

KG

11366

v. 909

Volume XXXIII



Plates

1599

1606



Harvard Lunar Plates

Measurements and Reductions

Mary Fowler

Volume ~~XXXIII~~

Plate	Date	Page
1599	1912 Jan. 31	1
1606	1912 Feb. 6	17

1
4.
21

2
17
29

3
21
12

MC 1599 Stars - measurements. 1913 Sept. 18.

	d	$\frac{1}{d}$	d	$\frac{1}{d}$	d	$\frac{1}{d}$	d	$\frac{1}{d}$
1	17683	14040	18728	15379				
4.6	15926	5995	15132	8950	60			
21.2	24	02	30	48	60			
	92	38	23	70				
	<u>21.1962</u>	<u>.1759</u>	<u>4.6406</u>	<u>.6420</u>				
2								
12.5	18770	18877	17410	18010				
29.2	17250	10409	12488	12915	01			
	47	0004	0002	0997				
	69	76	10	10				
	<u>29.1522</u>	<u>.1528</u>	<u>12.5091</u>	<u>.5106</u>				
3								
21.4	1021920	10300	16640	16332				
12.0	1015	10211	10229	12730	33			
	10140	148	35	30				
			40	30				
	<u>11.9924</u>	<u>.9914</u>	<u>21.3591</u>	<u>.3600</u>				

Gravel 4 or 5

MC 1549 Stars - measures 1913 Sept. 18

	d	n	d	n
1	17683	14040	18728	15379
4.6	15926	59959	15132	895060
21.2	29	02	30.33	48
	92	38	23	70
	<u>211962</u>	<u>1959</u>	<u>46406</u>	<u>6420</u>
2				
25	18770	18877	17410	18010
22	17250	10409	124802	1291501
	47	00	0002	0997
	69	76	10	10
	<u>291522</u>	<u>1528</u>	<u>125091</u>	<u>5106</u>
3				
214	1021920	10300	16640	16332
20	1015	10211	10229	1273033
	10140	14	35	30
			40	30
	<u>119929</u>	<u>9914</u>	<u>213591</u>	<u>3600</u>

Grades 4 or 5

MCN 99 - Moon - Measures.

1913 Sept 18

2.

	α	δ
$\frac{1}{15.0}$	15195	15222
18.6	89 80 95	1139698
	81	02
	00	20
	<u>18.6213</u>	<u>.6178</u>

$\frac{2}{14.6}$
15.0

$\frac{3}{14.1}$
20.0

$\frac{4}{14.1}$
20.3
min
in
26
 $\frac{5}{14.2}$
21.0

$\frac{6}{14.8}$
22.0

15500
1139000
9800
50
14.5900

14400
567069
5569
00
14.1265

13660
463030
35
60
14.0912

18518
10400
9707
10
14.1889

16770
1501002
2102
75
14.8240

16156
1022035
2935
46
.5922

16279
1498051
8181
75
.1298

15328
14324
2629
22
.1001

14411
1251219
1819
10
.1895

13545
529598
99
30
.8235

MC1599 Moon-Measures.

1913 Sept 18

2.

α 4 ν
 $\frac{1}{150}$ 151.95 15222
 186 8980 95- 1139698
 51
 00
18.6213 6178

$\frac{2}{14.6}$
 150

$\frac{3}{14.1}$
 200

$\frac{4}{14.1}$
 W 3
 mm
 in
 26
 $\frac{5}{14.2}$
 21.0

$\frac{6}{14.8}$
 220

15500
 113900
 9800
 50
145900

14400
 5670
 55.69
 00
141265

13660
 463030
 35-30
 60
140972

18518
 10400
 9707
 10
141889

16770
 1501002
 21
 75
148240

16156
 1022035-
 29
 46
5922

16279
 1498051
 51
 75-
1298

15328
 1432429
 26
 22
1001

14411
 1251219
 18
 10
1895

13545
 529598
 99
 30
8235

MC1599 Moon measures.

1913 Sept. 18.

3.

α	γ	α	γ
$\frac{7}{16.0}$	16552	$\frac{7}{16.0}$	18592
225	1510310	225	10035
	2510		3125
	60		88
	<u>22.1440</u>		<u>1442</u>

$\frac{8}{16.0}$	11485	$\frac{8}{16.0}$	18715
225	1015839	225	1403448
	4139		5048
	78		11-
	<u>22.5336</u>		<u>5329</u>

$\frac{9}{2}$ max in γ = about 22.5480

$\frac{9}{17.0}$	15378	$\frac{9}{17.0}$	17838
224	1111521	224	1207965
	3021		6565
	90		32
	<u>22.4261</u>		<u>4235</u>

possibly in termination

MC1599 Moon measures

1913 Sept. 18.

3.

$$\begin{array}{r}
 \text{d} \quad 4 \quad \quad \quad \text{v} \\
 \underline{7} \quad 16552 \quad \quad 18592 \\
 150 \quad 1510310 \quad 10035 \\
 228 \quad \quad 2510 \quad \quad 3125 \\
 \quad \quad 60 \quad \quad 88 \\
 \underline{221440} \quad \quad \underline{1442}
 \end{array}$$

$$\begin{array}{r}
 \underline{8} \\
 160 \quad 11485- \quad 18755 \\
 225 \quad 1015839 \quad 1403448 \\
 \quad \quad 4139 \quad \quad 5048 \\
 \quad \quad 78 \quad \quad 15- \\
 \underline{225336} \quad \quad \underline{5329}
 \end{array}$$

$$\underline{9} \quad \text{max in } y = \text{about } \underline{225480}$$

$$\begin{array}{r}
 \underline{9} \\
 170 \quad 15378 \quad 17838 \\
 224 \quad 11115- \quad 1207965- \\
 \quad \quad 3021 \quad \quad 65 \\
 \quad \quad 90 \quad \quad 32 \\
 \underline{224261} \quad \quad \underline{4235}
 \end{array}$$

possibly on
terminator

AAC 10-99

1913 Sept. 23.

4

Times etc.

Exp. to Sun 1912 Jan 31 $10^h 45^m$ $-10^h 57^m$
 Moon $10 50 47.3 - 10 50 47.5$
 Clock slow $01 28.9$

H. Sid T. $10 52 16.3$
 H. hour. $4 44 31.0$
 G. Sid T. $15 36 47.35$
 Sid. T. M. now $20 37 24.28$
 Interval $18 59 23.07$
 Reduction $03 06.66$
 G. M. T. $18 56 16.41$

From bank Alm. R. G. Reed.
 Moon 19^h $7^h 15^m 39.45 + 27 19 36.5$
 Motion in $1^m = 2.8200$ 4.444
 -3.7265 -10.51 $+16.6$
 Tabular place $7 15 28.94 + 27 19 53.1$

Moon's age 13 days.

Moon's parallax $61' 07.9$ Semidiameter $16' 40.9$

$939 = 10.9$
 $1001 = 12.5$

R = 1000.9
 augmentation $+12.5$

Irradiation -0.9
 R = 1012.5

R = 2.1704 $a = -50$ (H a) R = 2.1693 R² = 4.7059

AUG 15-99

1913 Sept. 23.

4

Times etc

Exp. Times 1912 Jan 31 10^h 45^m - 10^h 57^m
 Moon 10 50 473 - 10 50 475^v
 Clock slow 01 289^v

12 Sid T. 10 52 163^v
 H. comp. 4 44 31.05^v
 G Sid T. 15 36 4735^v
 Sid T. in Moon 20 37 2428^v
 Interval 18 59 2307^v
 Reduction 03 06.66^v
 G in T. 18 56 1641^v

From bank Alm. R.C. Head
 Moon 19^h 7^m 15 39 45 + 27 19 36.5^v
 Moon 1^h : 28200 4444
 ... -3.7265 - 10.51 + 16.6
 Tabular place 7 15 2894 + 27 19 53.1

Moon's parallax 61' 07".9
 Sun's distance 16' 40".9
 934 = 10.9 R = 10009
 1001 = 12.5 augmentation - 12.5
 Inequality - 0.9
 R = 10125
 R = 21704
 (1+a) R = 21693
 R2 = 47059
 a = -50

plate constants

1913 Sept 23

x	4.6413 [✓]	12.5098 [✓]	21.3596 [✓]
$\frac{x}{3}$	72459 [✓]	150628 [✓]	24.0366 [✓]
$x - \frac{x}{3}$	-2.6046 [✓]	-2.5530 [✓]	-2.6770 [✓]
y	21.19.60 [✓]	29.15.25 [✓]	11.9919 [✓]
n	20.6166 [✓]	28.6536 [✓]	11.5499 [✓]
$y - n$	+5594 [✓]	+4989 [✓]	+4420 [✓]

$$\begin{array}{r} x-3 \quad -69.54 \quad +5x \quad -2.4 \quad +27499 \\ -2.6046 -1472 = -2.7518 +23 = -2.7495 -4 = -2.7499 = 0 \\ -2.5530 -2026 = -2.7556 +63 = -2.7493 -6 = -2.7499 = 0 \\ -2.6770 -833 = -2.7603 +107 = -2.7496 -2 = -2.7498 +1 \\ 16.2665 -1416 +81 -4 = 18.8825 \end{array}$$

$$\begin{array}{r} 4-73+73x+44-3x+39-6024 \\ +5594+339=+5933+85=+6018-1+6=+6023=-1 \\ +4989+913=+5902+119=+6019-4+9=+6024=0 \\ +4420+1559=+5979+48=+6027-6+4=+6025=+1 \\ 20.3806^{\vee}+1187^{\vee}+81^{\vee}-5^{\vee}+6^{\vee}=19.9052^{\vee} \end{array}$$

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Plate constants

1913 Sept 23

5

x	46413	12.5098	21.3596
y	72459	15.0628	24.0366
$x-3$	-26046	-25530	-26770
y	211960	29.1525	119919
m	206166	286536	115499
$y-m$	+5794	+4989	+4420

$x-3$	-6954	+52	-24	+27495
-26046	-1472	-27518	+23	-27495-4 = -27499 = 0
-25530	-2026	-27556	+63	-27493-6 = -27499 = 0
-26770	-833	-27603	+107	-27496-2 = -27498 = -11
162659	-1416	+81	-9	-188825
$y-m$	+732	+44	-32+74	-6024
+5794	+339	+5933	+85	+6018-1+6 = +6023 = -1
-4989	+913	+5902	+117	+6019-4+9 = +6024 = 0
+4420	+1559	+5979	+48	+6027-6+4 = +6025 = +1
203807	+1187	+81	-5+6	= 199052

Table 6:	-1.5	-0.6	$a-e = -0.9$	$b+a = -2.9$
Obs.	-5.0	-4.3	-0.7	-3.0
$c-o$			-0.2	-0.1

kt.	pos. λ	resid
1	215.6	-3
2	240.5	+78
3	259.8	+117
4	270.0	-61
5	286.5	-81
6	318.4	-34
7	324.4	+58
8	353.0	-16
9	19.8	+108

NGC 1599

Moon's Center

1913 Sept 30.

16

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - C$
1	15.0000	-1.2648	-5	1.6010	4.7056	-3
2	14.5911	-1.6737	-4	2.8026	4.7114	+55
3	14.1282	-2.1366	-1	4.5655	4.7113	+54
4	14.0986	-2.1662	+0	4.6925	4.6925	-134
5	14.1892	-2.0756	+2	4.3073	4.6893	-166
6	14.8238	-1.4410	+5	2.0750	4.6929	-130
7	15.0000	-1.2648	+5	1.5984	4.7033	-26
8	16.0000	-0.2648	+6	0.0698	4.6975	-84
9	17.0000	+0.7352	+6	0.5414	4.7144	+85
Comp. $\Sigma^2 =$				4.7059		

	y	$y - y_0$	Δy	$(y - y_0)^2$
1	18.6196	-1.7622	+2	3.1046
2	19.0000	-1.3818	+2	1.9088
3	20.0000	-0.3818	+0	0.1458
4	20.3818	0.0000	-0	0.0000
5	21.0000	+0.6182	-1	0.3820
6	22.0000	+1.6182	-2	2.6179
7	22.1441	+1.7623	-2	3.1049
8	22.5332	+2.1514	-2	4.6277
9	22.4248	+2.0430	-2	4.1730

Approximate Center

$$x = 15.0 \quad y = 18.6196$$

$$\begin{array}{r} 22.1441 \\ \hline \end{array}$$

$$40.7637$$

$$\text{mean } y = 20.3818$$

$$y - \text{mean} = 22.5480$$

$$R = 2.1662$$

$$x - \text{min} = 14.0986$$

$$\text{mean } x = 16.2648$$

$$\text{Center } \begin{cases} x_0 = 16.2648 \\ y_0 = 20.3818 \end{cases}$$

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Lunar Center

1913 Sept 30.

16

	x	$x - X_0$	Δx	$(x - X_0)^2$	$(x - X_0)(y - Y_0)$	$y - Y_0$
1	15.0000	-1.2648	-5	1.6010	4.7056	-3
2	14.5911	-1.6737	-4	2.8026	4.7114	+5.5
3	14.282	-2.1366	-1	4.5655	4.7113	+5.4
-4	14.0986	-2.1662	+0	4.6925	4.6925	-13.4
5	14.1892	-2.0756	+2	4.3073	4.6893	-16.6
6	14.8238	-1.4410	+5	2.0750	4.6929	-13.0
7	15.0000	-1.2648	+5	1.5984	4.7033	-2.6
8	16.0000	0.2648	+6	0.0698	4.6975	-8.4
9	17.0000	1.07352	+6	0.5414	4.7144	+8.5

Comp. $\Sigma x^2 = 47059$

	y	$y - Y_0$	Δy	$(y - Y_0)^2$
1	18.6196	-1.7622	+2	3.1046
2	19.0000	-1.3818	+2	1.9088
3	20.0000	0.3818	+0	0.1458
4	20.3818	0.0000	-0	0.0000
5	21.0000	0.6182	-1	0.3820
6	22.0000	1.6182	-2	2.6179
7	22.1441	1.7623	-2	3.1049
8	22.5332	2.1514	-2	4.6277
9	22.4248	2.0430	-2	4.1730

Approximate Center

$$x = 15.04 = 18.6196$$

$$22.1441$$

$$40.7637$$

$$\text{mean } y = 20.3818$$

$$y - \text{mean} = 22.5450$$

$$R = 2.1662$$

$$x - \text{min} = 14.0986$$

$$\text{mean } x = 16.2648$$

$$\text{Center } \begin{cases} X = 16.2648 \\ Y = 20.3818 \end{cases}$$

Formation of Normals.

	ai	ai	bi
1	+ 2.22	+ 3.8	+ 5.3
2	+ 2.30	- 9.9	- 76.0
3	+ 0.81	- 115.5	- 20.5
4	- 0.00	+ 29.0	- 0.0
5	- 1.29	+ 345.5	- 103.0
6	- 2.33	+ 187.2	- 210.0
7	- 2.22	+ 32.8	- 45.7
8	- 0.56	+ 21.8	- 180.5
9	+ 1.51	+ 62.9	+ 173.2
	<u>+ 0.44</u>	<u>+ 737.6</u>	<u>- 457.2</u>

Normal Equations

$$+ 22.25 + 0.44 = + 738$$

$$+ 0.44 + 2006 = - 457$$

$$- 0.44 - 6.01 = - 15$$

$$+ 20.05 = - 472$$

$$b = - 23.6$$

$$+ 22.25 + 738 + 10 + 7 + 8$$

$$a = + 33.6$$

Residuals.

	O		O - C
1	- 3	- 42 + 42 = 0	- 3
2	+ 55	- 56 + 33 = - 23	+ 78
3	+ 54	- 72 + 9 = - 63	+ 117
4	- 134	- 73 - 0 = - 73	- 61
5	- 166	- 70 - 15 = - 85	- 81
6	- 130	- 58 - 38 = - 96	- 34
7	- 26	- 42 - 42 = - 84	+ 58
8	- 84	- 9 - 51 = - 60	- 16
9	+ 85	+ 25 - 48 = - 23	+ 108
			<u>+ 361 - 195</u>
			Average = 62

MC 15-99 Moon's Center

1913 Sept. 30.

7

Conditional Equations.

	a	b	c		c	0-c
1	-1.26	-1.76	-3	-27+38=	+11	-14
2	-1.67	-1.38	+55	-36+30=	-6	+61
3	-2.14	-0.38	+54	-46+8=	-38	+92
4	-2.17	+0.00	-134	-47-0=	-47	-87
5	-2.08	+0.62	-166	-45-13=	-58	-108
6	-1.44	+1.62	-130	-31-35=	-66	-64
7	-2.26	+1.76	-26	-27-38=	-65	+39
8	-0.26	+2.15	-84	-6-46=	-52	-32
9	+0.74	+2.04	-185	+16-44=	-28	+113

Average = 68

Mean Equations

$$\begin{aligned} 4) & -7.24 - 3.52 = -28 \\ 5) & -4.30 + 8.19 = +321 \end{aligned}$$

$$\begin{aligned} +4.30 + 2.10 &= +17 \\ +10.29 &= -304 \end{aligned}$$

$$-7.24 = -28 - 104 = -132$$

$$b = -29.6$$

$$a = +18.2$$

$$\begin{aligned} 5) & -9.32 - 2.90 = -194 \\ 4) & -2.22 + 7.57 = +155 \end{aligned}$$

$$\begin{aligned} +2.22 + 0.69 &= +46 \\ +8.26 &= -109 \end{aligned}$$

$$-9.32 = -194 - 38 = -232$$

$$b = -13.2$$

$$a = +24.9$$

$$\begin{aligned} \text{mean } b &= -21.4 \\ a &= +21.6 \end{aligned}$$

M.C. 15-99 Moon's Center

1913 Sept. 30

7

Conditional Equations

	a	b	c		d	e
1	-1.26	-1.76	-3	-27	+38	+11
2	-1.67	-1.38	+5.5	-36	+30	-6
3	-2.14	-0.38	+5.4	-46	+8	-38
4	-2.17	+0.00	-13.4	-47	0	-47
5	-2.08	+0.62	-16.6	-45	-13	-58
6	-1.44	+1.62	-13.0	-31	-35	-66
7	-1.26	+1.76	-2.6	-27	-38	-65
8	-0.26	+2.15	-8.4	-6	-46	-52
9	+0.74	-2.04	-15.5	+16	-44	-28
						+113

Average = 68

Mean Equations

$$4) -7.24 - 3.52 = -28$$

$$5) -4.30 + 8.19 = +321$$

$$+4.30 + 2.10 = +17$$

$$+10.29 = -304$$

$$-7.24 = -28 - 104 = -132$$

$$b = -29.6$$

$$a = +18.2$$

$$5) -9.32 - 2.90 = -194$$

$$4) -2.22 + 7.57 = +155$$

$$+2.22 + 0.69 = +46$$

$$+8.26 = +109$$

$$-9.32 = -194 + 38 = -232$$

$$b = -13.2$$

$$a = +24.9$$

$$\text{Mean } b = -21.4$$

$$a = +21.6$$

Red. ad. l. app.

 $S + 26^{\circ} 55'$

$$\begin{array}{rcl}
 H+K & 4 & 39 = 69^{\circ} 45' \\
 H & 21 & 26 \\
 \alpha & = & 7 \quad 13 \\
 G & 17 & 42 \\
 A+K & 0 & 55 = 13^{\circ} 45'
 \end{array}$$

$$\begin{array}{rcl}
 \cos S & 9.9502 \\
 L & 0.7285 \\
 (L) & 0.6787
 \end{array}$$

$$\begin{array}{rcl}
 \cos(H+K) & 9.9874 \\
 q & 0.9093 \\
 \sin & 9.3760 \\
 \tan S & 9.7056 \\
 \tan & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 g' & 0.8957 \\
 g & 8.8348
 \end{array}$$

$$\begin{array}{rcl}
 p & -0.11 \\
 g & +0.06 \\
 h & +1.39 \\
 \hline
 & +1.34
 \end{array}$$

$$\begin{array}{rcl}
 \sin S & 9.6558 \\
 \cos(H+K) & 9.5392 \\
 h & 1.2956 \\
 \sin & 9.9723 \\
 \sec S & 0.0498 \\
 \tan & 8.8239 \\
 g' & 0.4906 \\
 h & 0.1416
 \end{array}$$

$$\begin{array}{rcl}
 g' & = +7.88 \\
 h' & +3.09 \\
 L & -4.77 \\
 \hline
 & +6.20
 \end{array}$$

1599 Moon's Mean Position (1912.0)

8

$$\begin{array}{r}
 X_0 = 16.2648^\circ \quad Y_0 = 20.3818^\circ \\
 \text{---} \quad \quad \quad +17 \quad \quad \quad -12 \\
 \hline
 16.2665 \quad \quad \quad 20.3806
 \end{array}$$

From plate constants $X = 18.8825^\circ$ $Y = 19.9051^\circ$

$$\begin{array}{r}
 \xi = +0.8825^\circ \\
 \log \xi = 9.94571 \\
 \therefore \cos \xi = 9.95019 \\
 \therefore \text{const} = 8.50724
 \end{array}$$

$$\therefore (X - A) = 1.48828^\circ$$

$$X - A = + 30.78^\circ$$

$$A = 7 \quad 12 \quad 11^\circ$$

$$X_0 = 7 \quad 12 \quad 41.78^\circ$$

$$\text{Red} = + 1.34$$

$$\alpha = 7 \quad 12 \quad 43.12^\circ$$

$$\eta = -2.0949^\circ$$

$$\log \tan \eta = 9.7056^\circ$$

$$\therefore \xi = 9.8908^\circ$$

$$\therefore \eta_1 = 6.6498^\circ$$

$$\eta_1 = + 4^\circ$$

$$\eta_0 = -2.0953^\circ$$

$$\log \eta_0 = 0.32124m$$

$$\therefore \text{const} = 7.33115$$

$$\therefore (Y - D) = 2.99009m$$

$$S - D = -16 \quad 17.4^\circ$$

$$D = +27 \quad 11 \quad 23^\circ$$

$$S_0 = +26^\circ 55' 05.6''$$

$$\text{Red} = + 6.2^\circ$$

$$S' = +26 \quad 55 \quad 11.8^\circ$$

1599 Moon's mean Position (1912.0)

8

$$\begin{array}{r}
 X_0 = 162648 \quad Y_0 = 203818 \\
 \text{Red} = \quad +11 \quad \text{B} = \quad +11 \\
 \hline
 \quad 162659 \quad \quad 203807
 \end{array}$$

Jupiter's constant $X = 188825 \quad Y = 199057$

$$\begin{array}{r}
 Z = +08825 \\
 \log Z = 9.94577 \\
 \cos Z = 9.95019 \\
 \text{const} = 850724
 \end{array}$$

$$(X - H) = 148898$$

$$H - A = +30.78$$

$$A = 71211$$

$$X_0 = 71241.78$$

$$\text{Red} = +134$$

$$X = 71243.12$$

$$Y = -20948$$

$$\log |A| = 9.7056$$

$$Z = 298908$$

$$Y_0 = 66498$$

$$Y = +4$$

$$Y_0 = -20952$$

$$\log Y_0 = 0.32122m$$

$$\text{const} = 733115$$

$$(Y - D) = 299007m$$

$$S - D = -1617.4$$

$$D = +271123$$

$$S_0 = +26^{\circ}55'05.6''$$

$$\text{Red} = +63$$

$$S = +26^{\circ}55'11.8''$$

1599 Lunar Parallax.

$$\begin{array}{r}
 \alpha' = 7^h 12^m 43.1^s \checkmark \\
 \delta = 10^\circ 52' 16.3'' \checkmark \\
 + 3 \quad 39 \quad 33.2 \checkmark \\
 = + 54^\circ 53' 18'' \checkmark
 \end{array}$$

$$+ \quad \quad 20 \quad 49 \checkmark$$

$$- 54 \quad 32 \quad 29 \checkmark$$

$$\begin{array}{r}
 995727 \checkmark \\
 999999 \checkmark \\
 \hline
 023649 \checkmark \\
 0.19375 \checkmark
 \end{array}$$

$$\delta = 57 \quad 22 \quad 36 \checkmark$$

$$26 \quad 55 \quad 12 \checkmark$$

$$30 \quad 27 \quad 24 \checkmark$$

$$\begin{array}{r}
 982640 \checkmark \\
 824997 \checkmark \\
 970491 \checkmark \\
 \hline
 0.07457 \checkmark \\
 785585 \checkmark
 \end{array}$$

$$\delta - \delta' = + 24 \quad 40.1 \checkmark$$

$$\delta = + 27 \quad 19 \quad 57.9 \checkmark$$

$$\text{Hart-Alex } \delta = + 27 \quad 19 \quad 53.1 \checkmark$$

$$O - C \quad \quad \quad - \quad 1.2 \checkmark$$

$$\delta = + 26^\circ 55' 11.8'' \checkmark$$

$$\pi = 61' 07.9'' \checkmark$$

$$\begin{array}{r}
 9.86913 \checkmark \\
 8.24997 \checkmark \\
 9.91277 \checkmark \\
 \hline
 0.05141 \checkmark \\
 8.08328 \checkmark
 \end{array}$$

$$\alpha - \alpha' = + 41' 38.70 \checkmark$$

$$= + 2^m 46.58 \checkmark$$

$$\alpha = 7 \quad 15 \quad 29.70$$

$$\alpha = 7 \quad 15 \quad 28.99 \checkmark$$

$$+ 0.76 \checkmark$$

1599

Lunar Parallax

9

$$x' = 7^{\circ} 12' 43.12''$$

$$b = 10^{\circ} 52' 16.3''$$

$$+ 3^{\circ} 39' 33.2''$$

$$+ 54^{\circ} 53' 18''$$

$$+ 20' 49''$$

$$+ 54' 32.29''$$

$$995727$$

$$999999$$

$$023699$$

$$019375$$

$$8^{\circ} 57' 22.36''$$

$$26^{\circ} 55' 12''$$

$$30^{\circ} 27' 29''$$

$$982640$$

$$824997$$

$$970491$$

$$007457$$

$$785585$$

$$S - \delta' = +24' 40.1''$$

$$S = +27^{\circ} 19' 52.0''$$

$$\text{Newt. Alt. } \delta = +27^{\circ} 19' 53.1''$$

$$O - C = -1.1''$$

$$S = +26^{\circ} 55' 11.9''$$

$$\pi = 61' 07.9''$$

$$9.86913$$

$$824997$$

$$991277$$

$$005141$$

$$808328$$

$$\alpha - \alpha' = +41' 38.70''$$

$$= +2'' 46.58''$$

$$\alpha = 7^{\circ} 15' 29.68''$$

$$\alpha = 7^{\circ} 15' 28.99''$$

$$+0.74''$$

M
1
11
15
2
2
29
3
25
10

MC 1606

Star Measures

1913 Sept. 19.

17

	d	n	d	n
1	15830	18800	17573	14673
117	10016	14612	14940	7300
155	20	21	42	00
	41	10	65	73
	<u>155817</u>	<u>5810</u>	<u>117370</u>	<u>7373</u>
219	15003	16994	15900	18098
293	11787	10215	14960	9010
	87	19	70	11
	11	00	00	94
	<u>293218</u>	<u>3218</u>	<u>219067</u>	<u>9084</u>
255	12105	9410	17692	16466
190	05	9209	13035	11108
	11905	10	30	10
			90	64
	<u>99800</u>	<u>9801</u>	<u>255342</u>	<u>5356</u>

Grade 5

11
11
15
21
29
3
5
0

MC1606

Stars-Measures

1913 Sept 19

17

	d	N	d	N
1	15830	18800	17573	14673
117	10016	14612	14940	73000
155	20	21	42	0000
	41	10	61	73
	<u>155817</u>	<u>5810</u>	<u>117370</u>	<u>7373</u>
2	15003	16994	15900	18098
219	11787	10215	14960	901010
293	87	19	70	11
	11	00	00	94
	<u>293218</u>	<u>3218</u>	<u>219067</u>	<u>9084</u>
3	12105	9410	17692	16466
55	05	9209	13035	1110809
00	11905	10	30	10
			90	64
	<u>99800</u>	<u>9801</u>	<u>255342</u>	<u>5356</u>

Grade 5

MC 1606

1913 Sept. 19.

18

moon-measures.

	d	μ	$d \times$	μ
1	16678	19696		
18.0	958391	1676060		
17.7	06	65		
	78	02		
	<u>17.7085</u>	<u>7064</u>		

$\mu = \text{min} = \text{about } 17.6900$

2	14605	18775
19.0	628175	1711018
17.8	87	21
	10	87
	<u>17.8328</u>	<u>8339</u>

3	193	15948
18.0		9228
3		

200	19130	18714
18.6	1239084	1546452
	70	70
	40	16
	<u>18.6756</u>	<u>6747</u>

4	19190	18890
20.2	1074644	1731092
19.0	45	90
	61	84
	<u>20.1582</u>	<u>1592</u>

5	18103	17930
20.3	1105056	1496060
19.5	50	61
max	03	35
μ	<u>20.2949</u>	<u>2971</u>
μ		

MC 1606

1913 Sept 19

18

moon - lunares

d

4

n

d x

n

1	16678	19696
180	958391	1676060
17.7	06	65
	78	02
	<u>177085</u>	<u>7064</u>

2 $\eta = \text{min} = \text{about } 176900$

<u>2</u>	14605	18775
190	628175	1711018
178	87	21
	10	87
	<u>178328</u>	<u>8339</u>

3
17.3
18.0

~~15948~~
~~9228~~

<u>3</u>	200	19130	18714
	18.6	1239084	1546452
		70	70
		40	16
	<u>186756</u>	<u>6747</u>	

4
20.2
19.0

19170	18890
1074644	1731092
45	90
61	84
<u>20.1582</u>	<u>1592</u>

5
20.3
19.5
max
x

18103	17930
1105056	1496060
50	61
03	35
<u>20.2949</u>	<u>2971</u>

1901606

1913 Sept 19,

19

moon -
d y w

20.3
20.0

18060
10850
60 48
63

16965
14170
6458
66

20.27912801

20.0 16800
20.8 866072
48
05

15520
1356050
85
40

20.8144✓8094✓

8 scratch

19.3 15381
21.5 10220
15-20
89

21.5167

15165 17085
1035055 975053
50
85

5177 19.2664

14748
1207068
7068
60

2682

point to be used in stead of (7)

21.8
21.0

18958
1761210
10
53
19.8654

19910
1125070
5070
10
8653

1461606

1913 Sept 19,

19

$\frac{1}{2}$ d 4 unoon -
 20.3
 20.0

d 5c
 18040 12965
 10850 14170
 60 48 6458
 63 66
202791 2801

$\frac{1}{2}$
 20.0 16800 15520
 20.8 866072 1356058
 48 85-
 05 40
208144 8044

8.5 scratch
 19.3 15381 15165 17085 14748
 21.5 10220 1035055 9750 12070
 15-20 50 4453 7065
 89 85 85 60
215167 5177 192664 2682

point to be used in stead of (7)

$\frac{1}{2}$
 9.8
 1.0
 18915 19910
 17612,0 1125070
 10 5070
 53 10
198654 2653

NAG 1606

1913 Sept. 23.

w

Times Etc
Exp. to stars 1912 Feb. 6 11^h 50^m - 12^h 02^m
Moon 11 55 40.0^v - 11 55 40.2^v
Clock slow 1 34.2^v

H Sid T. 11 57 14.3^v
H. Long 4 44 31.05^v
G Sid T. 1.6 41 45.35^v
Sid T. in Moon 21 01 03.62^v
Interval 19 40 41.73^v
Reduction 3 13.43^v
G. M. T. 19 37 28.30^v

 $\Theta - \kappa = -0^h 59^m 26^s$

From Kant. Alm. Moon 19^m 12^h 55^m R. Q. 26.07^v - 50 03' 12.8^v
Motion in 1^m = 199.55^v 15.665^v
" " 37.4717^v + 1 14.77^v - 9 47.0^v
Tabular place 12 56 40.84^v - 5 12 59.8^v

Moon's parallax 57' 47.4^v
Semidiameter 15' 46.4^v

930 = 10.2

946 = 10.5

R =

946.4^v

Augmentation

+ 10.5^v

Irradiation (5)

- 1.0^v

R =

955.9^v

R =

2049.1^v

(1+a) R =

2048.1^vR² =4194.7^v $\alpha = -5.0$

MCL 1606

1913 Sept 23

w.

Tanner's Sta
Exp. Station 1912 Tab. 6 $11^h 50^m$ - $12^h 02^m$
Moon $11^h 55^m 40.0^s$ - $11^h 55^m 40.2^s$
Clock slow $1^m 34.2^s$

H. Sid. T. $11^h 57^m 14.3^s$
H. Long $4^m 44^s 31.05^s$
G. Sid. T. $16^h 41^m 45.35^s$
Sid. T. in Moon $21^h 01^m 03.62^s$
Inclined $19^h 40^m 41.73^s$
Reduction $3^m 13.43^s$
G. in T. $19^h 37^m 28.30^s$ $\Theta - \alpha = -0^h 59^m 26^s$

From Kant Alman $R - \alpha$ α κ
Moon $19^h 12^m 55^s$ $26^s 0.7$ - $5^s 0.3$ 12.8
Inclined $1^m = 1.9955$ 15.665
... 37.4717 $+ 1$ 14.77 - 9 47.0
Tabular place $12^h 56^m 40.84^s$ - $5^m 12^s 59.8$

Moon's parallax $57' 47''$
Sundarium $15' 46''$
 $R = 946.4$
Circumference $+ 105$
Irradiation (5) $- 10$
 $R = 955.9$
 $R = 20491$
 $(1+a) R = 20481$
 $R^2 = 41947$
 $a = -50$

1116606, Standard Computations.

1913 Sept. 23, 21

Cape no. 1759 mag 7.7				Cape no. 1769 mag 7.5				Cape no. 1777 mag 8.7			
C	12	53	24.95	12	58	40	56	13	00	38.29	
L			2504				54			27	
E			24.92				44			28	
mean	12	53	24.97	12	58	40	51	13	00	38.28	
Prec			+37.29				+37.02			+37.40	
X	12	54	02.26	12	59	17	53	13	01	15.68	
A	12	57	18	12	57	18		12	57	18	
X-A	-	3	15.74		+1	59	53		+3	57.68	
sin(X-A)			-195.73			+119.53				+237.67	
log "			2.29166m			2.07748				2.37598	
cos S			9.99723			9.99855				9.99658	
S ₀			0.79613m			0.58327				0.87980	
S ₁			-6.2536			+3.8306				+7.5823	
S ₂			-13			+7				+38	
S ₃			11.7451			21.8313				25.5861	
X			11.7372			21.9076				25.5349	
X-S			+279			+763				-512	
C	-6	24	29.6	-4	37	07.2		-7	07	24.3	
L			29.9			07.6				24.0	
E			30.8			08.1				25.0	
mean	-6	24	30.1	-4	37	07.6		-7	07	24.4	
Prec	-3	53.9		-3	55.0			-3	52.1		
S	-6	28	24.0	-4	41	02.6		-7	11	16.5	
D	-5	38	10	-5	38	10		-5	38	10	
S-D	-50	14.0		+57	07.4			-1	33	06.5	
tan(S-D)			-3014.2			+3427.7				-5587.9	
log "			3.47917m			3.53500				3.74725m	
" ₁₀			0.81032m			0.86615				1.07840m	
tan S			9.0549m			8.9134m				9.1008m	
S ₂			1.5969			1.1665				1.7596	
" ₁			7.7052m			7.1333m				7.9138m	
" ₀			-6.4613			+7.3477				-11.9784	
" ₁			-51			-14				-82	
" ₂			1.55336			2.93463				1.00134	
" ₃			1.55814			2.93218				9.9800	
" ₄			+478			-245				-334	

1912phae-proj.191				Standard Computed				1913 Sept 23.21			
Cape m. 1759m 177				Cape m. 1769m 175				Cape m. 1777m 178.7			
C	12	53	2495	12	58	40	56	13	00	38	29
L			2504				54				27
S			2492				44				28
mean	12	53	2497	12	58	40	51	13	00	38	28
Proc			+3729				+3702				+3740
X	12	54	0226	12	59	17	53	13	01	15	68
A	12	57	18	12	57	18		12	57	18	
A-A	-	3	1574	+1	59	53		+3	57	68	
in (A-A)			-19573	+119.53				+237.67			
log	2	29	166m	2	07	748		2	37	59.8	
cos	9	99	723	9	99	855		9	99	658	
S ₀	0	79	613m	0	58	327		0	87	980	
S ₀	-	6	2536	+3.8	306			+7	58	23	
S ₁	-		13	+	7			+		36	
S	1	17	451	-	21	83	13	25	58	61	
X	1	17	372		21	90	76	25	53	49	
20-3			+279				+763				-512
C	-6	24	296	-4	37	07	2	-7	07	243	
L			299				076				240
S			308				081				250
mean	-6	24	30.1	-4	37	07.6		-7	07	244	
Proc	-3	53	9	-3	55	0		-3	52	1	
S	-6	28	240	-4	41	026		-7	11	165	
D	-5	38	10	-5	38	10		-5	38	10	
S-D	-50	140		+	57	074		-1	33	065	
tan (S-D)			-30142				+34277				-55879
log	3	47	917m	3	53	500		3	74	725m	
γ ₀	0	81	032m	0	86	615		1	07	840m	
tan S	9	05	49m	8	91	34m		9	10	08m	
S'	1	59	69	1	16	65		1	75	96	
γ ₁	7	70	52m	7	13	33m		7	91	38m	
γ ₀	-6	46	13	+7	34	77		-1	19	784	
γ ₁	-		51	-		14		-		82	
γ ₂	1	55	336	2	93	463		1	00	134	
γ ₃	1	55	814	2	93	218		9	98	00	
γ ₄			+478			-245				-334	

1913 Sept. 23

MC1606

Plato constants

	x	y	$R.A.$	$Decl.$
1	117372 ^v	15.5814 ^v	12 54 01	-6 28 24
2	219076 ^v	29.3218 ^v	59 18	-4 41 03
3	25.5349 ^v	9.9801 ^v	13 01 16	-7 11 17
3	59.18	54.88	7 11 4	35 18 20 44
	19.73	18.29	12 58 12	-6 06 55
	-18	-22	-	54 +28 45
	1.73	3.71	12 57 18	-5 38 10
	31	465		
	1.73	1725		
	51.9			
	53.63			

$$A = 12^h 57^m 18^s$$

$$D = -5^{\circ} 38' 10''$$

$$\begin{aligned}
 x - 3 - 654 & \quad + 5x & \quad + 1033^v \\
 -79 - 1013 & = -1092 + 59 = -1033 & = 0 \\
 +763 - 1906 & = -1143 + 110 = -1033 & = 0 \\
 -512 - 649 & = -1161 + 128 = -1033 & = 0 \\
 18.2493 - 1.283 & \quad + 91^v & = 18.2334^v
 \end{aligned}$$

$$\begin{aligned}
 y - 4 + 61.5x & \quad + 74 & \quad - 1307 \\
 +47.8 + 7222 & + 1200 + 109 = +1309 & = +2 \\
 -245 + 1347 & = +1102 + 205 = +1307 & = 0 \\
 -334 + 1570 & = +1236 + 70 = +1306 & = -1 \\
 19.7395 + 1122 & \quad + 138^v & = 19.7348^v
 \end{aligned}$$

Tabular	$a = -1.1$	$a = -4.6$	$a - c = +3.1$	$b + a = +1.9$
Observed	-5.0	-7.0	+2.0	+3.5
$c - 0$	+3.9	+2.4	+1.1	-1.6

1913 Sept 23

MC 1606	x	y	$R.A$	$Decl$
1	117372	155814	12 54 01	-6 28 24
2	219076	293218	59 18	-4 41 03
3	255349	99801	13 01 16	-7 11 17
3	5918	5488	7 11 4	35 18 20
	1973	1829	12 58	12 -6 06
	-18	-22	-54	+28
	173	371	12 57	18 -5 38
	31	465		
	173	1725	A = 12 57 18	
	519		D = -5 38 10	
	5363			

$$\begin{aligned}
 x - 3 - 654 & \quad + 52 & \quad + 1073 \\
 - 79 - 1013 & = - 1092 + 59 = - 1033 & = 0 \\
 + 763 - 1906 & = - 1143 + 110 = - 1033 & = 0 \\
 - 512 - 649 & = - 1161 + 128 = - 1033 & = 0 \\
 18.2493 - 1283 & + 91 & = 182334
 \end{aligned}$$

$$\begin{aligned}
 y - 4 + 6152 & \quad + 74 & \quad - 1307 \\
 + 478 + 722 & = + 1200 + 109 = + 1309 & = + 2 \\
 - 245 + 1047 & = + 1102 + 205 = + 1307 & = 0 \\
 - 334 + 1570 & = + 1236 + 70 = + 1306 & = - 1 \\
 19.7391 + 1122 & + 138 & = 197348
 \end{aligned}$$

Tabular	$a = -1.1$	$a = -4.6$	$a - 2 = +3.1$	$b + a = +1.9$
Observed	-50	-70	+20	+35
$c - 0$	+39	+24	+11	-16

pt.	mag. L	residual
1	186.8	-8
2	158.4	+45
3	121.4	+43
4	111.2	-13
5	90.0	-58
6	82.8	-48
7	52.3	+63
8	30.0	+18

NIC 160 G

1913 Sept 24, 23.

Moon's Center

	x	$x - X_0$	Δx	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$0 - c$
1	18.00000	-0.2438	+4	0.0592	4.2024	+7.7
2	19.00000	+0.7562	+4	0.5724	4.2182	+23.5
3	20.00000	+1.7562	+2	3.0849	4.2242	+29.5
4	20.1587	+1.9149	+1	3.6672	4.2184	+23.7
5	20.2960	+2.0522	0	4.2115	4.2115	+16.8
6	20.2796	+2.0358	-0	4.1445	4.2110	+16.3
7	~~20.00000~~	~~+1.7562~~	~~-2~~	~~3.0835~~	~~4.2226~~	
8	19.8654	+1.6216	-2	2.6289	4.2120	+17.3
8	19.2673	+1.0235	-3	1.0469	4.1991	+4.4
				Comp $\Sigma^2 =$	4.1947	

	y	$(y - Y_0)$	Δy	$(y - Y_0)^2$
1	17.7074	-2.0348	-7	4.1432
2	17.8334	-1.9088	-6	3.6458
3	18.6751	-1.0671	-3	1.1393
4	19.0000	-0.7422	-2	0.5512
5	19.7422	0.0000	0	0.0000
6	20.0000	+0.2578	+1	0.0665
7	~~20.8092~~	~~+1.0670~~	~~+3~~	~~1.1391~~
8	21.0000	+1.2578	+4	1.5831
8	21.5172	+1.7750	+6	3.1522

Approximate Center

$$\begin{aligned}
 x &= 20.0 & y &= 18.6751 \\
 & & & 20.8092 \\
 & & & \hline
 & & & 39.4843 \\
 \text{mean } y &= & & 19.7422 \\
 y - \text{min} &= & & 17.6900 \\
 R &= & & 2.0522 \\
 x - \text{max} &= & & 20.2960 \\
 \text{mean } x &= & & 18.2438
 \end{aligned}$$

$$\begin{aligned}
 \text{Center } \left\{ \begin{aligned} X &= 18.2438 \\ Y &= 19.7422 \end{aligned} \right.
 \end{aligned}$$

151606

1913 Feb 24, 23

Arrows Center

	x	$x - X_0$	Δx	$(x - X_0)^2$	$(x - X_0)^2 + (y - Y_0)^2$	$0 - c$
1	180000	-02438	+4	00592	42024	+77
2	190000	+07562	+4	05724	42182	+235
3	200000	+17562	+2	30849	42242	+295
4	201587	+19149	+1	36672	42184	+237
5	202960	+20522	0	42115	42115	+168
6	202796	+20358	-0	41445	42110	+163
7	~~200000~~	~~+17562~~	~~-2~~	~~30830~~	~~42226~~	
8	198654	+16216	-2	26289	42120	+173
9	192673	+10233	-3	10469	41991	+44
				Sum $\Sigma x^2 =$	41947	

	y	$y - Y_0$	Δy	$(y - Y_0)^2$
1	177074	-20348	-7	41432
2	178334	-19088	-6	36458
3	186751	-10671	-3	11393
4	190000	-07422	-2	05512
5	197422	00000	0	00000
6	200000	+02578	+1	00665
7	~~208092~~	~~+10670~~	~~+3~~	~~11391~~
8	210000	+12578	+4	15831
9	215172	+17750	+6	31522

Approximate Center

$$x = 2004 = 186751$$

$$208092$$

$$394843$$

$$\text{mean } y = 197422$$

$$y - \text{min} = 176900$$

$$R = 20522$$

$$x - \text{max} = 202960$$

$$\text{mean } x = 182438$$

$$\text{Center } \begin{cases} X = 182438 \\ Y = 197422 \end{cases}$$

Formation of Normals.

	ab	an	bn
1	+ 0.49	- 18.5	- 156.3
2	- 1.45	+ 178.6	- 448.8
3	- 1.88	+ 519.2	- 315.6
4	- 1.41	+ 452.7	- 175.4
5	+ 0.00	+ 344.4	+ 0.0
6	+ 0.53	+ 332.5	+ 42.4
7	+ 2.04	+ 280.3	+ 218.0
8	+ 1.82	+ 44.9	+ 78.3
	+ 0.14	+ 2134.1	- 757.4

1606

Moon's Center.

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Conditional Equations.

	a	b	0		c	0-c
1	-0.24	-2.03	= +77	- 25 + 1.10	= + 85	- 8
2	+0.76	-1.91	= +235	+ 84 + 1.03	= + 187	+ 48
3	+1.76	-1.07	= +295	+ 194 + 58	= + 252	+ 43
4	+1.91	-0.74	= +237	+ 210 + 40	= + 250	- 13
5	+2.05	+0.00	= +168	+ 226 - 0	= + 226	- 58
6	+2.04	+0.26	= +163	+ 225 - 14	= + 211	- 48
7	+1.62	+1.26	= +173	+ 178 - 68	= + 110	+ 63
8	+1.02	+1.78	= +44	+ 112 - 96	= + 26	+ 18

Average: 37

Normal Equations.

$$+ 19.42 + 0.14 = + 2134$$

$$+ 0.14 + 14.28 = - 757$$

$$- 0.14 - 0.00 = - 15$$

$$+ 14.28 = - 772$$

$$b = -54.0$$

$$- 0.00 - 0.14 = + 7$$

$$+ 19.42 = + 2141$$

$$a = +110.0$$

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Moon's Center

24

Concl. Equations

	a	b	c	d	e	f	g	h
1	-0.24	-2.03	=	+7.7	-	2.5	+1.10	= +8.5 = 8
2	+0.76	-1.91	=	+2.35	+	8.4	+1.03	= +18.7 +48
3	+1.76	-1.07	=	+2.95	+	1.94	-5.8	= +2.52 +43
4	+1.91	-0.74	=	+2.37	+	2.10	-4.0	= +2.50 -13
5	+2.05	+0.00	=	+1.64	+	2.26	-0	= +2.26 -58
6	+2.04	+0.26	=	+1.63	+	2.25	-1.4	= +2.11 -48
7	+1.62	+1.26	=	+1.73	+	1.78	-6.8	= +1.10 +63
8	+1.02	+1.78	=	+4.4	+	1.12	-9.6	= +2.6 +18

Average 37

Normal Equations

$$+19.42 + 0.14 = +21.34$$

$$+ 0.14 + 14.28 = -7.57$$

$$- 0.14 - 0.00 = -1.5$$

$$+14.28 = -7.72$$

$$b = -54.0$$

$$- 0.00 - 0.14 = +7$$

$$+19.42 = +21.91$$

$$a = +110.0$$

1606

Moon's mean Position (1912.0)

$$\begin{array}{r}
 X_0 = 18.2438'' \\
 \text{red.} = + 55'' \\
 \hline
 18.2493''
 \end{array}
 \quad
 \begin{array}{r}
 Y_0 = 19.7422'' \\
 \text{red.} = - 27'' \\
 \hline
 19.7395''
 \end{array}$$

From Plate Constants $X = 18.2334''$ $Y = 19.7348''$

$$\begin{array}{r}
 \xi = +0.2334'' \\
 \log \xi = 9.36810'' \\
 \text{wgs} = 9.99767'' \\
 \text{wgs} = 8.50724''
 \end{array}$$

$$\begin{array}{r}
 \eta = -2.2652'' \\
 \log \tan \delta = 9.0093'' \\
 \text{wgs} = 8.7362''
 \end{array}$$

$$\text{.. (2-4) } 0.86319''$$

$$\begin{array}{r}
 \log m_0 = 0.35511'' \\
 \text{wgs} = 7.33115''
 \end{array}$$

$$X-41 \quad + \quad 7.30''$$

$$\text{.. (1-0) } -3.02396''$$

$$A \quad 12 \quad 57 \quad 18''$$

$$\delta-D = -17 \quad 36.7''$$

$$A_0 \quad 12 \quad 57 \quad 25.30''$$

$$D = -5 \quad 38 \quad 10.7''$$

$$\text{Red.} \quad + 0.56''$$

$$S_0 = -5^\circ 55' 46.7''$$

$$X' \quad 12 \quad 57 \quad 25.86''$$

$$\text{Red.} \quad - 6.0''$$

$$d' = -5 \quad 55 \quad 52.7''$$

1606 Moon's mean Position (1912.0)

$$\begin{array}{r}
 X_0 = 18.2438 \\
 \text{Red} = +1.55 \\
 \hline
 18.2493
 \end{array}
 \qquad
 \begin{array}{r}
 Y_0 = 19.7422 \\
 \text{Red} = -27 \\
 \hline
 19.7395
 \end{array}$$

From Platicretant. $X = 18.2334$ $Y = 19.7348$

$$\begin{array}{r}
 S = +0.2334 \\
 \log 3 = 9.36810 \\
 \text{wst} = 9.99767 \\
 \text{wst} = 8.50729
 \end{array}$$

$$(2-4) 0.86319$$

$$X-41 \quad \quad \quad 7.30$$

$$A \quad 12 \quad 57 \quad 18$$

$$A_0 \quad 12 \quad 57 \quad 25.30$$

$$\text{Red} = +0.56$$

$$X' \quad 12 \quad 57 \quad 25.86$$

$$\eta = -2.2652$$

$$\begin{array}{r}
 \log \tan 5 \quad 9.0093 m \\
 \quad \quad \quad 8.7362
 \end{array}$$

$$\begin{array}{r}
 \log m_0 = 0.35511 m \\
 \text{wst} = 7.33115
 \end{array}$$

$$(2-1) \quad 3.02396$$

$$S-D = -1.7 \quad 36.7$$

$$D = -5 \quad 38 \quad 10.$$

$$S_0 = -5^\circ 55' 46.7$$

$$\text{Red} = -6.0$$

$$S' = -5 \quad 55 \quad 52.7$$

1606

Red ad l. appr

$$H + \alpha \quad 9^{\circ} 58' = 149^{\circ} 30'$$

$$H \quad 21 \quad 01$$

$$\alpha \quad 12 \quad 57$$

$$G \quad 17 \quad 52$$

$$G + \alpha \quad 6 \quad 49 = 102^{\circ} 15'$$

$$l \cos(G + \alpha) \quad 9.3267 \text{ m}$$

$$g \quad 8.9256$$

$$\sin \quad 9.9900 \text{ m}$$

$$\tan \quad 9.0167 \text{ m}$$

$$i \quad 8.8239$$

$$(g') \quad 0.2523 \text{ m}$$

$$(g) \quad 8.7562 \text{ m}$$

$$f \quad -0.05$$

$$g \quad -0.06$$

$$h \quad +0.67 \checkmark$$

$$+0.56$$

$$\delta_0 = -5 \quad 56$$

$$l \cos \delta \quad 9.9977$$

$$i \quad 0.7760 \text{ m}$$

$$i \quad 0.7737 \text{ m}$$

$$l \sin \delta \quad 9.0144 \text{ m}$$

$$\cos(H + \alpha) \quad 9.9353 \text{ m}$$

$$h \quad 1.2918$$

$$\sin \quad 9.7055$$

$$\sec \delta \quad 0.0023$$

$$i \quad 8.8239$$

$$(h') \quad 0.2415$$

$$(h) \quad 9.8235$$

$$g' \quad -1.79$$

$$h' \quad +1.74$$

$$i \quad -5.94 \checkmark$$

$$-5.99 \checkmark$$

1606

Red ad l. after

$H + \alpha$ 9 58 : 149° 30'
 H 21 01
 X 12 57
 G 17 52
 $H + X$ 6 49 - 102° 15'

$\cos(G + X)$ 9.3267 m
 g 8.9256
 $\sin$ 9.9900 m
 $\tan S$ 9.0167 m
 μ 8.8239

(g') 0.2523 m
 (g) 8.7562 m

f -0.05
 g -0.06
 μ +0.67
+0.56

δ_{α} -5° 56'

$\cos S$ 9.9977
 μ 0.7760 m
 μ 0.7737 m

$\sin S$ 9.0144 m
 $\cos(H + \alpha)$ 9.9353 m
 μ 1.2918
 $\sin$ 9.7055
 $\sec S$ 0.0023
 μ 8.8239

(h') 0.2415
 (h) 9.8235

g' -1.79
 h' +1.74
 μ -5.94
-5.99

1606

Lunar Parallax.

$$\alpha = 12^h 57^m 25.86^s$$

$$\delta = 11^{\circ} 57' 14.3''$$

$$- 1^{\circ} 00' 11.56''$$

$$- 15^{\circ} 02' 53''$$

$$- 5^{\circ} 34''$$

$$- 14^{\circ} 57' 19''$$

$$9.95727^{\circ}$$

$$0.00000^{\circ}$$

$$0.01996^{\circ}$$

$$9.97223^{\circ}$$

$$\gamma = 43^{\circ} 10' 09.5''$$

$$- 5^{\circ} 55' 52.7''$$

$$49^{\circ} 06' 02''$$

$$9.82640^{\circ}$$

$$8.22556^{\circ}$$

$$9.87844^{\circ}$$

$$0.16485^{\circ}$$

$$8.09525^{\circ}$$

$$s - s' = +42^{\circ} 48.5''$$

$$\delta = -5^{\circ} 13' 04.2''$$

$$\text{Nautical } \delta = -5^{\circ} 12' 59.8''$$

$$O-C = -4.4''$$

$$s' = -5^{\circ} 55' 52.7''$$

$$\Pi = 57' 47.4''$$

$$9.86913^{\circ}$$

$$8.22556^{\circ}$$

$$9.41436^{\circ}$$

$$0.00180^{\circ}$$

$$75.1085^{\circ}$$

$$\alpha - \alpha' = -11^{\circ} 08.77''$$

$$= -44.58''$$

$$\alpha = 12^h 56^m 41.28^s$$

$$\delta = 12^{\circ} 56' 40.84''$$

$$+0.44''$$

1606 *Lunar Parallax*

$$\begin{array}{r}
 4' \quad 12'' \quad 57''' \quad 25.86 \\
 0' \quad 11'' \quad 57''' \quad 14.3 \\
 - \quad 1'' \quad 00''' \quad 11.56 \\
 - \quad 15'' \quad 02''' \quad 53''' \\
 \hline
 \end{array}$$

$$- \quad \quad \quad 5 \quad 34$$

$$- \quad 14 \quad 57 \quad 19$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 001996 \\
 \hline
 997223
 \end{array}$$

$$r = 43 \quad 10 \quad 09.5$$

$$- \quad 5 \quad 55 \quad 52.7$$

$$49 \quad 06 \quad 02$$

$$\begin{array}{r}
 982640 \\
 822556 \\
 987844 \\
 016485 \\
 \hline
 809525
 \end{array}$$

$$s - s' = +42 \quad 48.5$$

$$s = -5 \quad 13 \quad 04.2$$

$$\text{Nautical } s = -5 \quad 12 \quad 59.8$$

$$o - c = -9.9$$

$$s = -5^{\circ} 55' 52.7''$$

$$\pi = 57' 47.4''$$

$$\begin{array}{r}
 986913 \\
 822556 \\
 941436 \\
 000180 \\
 \hline
 751085
 \end{array}$$

$$\alpha - \alpha' = -11' \quad 08.77$$

$$= -44.58$$

$$\alpha = 12 \quad 56 \quad 41.28$$

$$\kappa = 12 \quad 56 \quad 40.84$$

$$= 0.44$$

