73	179.36	13 133	133 18 49
19.58	26.45	10 45 04	+11 06 16
-18	-22	-	- 34 35
1.58	4.45	10 44 15	+10 31 41
31	4.66 $\frac{1}{2}$		
49 ^{s}	2075 $''$		
		$A = 10^h 44^m 15^s$	
		$D = +10 31 41$	

$$\begin{array}{rcl}
 x-3 & -1244 & +32 & +3027 \\
 +740-3808 & = -3068+41 & = -3027 & = 0 \\
 +1079-4173 & = -3094+67 & = -3027 & = 0 \\
 -1246-1848 & = -3094+68 & = -3026 & = +1 \\
 183105^v-2694^v & +55^v & & = 18.3493^v
 \end{array}$$

$$\begin{array}{rcl}
 y-\eta & +12442 & +1.52 & -2144 \\
 +385+1714 & = +2099+46 & = +2145 & = +1 \\
 -691+2785 & = +2094+50 & = +2144 & = 0 \\
 -683+2805 & = +2122+22 & = +2144 & = 0 \\
 21.7252+2278^v & +33^v & & = 21.7419^v
 \end{array}$$

Tables $a: -1.0$ $a: -2.5$ $a-e = +1.5$ $b+a = +0.5$
 clus. $a = -3.0$ $a = -1.5$ $a-e = -1.5$ $b+a = -0.4$

2234

Plate Constant

R.A.

Decl.

2	4							
13.7794	30.7080	10	41	59	+11	39	03	
22.3876	33.6534		46	31	+12	02	46	
22.5604	14.9024		46	43		5	37	00
58.73	179.36		13	133		133	18	49
19.58	26.45	10	45	04	+11	06	16	
18	-22		-	49		-	34	35
1.58	4.45	10	44	15	+10	31	41	
31	46.62							
49.5	20.75							

$$A = 10^{\circ} 44' 15''$$

$$D = +10^{\circ} 31' 41''$$

$$\begin{aligned}
 x - \bar{x} &= -1244 & +32 & & +3027 \\
 +740 - 3808 & = -3068 & +41 & = -3027 & = 0 \\
 +1079 - 4173 & = -3094 & +67 & = -3027 & = 0 \\
 -1246 - 1848 & = -3094 & +68 & = -3026 & = +1 \\
 183105 - 2694 & & +55 & & = 183493
 \end{aligned}$$

$$\begin{aligned}
 y - \bar{y} &= +12442 & +154 & & -2144 \\
 +385 + 1714 & = +2099 & +46 & +2145 & = +1 \\
 -691 + 2785 & = +2094 & +50 & +2144 & = 0 \\
 -683 + 2805 & = +2122 & +22 & +2144 & = 0 \\
 217252 + 2278 & & +33 & & = 217419
 \end{aligned}$$

Tables $a = -10$ $e = -2.5$ $a - e = +1.5$ $b + a = +0.5$
 Obs $a = -3.0$ $e = -1.5$ $a - e = -1.5$ $b + a = -0.4$

2234 Standard Coordinates

Cape No. 1469 m 8.5				Cape No. 1475 m 8.8				Cape No. 1477 m 8.2			
C	10	41	20.67	10	45	53.09		10	46	04.91	
L			82			17				95	
E			71			00				93	
mean	10	41	20.73	10	45	53.09		10	46	04.93	
Prece		+	37.93		+	37.95			+	37.73	
A	10	41	58.66	10	46	31.04		10	46	42.76	
A	10	44	15	10	44	15		10	44	15	
A-A	-	2	16.34	+	2	16.04		+	2	27.76	
Sub(A-A)		-	136.34		+	136.04			+	147.76	
log u			2.13462			2.13367				2.16955	
log S			9.99096			9.99033				9.99385	
log			0.63282			0.63124				0.67064	
S		-	4.2936		+	4.2780			+	4.6842	
S ₁		-	10		+	17			+	8	
S			137054			222797				226850	
Σ			137794			223876				225604	
Σ-S		+	740		+	1079				-1246	

C	+11	42	51.2	+12	06	34.6	+9	40	48.9
L			50.8			34.6			48.6
E			50.9			34.1			48.1
mean	+11	42	51.0	+12	06	34.4	+9	40	48.5
Prece		-	3		-	3		-	3
A	+11	39	02.8	+12	02	46.2	+9	37	00.2
D	+10	31	41	+10	31	41	+10	31	41
A-D	+1	07	21.8	+1	31	05.2	-	54	40.8
Sub(A-D)		+	40423		+	5466.5		-	3281.1
log u			3.60663			3.73771			3.51602
log			0.93778			1.06886			0.84717
log S			9.3143			9.3292			9.2290
S ₂			12656			12625			13413
S ₁			76333			76452			76237
S ₀		+	8.6652		+	11.7181		-	70335
S ₁		+	43		+	44		+	42
S			30.6695			33.7225			14.9707
S			30.7080			33.6534			14.9024
S-S		+	385		-	691			-683

2234 Standard Coordinates

Cape W. 1469 mag 8.5				Cape W. 1475 mag 8.8				Cape W. 1477 mag 8.2			
C	10	41	20.67	10	45	53.09		10	46	04.91	
L			82			17				95	
E			71			00				93	
mean	10	41	20.73	10	45	53.09		10	46	04.93	
Prece			+ 37.93			+ 37.91				+ 37.73	
A	10	41	58.66	10	46	31.04		10	46	42.76	
A	10	44	15	10	44	15		10	44	15	
d-A	-	2	16.34	+	2	16.04		+	2	27.76	
sin(d-A)			- 136.34			+ 136.04				+ 147.76	
log II)			2.13462			2.13367				2.16955	
log S			9.99096			9.99033				9.99385	
30			0.63282			0.63124				0.67064	
30			-4.2936			+4.2780				+4.6842	
31			- 10			+ 17				- 8	
3			13.7054			22.2797				22.6850	
2			13.7794			22.3876				22.5604	
2-3			+ 740			+ 1079				- 1246	

C	+11	42	51.2	+12	06	34.6	+9	40	48.9
L			50.8			34.6			48.6
E			50.9			34.1			48.1
mean	+11	42	51.0	+12	06	34.4	+9	40	48.5
Prece			- 3 48.2			- 3 48.2			- 3 48.3
d	+11	39	02.8	+12	02	46.2	+9	37	00.2
D	+10	31	41	+10	31	41	+10	31	41
d-D	+1	07	21.8	+1	31	05.2	-	54	40.8
tan(d-D)			+40.423			+54.66.5			-32.81.1
log			3.60663			3.73771			3.51602
40			0.93778			1.06886			0.84717
tan S			9.3143			9.3292			9.2290
32			1.2656			1.2625			1.3413
31			7.6333			7.6452			7.6237
40			+8.6652			+11.7181			-7.0335
41			+ 43			+ 44			+ 42
3			30.6695			33.7225			14.9707
4			30.7080			33.6539			14.9024
4-3			+ 38.5			- 69.1			- 68.3

pt.	pos. L	resid.
1	180.0	+11.5
2	160.7	-8.2
3	145.1	-5
4	126.5	+11
5	110.1	+18
6	90.0	-32
7	82.5	-2
8	59.5	-52
9	53.7	+83
10	33.7	+29

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Moon's Center.

26

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	18.3060	0.0000	+1	0.0000	4.4360	+147
2	19.0000	+0.6940	+1	0.4817	4.4223	+10
3	19.5119	+1.2059	+1	1.4544	4.4342	+129
4	20.0000	+1.6940	+1	2.8699	4.4394	+181
5	20.2846	+1.9786	+0	3.9148	4.4420	+207
6	20.4124	+2.1064	0	4.4369	4.4369	+156
7	20.3951	+2.0891	-0	4.3643	4.4394	+181
8	20.1136	+1.8076	-0	3.2674	4.4306	+93
9	20.0000	+1.6940	-1	2.8693	4.4428	+215
10	19.4822	+1.1762	-1	1.3832	4.4320	+107

Comp $R^2 = 4.4218$

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	19.6200	-2.1066	-2	4.4360
2	19.7411	-1.9849	-2	3.9406
3	20.0000	-1.7260	-2	2.9798
4	20.4733	-1.2527	-1	1.5695
5	21.0000	-0.7260	-1	0.5272
6	21.7260	0.0000	0	0.0000
7	22.0000	+0.2740	0	0.0751
8	22.8044	+1.0784	+1	1.1632
9	22.9803	+1.2543	+1	1.5735
10	23.4719	+1.7459	+2	3.0488

Appr. Center $x = 20.0$ $y = 20.4733$ 22.9803 434536 $y_0 = 21.7268$ $y = \text{min} = 19.6200$ $R = 2.1068$ $x = \text{max} = 20.4124$ $x_0 = 18.3056$ Center $\begin{cases} x_0 = 18.3060 \\ y_0 = 21.7260 \end{cases}$

2234

Moon's Center

26

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - 1$
1	18.3060	0.0000	+1	0.0000	4.4360	+1.47
2	19.0000	+0.6940	+1	0.4817	4.4223	+1.10
3	19.5119	+1.2059	+1	1.4544	4.4342	+1.29
4	20.0000	+1.6940	+1	2.8699	4.4394	+1.81
5	20.2846	+1.9786	+0	3.9148	4.4920	+2.07
6	20.4124	+2.1064	0	4.4369	4.4369	+1.56
7	20.3951	+2.0891	-0	4.3643	4.4394	+1.81
8	20.1136	+1.8076	-0	3.2674	4.4306	+1.93
9	20.0000	+1.6940	-1	2.8693	4.4428	+2.15
10	19.9822	+1.1762	-1	1.3832	4.4320	+1.07

comp R^2 : 4.4218

	y	$y - y_0$	Δy	$(y - y_0)^2$
-1	19.6200	-2.1060	-2	4.4360
2	19.7411	-1.9849	-2	3.9406
3	20.0000	-1.7260	-2	2.9798
4	20.4733	-1.2527	-1	1.5695
5	21.0000	-0.7260	-1	0.5272
6	21.7260	0.0000	0	0.0000
7	22.0000	+0.2740	0	0.0751
8	22.8044	+1.0784	+1	1.1632
9	22.9803	+1.2543	+1	1.5735
10	23.4719	+1.7459	+2	3.0488

Aphe Center $z = 20.0$ $y = 20.4733$ 22.9803 43.4536 $y_0 = 21.7268$ $y = 19.6200$ $R = 2.1068$ $z = 20.4124$ $x_0 = 18.3056$ Center $x_0 = 18.3060$

Formation of normals.

	ab	an	bn
1	- 0.00	+ 0.0	- 310.0
2	- 1.36	+ 6.9	- 19.8
3	- 2.09	+ 156.0	- 223.0
4	- 2.11	+ 306.0	- 226.5
5	- 1.45	+ 410.0	- 151.0
6	+ 0.00	+ 329.0	+ 0.0
7	+ 0.56	+ 378.2	+ 44.0
8	+ 1.95	+ 168.0	+ 100.3
9	+ 2.11	+ 363.5	+ 269.0
10	+ 2.06	+ 126.2	+ 187.2
	- 0.33	+ 2243.8	- 324.8

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27

Moon's Center - Conditional Equations

	a	b	c		L	O - L
1	0.00	-2.11	= +1.47	+	0 + 32 = +32	+115
2	+0.69	-1.98	= +1.0	+	62 + 30 = +92	-82
3	+1.21	-1.73	= +1.29	+	108 + 26 = +134	-5
4	+1.69	-1.25	= +1.81	+	151 + 19 = +170	+11
5	+1.98	-0.73	= +2.07	+	178 + 11 = +189	+18
6	+2.11	+0.00	= +1.56	+	188 - 0 = +188	-32
7	+2.09	+0.27	= +1.81	+	187 - 4 = +183	-2
8	+1.81	+1.08	= +93	+	162 - 17 = +145	-52
9	+1.69	+1.25	= +2.15	+	151 - 19 = +132	+83
10	+1.18	+1.75	= +1.07	+	105 - 27 = +78	+29

Average = 43

Normal Equations

$$\begin{aligned}
 +25.04a - 0.33b &= +2244 \\
 -0.33a + 19.31b &= -325
 \end{aligned}$$

$$\begin{aligned}
 -0.33 - 0.00c &= +30 \\
 +19.31 &= -295
 \end{aligned}$$

$$b = -15.3$$

$$+25.04a = +2244 - 5 = +2239$$

$$a = +89.5$$

1
2
3
4
5
6
7
8
9
10

2234

27

Unovis Center - Conditional Equations

	a	b		c	d	e	f
1	0.00	-2.11	=	+1.47	+	0 + 32	= +32 +115
2	+0.69	-1.98	=	+1.0	+	62 + 30	= +92 - 82
3	+1.21	-1.73	=	+1.29	+	108 + 26	= +134 - 5
4	+1.69	-1.25	=	+1.81	+	151 + 19	= +170 +11
5	+1.98	-0.73	=	+2.07	+	178 + 11	= +189 +18
6	+2.11	+0.00	=	+1.56	+	188 - 0	= +188 - 32
7	+2.09	+0.27	=	+1.81	+	187 - 4	= +183 - 2
8	+1.81	+1.08	=	+93	+	162 - 17	= +145 - 52
9	+1.69	+1.25	=	+2.15	+	151 - 19	= +132 + 83
10	+1.18	+1.75	=	+1.07	+	105 - 27	= +78 +29

Average = 43

Normal Equations

$$\begin{aligned}
 +25.04 - 0.33 &= +2244 \\
 -0.33 + 19.31 &= -325
 \end{aligned}$$

$$\begin{aligned}
 +0.33 - 0.00 &= +30 \\
 +19.31 &= -295
 \end{aligned}$$

$$f = -15.3$$

$$+25.04 = +2244 - 5 = +2239$$

$$a = +89.5$$

2234 Moon's mean Position (1912.0)

28

$$\begin{array}{r} X_0 = 18.3060^\circ \\ + 45^\circ \\ \hline 18.3105^\circ \end{array}$$

$$\begin{array}{r} Y_0 = 21.7260^\circ \\ - 8^\circ \\ \hline 21.7252^\circ \end{array}$$

From Plate constant $X = 18.3493^\circ$ $Y = 21.7419^\circ$

$$z = +0.3493^\circ$$

$$\eta = -0.2581^\circ$$

$$\begin{array}{r} \log z = 9.54320^\circ \\ \log S = 9.99268^\circ \\ \hline 8.50724^\circ \end{array}$$

$$\begin{array}{r} \log \tan \delta = 9.2609^\circ \\ 9.0889^\circ \\ \hline 7.0534^\circ \\ 5.4032^\circ \end{array}$$

$$(z-A) = 1.04328^\circ$$

$$X-A = +1.105^\circ$$

$$A = 10.4415^\circ$$

$$\alpha_0 = 10.442605^\circ$$

$$\text{Red} = +2.75^\circ$$

$$\alpha_0 = 10.442880^\circ$$

$$\begin{array}{r} \log \eta = 9.41179^\circ \\ 7.33115^\circ \\ \hline \end{array}$$

$$(z-D) = 2.08064^\circ$$

$$\delta-D = -2.004^\circ$$

$$D = +10.3141^\circ$$

$$\delta_0 = +10.29406^\circ$$

$$\text{Red} = -14.1^\circ$$

$$\delta_0 = +10.29265^\circ$$

2234 Incons Mean Position (1912.0)

28

$$X_0 = 18.3060$$

$$\frac{1}{2} \Delta = \frac{+ 45}{18.3105}$$

$$Y_0 = 21.7260$$

$$\frac{1}{2} \Delta = \frac{- 8}{21.7252}$$

From Plate constant $X = 18.3493$ $Y = 21.7419$

$$z = +0.3493$$

$$\eta = -0.2581$$

$$\log z = 9.54320$$

$$\log S = 9.99268$$

$$85.0724$$

$$\log \tan S = 9.2609$$

$$9.0889$$

$$\frac{70534}{54032}$$

$$(z-1) = 1.04328$$

$$\log \eta = 9.41179$$

$$733115$$

$$\alpha - A = +1105$$

$$A = 104415$$

$$(z-1) = 2.08064$$

$$\alpha_0 = 104426.05$$

$$z-1 = 2.004$$

$$\text{Red} = +275$$

$$D = +103141$$

$$\alpha_0 = 104428.80$$

$$S_0 = +1029406$$

$$\text{Red} = +14.1$$

$$S_0 = +1029265$$

2234

Red. ad l. app

29

$$H + \alpha \quad 12 \quad 02 = 180^\circ 30'$$

$$H \quad 1 \quad 18$$

$$\alpha \quad 10 \quad 44$$

$$G \quad 22 \quad 12$$

$$G + \alpha \quad 8 \quad 56 = 134^\circ$$

$$l \cos(G + \alpha) \quad 9 \ 84 \ 1 \ 8m$$

$$q \quad 1 \ 2 \ 8 \ 0 \ 5$$

$$\sin \quad 9 \ 8 \ 5 \ 6 \ 9$$

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

$$\frac{1}{\cos} \quad 8 \ 8 \ 2 \ 3 \ 9$$

$$(g') \quad 1 \ 1 \ 2 \ 2 \ 3m$$

$$(g) \quad 9 \ 2 \ 2 \ 9 \ 3$$

$$f \quad + \ 2 \ 5 \ 9$$

$$g \quad + \ 0 \ 1 \ 7$$

$$h \quad - \ 0 \ 0 \ 1$$

$$+ \ 2 \ 7 \ 5 \quad \checkmark$$

$$S_0 = + \ 1 \ 0^\circ \ 30'$$

$$l \cos S \quad 9 \ 9 \ 9 \ 2 \ 7$$

$$\dots \quad 0 \ 4 \ 6 \ 7 \ 8$$

$$\dots (i) \quad 0 \ 4 \ 6 \ 0 \ 5$$

$$l \sin S \quad 9 \ 2 \ 6 \ 0 \ 6$$

$$\cos(H + \alpha) \quad 9 \ 0 \ 9 \ 0 \ 0m$$

$$h \quad 1 \ 3 \ 0 \ 6 \ 6$$

$$\sin \quad 7 \ 9 \ 4 \ 0 \ 8m$$

$$\sec S \quad 0 \ 0 \ 0 \ 7 \ 3$$

$$\frac{1}{\cos} \quad 8 \ 8 \ 2 \ 3 \ 9$$

$$(h') \quad 0 \ 5 \ 6 \ 7 \ 2m$$

$$(h) \quad 8 \ 0 \ 7 \ 8 \ 6m$$

$$g' \quad - \ 1 \ 3 \ 2 \ 5$$

$$h' \quad - \ 3 \ 6 \ 9$$

$$i \quad + \ 2 \ 8 \ 9 \quad \checkmark$$

$$- \ 1 \ 4 \ 0 \ 5$$

2234

Red ad E. app.

29

$$H + \alpha \quad 12 \quad 02 = 180^\circ 30'$$

$$H \quad 1 \quad 18$$

$$\alpha \quad 10 \quad 44$$

$$G \quad 22 \quad 12$$

$$G + \alpha \quad 8 \quad 56 = 134^\circ$$

$$l \cos(G + \alpha) \quad 9 \ 84 \ 18m$$

$$g \quad 1 \ 28 \ 05$$

$$\sin \quad 9 \ 85 \ 69$$

$$\tan \quad 9 \ 26 \ 80$$

$$i \quad 8 \ 82 \ 39$$

$$(g') \quad 1 \ 122 \ 3m$$

$$(g) \quad 9 \ 229 \ 3$$

$$f \quad + \ 259$$

$$g \quad - \ 0.17$$

$$h \quad - \ 0.01$$

$$+ \ 275 \checkmark$$

$$S = + \ 1^\circ \ 30'$$

$$l \cos S \quad 99927$$

$$i \quad 0.4678$$

$$(i) \quad 0.4605$$

$$l \sin S \quad 9.2606$$

$$\cos(H + \alpha) \quad 0.0000m$$

$$h \quad 1.3066$$

$$\sin \quad 79408m$$

$$\sec S \quad 0.0073$$

$$i \quad 8.8239$$

$$(h') \quad 0.5672m$$

$$(h) \quad 8.0786m$$

$$g' \quad - \ 1325$$

$$h' \quad - \ 369$$

$$i \quad + \ 289 \checkmark$$

$$- \ 14.05$$

2234 Luman Parol Cay,

$$\begin{array}{rcl}
 \delta' & = & 10^{\circ} 44' 28.80'' \checkmark \\
 \theta & = & 9 \quad 53 \quad 42.75'' \checkmark \\
 \delta - \alpha & = & - \quad 50 \quad 46.05'' \checkmark \\
 & & - \quad 12^{\circ} 41' 30'' \checkmark \\
 & & - \quad \quad \quad 4 \quad 38'' \checkmark \\
 & & - \quad 12 \quad 36 \quad 52'' \checkmark
 \end{array}$$

$$\begin{array}{r}
 995727 \checkmark \\
 000000 \\
 001062 \checkmark \\
 \hline
 996789 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 \delta & - & 42 \quad 53 \quad 00 \checkmark \\
 & & 10 \quad 29 \quad 26 \checkmark \\
 & & 32 \quad 23 \quad 34 \checkmark
 \end{array}$$

$$\begin{array}{r}
 9.82640 \checkmark \\
 8.23533 \checkmark \\
 9.72894 \checkmark \\
 016717 \checkmark \\
 \hline
 795784 \checkmark
 \end{array}$$

$$\delta - \delta' = +31 \quad 11.9'' \checkmark$$

$$\delta = +11 \quad 00 \quad 38.4'' \checkmark$$

$$\text{Nautical } \delta = +11 \quad 00 \quad 41.7'' \checkmark$$

$$\theta - \theta' = - \quad 3.3'' \checkmark$$

$$\delta' = +10^{\circ} 29' 26.5'' \checkmark$$

$$\pi = 59' 06.3'' \checkmark$$

$$\begin{array}{r}
 9.86913 \checkmark \\
 8.23533 \checkmark \\
 934184 \checkmark \\
 000807 \checkmark \\
 \hline
 745437 \checkmark
 \end{array}$$

$$\alpha - \alpha' = -9' 47.22'' \checkmark$$

$$= -39.15'' \checkmark$$

$$\alpha = 10 \quad 43 \quad 49.65'' \checkmark$$

$$\alpha = 10 \quad 43 \quad 49.01'' \checkmark$$

$$+0.64'' \checkmark$$

2234

Lunar Parallax

$$\begin{array}{rcl}
 \lambda & = & 10' \quad 44'' \quad 28.80 \\
 \delta & = & 9' \quad 53'' \quad 42.75 \\
 S - \alpha & = & - \quad 50' \quad 46'' \\
 & & - \quad 12' \quad 41'' \quad 30'' \\
 & & - \quad \quad \quad 4' \quad 38'' \\
 & & - \quad 12' \quad 36'' \quad 52''
 \end{array}$$

$$\begin{array}{r}
 991727 \\
 000000 \\
 001062 \\
 \hline
 996789
 \end{array}$$

$$\begin{array}{rcl}
 \delta & 42' & 53'' \quad 00 \\
 & 10' & 29'' \quad 26 \\
 & 32' & 23'' \quad 34
 \end{array}$$

$$\begin{array}{r}
 982640 \\
 823533 \\
 972894 \\
 016717 \\
 \hline
 795784
 \end{array}$$

$$S - \delta = +31 \quad 11.9$$

$$S = -11 \quad 00 \quad 38.4$$

$$\text{Nautical } S = +11 \quad 00 \quad 41.7$$

$$O - C = - \quad 3.3$$

$$S = +10' \quad 29'' \quad 26.5$$

$$\pi = 59' \quad 06.3$$

$$\begin{array}{r}
 9.86913 \\
 823533 \\
 9.34184 \\
 \hline
 000807 \\
 745437
 \end{array}$$

$$\alpha - \lambda = -9' \quad 49.22$$

$$= -39' \quad 25''$$

$$\alpha = 10 \quad 43 \quad 49.65$$

$$\alpha = 10 \quad 43 \quad 49.01$$

$$+0.64$$

