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Harvard Lunar Plates.

Measures and Reductions

Mary Fowler.

Volume ~~XIX~~

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MC1041 (1911) April 12)

Comparison Stars – Standard Coordinates.

1		no.	mag
Cape.		1778	8.4
C	13^h	01^m	$04.^s12$
L			.22
E			12
mean			04.15
Prec	+		34.05
1911	13^h	01^m	$38.^s20$
A	13	07	34
α−A	−	5	55.80
sin(α−A)	−		355.76
log.		2.551162n	
:: cos δ		9.999053	
:: ξ₀		1.057432n	
ξ₀		−11.41137	
ξ₁	−		74
ξ		6.57899	
ξ₂		6.71172	
x − ξ		+1383	
C	− 3°	46′	24.″02
L			23.5
E			24.3
mean			23.9
Prec	−	3	32.6
1911	− 3	49	56.5
D	− 5	21	27
δ − D	+ 1	31	30.5
tan(δ−D)	+		5491.8
log		3.739711	
:: η₀		1.070866	
:: tan δ		8.82250n	
:: ξ²		2.11449	
:: η₁		7.99443n	
η₀		+11.77222	
η₁	−		100
		33.76222	
		34.12253	
y − η	+	3631	

2		no.	mag
		1785	7.4
	13^h	04^m	$34.^s23$
			23
			18
			34.21
	+		34.31
	13	05	$08.^s52$
	13	07	34
	−	2	25.48
	−		145.48
			2.162280n
			9996588
			0.666627n
			−4.6411
	−		26
			13.3563
			13.2373
			−1240
	− 7°	07′	18.″8
			.4
			.9
			18.7
	−	3	31.7
	− 7	10	50.4
	− 5	21	27
	− 1	49	23.4
	−		6565.6
			3.817277n
			1.148422n
			9.10003n
			1.33332
			7.48669n
			−14.0742
	−		31
			7.9227
			8.2236
			+3009

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MC 1041 (1911) April (12) 1.

Comparison Stars – Standard Coordinates.

1		m.	mag	2		m.	mag
Cafe.		1778	8.4			1785	7.4
C	13h	01m	04.72	13h	04m	34.23	
L			.82			23	
E			120			18	
Mean			04.15			34.21	
Prec		+	34.05		+	34.31	
1911	13h	01m	38.20	13	05	08.52	
A	13	07	34	13	07	34	
α–A		– 5m	55.80		– 2	25.48	
Sin(α–A)		–	355.76		–	145.48	
log			2.551166n			2.162806n	
" ws δ			9.999403			9.999658	
= ξ_0			1.057433n			0.666622n	
ξ_0	–11.	41	37			–4.64	11
ξ_1	–		74			–	26
ξ		6.57	89			13.35	63
z		6.71	72			13.23	73
x – ξ		+13	83			–12	40
C	–3°	46′	24.072	–7°	07′	18.″8	
L			23.5			.4	
E			24.3			.9	
mean			23.9			18.7	
Prec	–	3	32.6	–	3	31.7	
1911	–3	49	56.5	–7	10	50.4	
D	–5	21	27	–5	21	27	
δ – D	+1	31	30.5	–1	49	23.4	
tan(δ–D)	+		549 1.8	–		6565.6	
log			3.739711			3.817127n	
" m_0			1.070866			1.148422n	
tan δ			8.42260n			9.09933n	
ξ^2			2.11499			1.33332	
η_1			7.99443n			7.48591n	
η_0	+11.	72	22			–4.07	42
η_1	–		100			–	31
η		33.76	22			7.92	27
$\sin\frac{\eta}{2}$		34.12	53			8.22	36
δ – D	+	3631				+3009	

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MC 1041 (1911 Apr. 12)

Comp. Stars - Standard Coords.

3	No.	Mag
Capt	1796	7.7
C	13h 10m 52.81	
L		32
E		30
Mean		52.31
Rec	+	34.20
1911	13 11	26.51
A	13 07	34
α - A	+ 3	52.51
sin(α - A)	+	232.50
log "	2.366427	
" cos δ	9.998211	
" z_0	0.87187	
z_0	+7.44527	
z_1	+	11
z	25.44637	
x	25.47780	
x - z	+ 317	
C	−5° 08′	21.0″
L		20.9
E		21.1
Mean		21.0
Rec	− 3	30.0
1911	−5 11	51.0
D	−5 21	27
δ - D	+ 9	36.0
tan(δ - D)	+	576.0
log "	2.760422	
log η_0	0.091577	
" tan δ	8.95899n	
" z^2	1.74397	
" η_1	7.75602n	
η_0	+1.23477	
η_1	−	57
η	23.22900	
y	23.40378	
y - 3	+1748	

4	No.	Mag.
	1797	8.2
	13h 11m	37.46
		46
		46
		37.46
	+	34.31
13	12	11.77
13	07	34
	+ 4	37.77
	+	277.75
	2.443666	
	9.997233	
	0.948133	
	+8.87422	
	+	32
	26.87774	
	26.81106	
	−	668
−6°	24′	25.1″
		24.2
		24.3
		24.5
	− 3	29.7
−6	27	54.2
−5	21	27
−1	06	27.2
−		39877
	3.600733n	
	0.931888n	
	9.05433n	
	1.89633	
	8.00400n	
	−8.54822	
	−	101
	13.44171	
	13.60382	
	+1621	

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MC 1041 (1911 Apr. 12)

Comp Stars. Standard Coords.

		No.	Mag.
Cape		1796	7.7
C	13h	10m	52.81
L			32
E			30
Mean			52.81
Prec	+		34.20
1911	13	11	26.51
A	13	07	34
α - A	+	3	52.51
sin(δ - A)	+		232.50
log		2.366421	
cos δ		9.998211	
$\Delta\alpha_0$		0.871879	
δ_0	+	7.4452	
δ_1	+		11
δ		25.44463	
x		25.47780	
x - δ	+	317	
C	−5°	08′	21.0″
L			20.9
E			21.1
Mean			21.0
Prec	−	3	30.0
1911	−5	11	51.0
D	−5	21	27
δ − D	+	9	36.0
tan(δ - D)	+		576.0
log		2.760421	
log $\Delta\alpha_0$		0.091579	
log tan		8.95899n	
δ_2		1.74397	
η_1		7.75601n	
η_0	+	1.23477	
η_1	−		57
η		23.22900	
y		23.40378	
y - η	+	1748	

		No.	Mag.
		1797	8.2
13h	11m	37.46s	
			46
			46
			37.46
	+		34.31
13	12	11.77	
13	07	34	
	+	4	37.77
	+		277.75
		2.443666	
		9.997223	
		0.948133	
	+	5.87422	
	+		32
		26.87774	
		26.81066	
	−	668	
−6°	24′	25.1″	
			24.2
			24.3
			24.5
	−	3	29.7
−6	27	54.2	
−5	21	27	
−1	06	27.2	
−		59.877	
		3.600733n	
		0.931488n	
		9.05433n	
		1.89963	
		8.00400n	
	−	8.5482	
	−	101	
		13.44177	
		13.60378	
	+	1621	

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MC 1041 1912 Dec. 10. 3.

Comp. Stars - measures.-

Reseau reversed on plate.

	4				x			
	a		N		a		N	
1								
6.7	1.5973		14335		15168		14140	
34.1	14721	16	5566	68	12338	40	6944	46
mag	20		66		34		41	
8.4	62		11		71		14	
	34.1253		.1253		6.7168		.7177	
2								
13.2	17201		18126		18240		18886	measured with plate tilted.
8.2	14952	51	10344	49	10526	26	16540	39
mag	55		49		27		2539	
7.4	91		21		10		820	
	8.2746		.2225		13.2310		.2336	
3								
25.5	18423		17726		14241		15917	
23.4	14371	71	87505	50	90096	02	11129	35
mag	69		52		06		25	
7.7	10		19		27		19	
	23.4048		.4029		25.4772		.4788	
4								
26.8	16149		16390		18269		17470	
13.6	10097	07	12420	23	16370	69	9355	50
mag	01		19		61		49	
8.2	49		98		79		66	
	13.6047		.6028		26.8096		.8116	

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MC 1041 1912 Dec. 10. 3.

Comp. Stars: measures.—

Plate reversed in plate-

	a	N	a	N
4				
6.7	15973	14335	15168	14140
34.1	14721 16	55666 68	12328 40	69444 46
mag	20	66	34	41
8.7	62	11	71	14
	34.1253	.1253	6.7168	.7177
2				
13.2	17204	18126	18240	18886 measured
9.4	14952 51	10349 49	10526 28	16540 39 with
mag	55	49	27	25 plate
7.4	91	21	10	20 tilted.
	8.7246	.2225	13.2310	.2336
3				
25.5	18423	14726	14241	15917
23.4	14371 71	87505 50	90097 02	11129 35
mag	69	52	06	25
7.7	10	19	27	19
	23.4048	.4029	25.4772	.4788
4				
6.8	16149	16390	18269	17470
3.6	10097 07	12420 23	16378 64	9355 50
mag	01	19	41	49
5.2	49	98	79	66
	13.6047	.6028	26.8096	.8116

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Neon - measures Roscoe reversed on plate.

	d	p	N
1			
17.8			
22.0			

d		N	
18818		17859	
17050	40	9615	09
40		11	
18		50	

17.8225 .8240

2			
17.0	17664		17290
22.6	11276	81	13689 90
	60		91
	63		05

22.6391 .6394

3			
16.2	16662		16215
22.8	8800	84	14073 90
mean	91		85
in	69		28
4			

22.7876 .7868

4			
16.0	16686		16240
22.6	9035	41	13898 90
	30		95
	84		44

22.7649 .7653

5			
15.0	15751		16144
22.4	12409	16	9479 79
	16		87
	49		55

22.3336 .3331

6			
14.6			
22.0			

16341		15381	
13121	22	8560	65
29		60	
35		71	

14.6785 .6812

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MC1941 1912 Dec. 10.

Wedge measures (mean reversed on plate)

	a	N		a	N
1				18818	17859
7.8				17050	96159
2.0				40	11
				18	50
				17.8825	.6240
2					
7.0	17664	17290			
2.6	12768	13689	90		
	60	91			
	63	05			
	22.6391	.6344			
3					
6.2	16662	16215			
2.8	8800	14073	90		
	91	85			
	69	28			
	22.7826	.7868			
4					
6.0	16686	16240			
2.6	9035	13898	90		
	30	95			
	59	44			
	22.7649	.7653			
5					
1.0	15751	16144			
2.4	12409	9479	79		
	16	57			
	49	55			
	22.3736	.3331			
6					
4.6				16341	15381
2.0				13122	85660
				29	60
				35	71
				14.6785	.6812

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MC1041 1912 Dec 10 5.

known-measures.

	α	ν	α	ν
7			15400	15368
14.4			8300 96	12383 81
21.0			07	78
			98	01
			14.2902	.2925
8			15408	14287
14.3			8250 44	11440 30
20.8			50	34
min in 76			01	78
			14.2845	.2849
9			15470	14225
14.5			10133 20	9560 57
20.0			22	80
			61	25
			14.4660	.4659

10		
15.0	12961	13765
19.4	9939 30	6750 68
	31	59
	72	59
	193031	.2996
11		

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IMC 1041 1912 Dec. 10.

Micrometer-measures

	d	n
7		
14.4	15400	11308
21.0	8300	12383 81
	0796	78
	96	01
	14.2902	.2925
8		
14.3	15408	14287
20.8	8250 44	11440 30
	50	34
	01	78
	14.2845	.2849
9		
14.5	15470	14225
0.0	10133 20	9560 57
	22	80
	61	25
	14.4660	.4659
10		
	0 12961	13765
	14 9939 30	675063
	31	59
	72	59
	1.9303 1	.2996
11		

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MC 1041

1913 Jan 7.

	x	y	R.a	Decl
1	66.7172	34.1253	$13^h\ 01^m\ 38^s$	$-3^\circ\ 49'\ 56''$
2	13.2373	8.2236	13 05 08	−7 10 50
3	25.4780	23.4038	13 11 27	−5 11 51
4	26.8106	13.6038	13 12 12	−6 27 54
4	7224	78.36	30 25	22 40 31
	18.06	19.59	13 07 36	−5 40 08
	31	−22	− 2	+ 18 41
	1586	241	13 07 34	−5 21 27
		465		
		1205		
		1446		
		964		
		1120.65		

Preliminary Reduction

x − 3	− 1024	− 2x		+ 2112
+ 1383	− 3481	= − 2098	− 13 = − 2111	= + 1
− 1240	− 839	= − 2079	− 26 = − 2105	= + 7
+ 317	− 2387	= − 2070	− 51 = − 2121	= − 9
− 668	− 1388	= − 2056	− 54 = − 2110	= + 2
16.2521	− 2124		− 32	= 16.2477

y − 7	+ 101x	+ 4		− 4346
+ 3631	+ 679	= + 4310	+ 34 = + 4344	= − 2
+ 3009	+ 1336	= + 4345	+ 8 = + 4353	= + 7
+ 1748	+ 2573	= + 4321	+ 23 = + 4344	= − 2
+ 1621	+ 2708	= + 4329	+ 14 = + 4343	= − 3
20.6186	+ 1641		+ 21	= 20.5503

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MC 1041

1913 Jan 7.

	x	y	R.A.	Decl
1	66.7172	34.1253	$13^h\ 01^m\ 38^s$	$-3^\circ\ 49'\ 56''$
2	13.2373	8.2236	13 05 08	−7 10 50
3	25.4780	23.4038	13 11 27	−5 11 51
4	26.8106	13.6038	13 12 12	−6 27 54
4	7224	7856	30 25	22 40 31
	1806	1959	13 07 36	−5 40 08
	31	22	2	+ 18 41
	1386	241	13 07 34	−5 21 27
		465		
		1205		
		1446		
		964		
		1120.65		

Preliminary Reduction.

$x-\xi$	-1024	$-2x$		$+2112$
$+19383-3481$	$=-2098$	-13	$=-2111$	$=+1$
$-1240-839$	$=-2079$	-26	$=-2105$	$=+7$
$+317-2387$	$=-2070$	-51	$=-2121$	$=-9$
$-668-1388$	$=-2056$	-54	$=-2110$	$=+2$
$16.2521-2124$		-32		$=16.2477$

$y-\eta$	$+1012x$	$+4$		-4346
$+3631+679$	$=+4310$	$+34$	$=+4344$	$=-2$
$+3009+1336$	$=+4345$	$+8$	$=+4353$	$=+7$
$+1748+2573$	$=+4321$	$+23$	$=+4344$	$=-2$
$+1621+2708$	$=+4329$	$+14$	$=+4343$	$=-3$
$8186+1641$		$+21$		$=20.5502$

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MC1041

1913 Aug. 26. 7

Plate Constants.

Conditional Equations.

6.724 34.13 +1 = +1		-2
13.234 8.22 +1 = +7		+7
25.48 + 23.40 +1 = -9		-2
26.81 + 13.60 +1 = +2		-3

Mean Equations.

a	b	c		
+ 9.98	+21.18	+1 = +4.00		+2.50
+26.14	+18.50	+1 = -3.50		-2.50
+20.02	+10.91	+1 = +4.50		+2.00
+16.10	+28.76	+1 = -4.00		-2.00
-16.16	+ 2.68	= +7.50		+5.00
+ 3.92	-17.85	= +8.50		+4.00
- 3.92	+ 0.65	= +1.82		+1.21
	-17.20	= +10.32		+5.21
		b = -0.60		-0.30
-16.16 = +7.50	+ 1.61	= +9.11	= +5.00	+0.81 = +5.81
		a = -0.56		-0.36

+4.0	-3.5	+4.5	-4.0	+2.5	-2.5	+2.0	-2.0
+5.6	+14.7	+11.3	+ 9.1	+3.6	+9.4	+7.2	+5.8
+2.7	+11.1	+ 6.6	+17.3	+6.4	+5.6	+3.3	+8.7
+22.3	+22.3	+22.4	+22.4	+12.5	+12.5	+12.5	+12.5

c for (x - 3)

Residuals		c	o	o - c
- 4	-20 +22	= -2	+1	+3
- 7	- 5 +22	= +10	+7	-3
- 14	- 1.4 +22	= -6	-9	-3
- 15	- 8 +22	= -1	+2	+3
- 2	-10 +12	= 0	-2	-2
- 5	- 2 +12	= +5	+7	+2
- 9	- 7 +12	= -4	-2	+2
-10	- 4 +12	= -2	-3	-1

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Plate Constants.

Conditional Equations.

6.772 + 34.133 + 1 = +1		−2
13.234 + 8.272 + 1 = +7		+7
25.48 + 23.40 + 1 = −9		−2
26.81 + 13.60 + 1 = +2		−3

Mean Equations

a	b	c		
+ 9.98	+ 21.18	+ 1 = + 4.00		+ 2.50
+ 26.14	+ 18.50	+ 1 = − 3.50		− 2.50
+ 20.02	+ 10.91	+ 1 = + 4.50		+ 2.00
+ 16.10	+ 28.76	+ 1 = − 4.00		− 2.00
− 16.16	+ 2.68	= + 7.50		+ 5.00
+ 3.92	− 17.85	= + 8.50		+ 4.00
− 3.92	+ 0.65	= + 1.82		+ 1.21
	− 17.20	= + 0.32		+ 5.21
		b = − 0.60		− 0.30
− 16.16	= + 7.50 +	1.61 = + 9.11		= + 5.00 + 0.81 = + 5.81
		a = − 0.56		− 0.36

+ 4.0	− 3.5	+ 4.5	− 4.0	+ 2.5	− 2.5	+ 2.0	− 2.0
+ 15.6	+ 14.7	+ 11.3	+ 9.1	+ 3.6	+ 9.4	+ 7.2	+ 5.8
+ 2.7	+ 11.1	+ 6.6	+ 17.3	+ 6.4	+ 5.6	+ 3.3	+ 8.7
+22.3	+22.3	+22.4	+22.4	+12.5	+12.5	+12.5	+12.5

c bar (x − 5)

Residuals	c	o	o − c
− 4 − 20	+ 22 = − 2	+ 1	+ 3
− 7 − 45	+ 22 = + 10	+ 7	− 3
− 14 − 14	+ 22 = − 6	− 9	− 3
− 13 − 8	+ 22 = − 1	+ 2	+ 3
− 2 − 10	+ 12 = 0	− 2	− 2
− 5 − 2	+ 12 = + 5	+ 7	+ 2
− 9 − 7	+ 12 = − 4	− 2	+ 2
− 10 − 4	+ 12 = − 2	− 3	− 1

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Times Etc.

Exposures Stars 1911 Apr. 12	12^h	50^m		−	12^h	59^m
" moon	12	54	31.2	−	12	54 31.4
clock fast		2	49.1			
H. Sid. T.	12	51	42.2			
H. Long.	4	44	31.05			
G. S. T.	17	36	13.25			
Sid. T. M. noon	1	18	16.64			
Interval	16	17	56.61			
Reduction		2	40.21			
G. M. T.	16	15	16.40			

	R.A.			Decl.		
From Am. Ephem.						
moon 16^h	13^h	06^m	$00^s.85$	$-4°$	$48'$	$12''.8$
motion in 1^m = $1^s.8611$					14.347	
" " $15^m.273$ =			+28.42		− 3	39.1
Tabular place	13^h	06^m	$29^s.27$	$-4°$	$51'$	$51''.9$

Moon's parallax	55'	29".0
" semidiam.	15'	08.7

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Pt.	Pos. ∠	Resid.
10	219°.4	+16
9	245.5	−77
8	270.0	+21
7	275.3	+87
6	306.8	+2
5	320.5	−47
4	352.7	−135
3	0.0	+92
2	22.3	+74
1	53.2	−34

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Moon's Center

	x	x − X₀	Δx	(x−X₀)²	(x−X₀)²+(y−Y₀)²	O − C
1	17.8232	+ 1.5703	− 0	2.4658	3.8615	− 76
2	17.0000	+ 0.7471	− 1	0.5580	3.8733	+ 42
3	16.2529	0.0000	− 1	0.0000	3.8762	+ 71
4	16.0000	− 0.2529	− 1	0.0640	3.8536	− 155
5	15.0000	− 1.2529	− 0	1.5698	3.8647	− 44
6	14.6798	− 1.5731	− 0	2.4746	3.8703	+ 12
7	14.2914	− 1.9615	− 0	3.8474	3.8802	+ 111
8	14.2847	− 1.9682	0	3.8738	3.8738	+ 47
9	14.4660	− 1.7869	+ 0	3.1930	3.8643	− 48
10	15.0000	− 1.2529	+ 0	1.5698	3.8732	+ 41
				mean	3.8691	+ 1

	y	y − Y₀	Δy	(y−Y₀)²
1	22.0000	+ 1.1810	+ 4	1.3957
2	22.6392	+ 1.8202	+ 6	3.3153
3	22.7872	+ 1.9682	+ 6	3.8762
4	22.7651	+ 1.9461	+ 6	3.7896
5	22.3334	+ 1.5144	+ 5	2.2949
6	22.0000	+ 1.1810	+ 4	1.3957
7	21.0000	+ 0.1810	+ 1	0.0328
8	20.8190	0.0000	0	0.0000
9	20.0000	− 0.8190	− 3	0.6713
10	19.3018	− 1.5172	− 5	2.3034

Approximate Center

x = 15.0 y = 22.3834
19.3018
41.6852
mean Y = 20.8176
max Y = 22.7872
R = 1.9696
min X = 14.2847
mean X = 16.2543

y = 22.0 x = 17.8232
14.6798
32.5030
mean X = 16.2515
X-min = 14.2847
R = 1.9668
max Y = 22.7872
mean Y = 20.8204

X₀ = 16.2529
Y₀ = 20.8190

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NGC 1981 1913 Feb. 7.

Provisional Center

	x	x − X₀	Δ	(x − X₀)²	(x − X₀)² + (y − Y₀)²	O − C
1	17.8232	+ 1.5703	+ 8	2.4658	3.8615	− 76
2	17.6000	+ 0.7471	− 1	0.5580	3.8733	+ 42
3	16.2529	0.0000	+ 1	0.0000	3.8764	+ 71
4	16.0000	− 0.2529	+ 1	0.0640	3.8534	− 155
5	15.0000	− 1.2529	− 0	1.5698	3.8647	− 44
6	14.6798	− 1.5731	− 0	2.4746	3.8703	+ 12
7	14.2914	− 1.9615	− 0	3.8474	3.8802	+ 111
8	14.2847	− 1.9682	− 0	3.8738	3.8738	+ 47
9	14.4660	− 1.7869	− 0	2.1930	3.8643	− 48
10	15.0000	− 1.2529	+ 0	1.5698	3.8732	+ 41

mean 3.8691

	y	y − Y₀	Δ	(y − Y₀)²
1	22.4000	+ 1.1810	+ 4	1.3957
2	22.6392	+ 1.8202	+ 6	3.3153
3	22.7872	+ 1.9682	+ 6	3.8726
4	22.7651	+ 1.9461	+ 6	3.7896
5	22.3334	+ 1.5144	+ 5	2.2949
6	22.0000	+ 1.1810	+ 4	1.3957
7	21.0000	+ 0.1810	+ 1	0.0328
8	20.8190	0.0000	0	0.0000
9	20.0000	− 0.8190	− 3	0.6713
10	19.3018	− 1.5172	− 5	2.3024

Approximate Center

x = 15.0 y = 22.3334
19.3018
41.6352
mean Y = 20.8176
mean y = 22.7872
K = 1.9696
mean X = 14.2847
mean X = 16.2543

y = 22.0 x = 17.8232
14.6798
32.5030
mean X = 16.2515
X − mean = 14.2847
K = 1.9668
mean y = 22.7872
mean Y = 20.8204

X₀ = 16.2529
Y₀ = 20.8190

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Formation of Normals.

No.	at	an	bw
1	+ 1.85	− 119.2	− 89.6
2	+ 1.36	+ 31.5	+ 76.5
3	0.00	0.0	+ 139.8
4	− 0.49	+ 38.8	− 302.0
5	− 1.89	+ 55.0	− 66.5
6	− 1.85	− 18.8	+ 14.2
7	− 0.35	− 217.6	+ 20.0
8	0.00	− 92.5	0.0
9	+ 1.47	+ 86.0	+ 39.4
10	+ 1.90	− 51.3	− 62.4
	+ 2.00	− 288.1	− 230.6

[aa] = +19.62 [bb] = +19.07

[ac] = −7.72 [bc] = +7.45

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Moon's Center.

Conditional Equations.

	a	b	o	c	o-c
1	+1.57	+1.18	+c = -76	-26 - 9 - 7 = -42	-34
2	+0.75	+1.82	+c = +42	-12 - 13 - 7 = -32	+74
3	0.00	+1.97	+c = +71	0 - 14 - 7 = -21	+92
4	-0.25	+1.95	+c = -155	+4 - 14 - 7 = -17	-138
5	-1.25	+1.51	+c = -44	+21 - 11 - 7 = +3	-47
6	-1.57	+1.18	+c = +12	+26 - 9 - 7 = +10	+2
7	-1.96	+0.18	+c = +111	+32 - 1 - 7 = +24	+87
8	-1.97	0.00	+c = +47	+33 0 - 7 = +26	+21
9	-1.79	-0.82	+c = -48	+30 + 6 - 7 = +29	-77
10	-1.25	-1.52	+c = +41	+21 + 11 - 7 = +25	+16

-296 +292

Average (O-C) = 59

Normal Equations.

+19.62 + 2.00 - 7.72 = -288
+ 2.00 + 19.07 + 7.45 = -231
- 7.72 + 7.45 + 10.00 = +1

$\frac{\Delta a}{\Delta c} = +0.434$

- 2.00 - 0.20 + 0.79 = +29
+ 7.72 + 0.79 - 3.04 = -113

+1887 + 8.24 = -202
+ 8.24 + 6.96 = -112

$\frac{\Delta b}{\Delta c} = -0.437$

- 824 - 3.60 = +88
+ 3.36 = -24

c = -7

- 925 - 8.24 = +132
+ 9.62 = -70

b = -7+

+ 2.07 - 2.00 - 2.68 = -0
+19.76 - 19.07 - 25.60 = -3

+21.69 - 10.40 = -288
+21.76 - 18.15 = -234

-12.41 + 10.40 = +134
+ 9.28 = -154

a = -17-

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Momo Centr.

Conditional Equations.

	a	b	o	c	o-c
1	+1.57	+1.18	-76	-26 - 9 - 7 : -42	-34
2	+0.75	+1.82	+42	-12 - 13 - 7 : -32	+74
3	0.00	+1.97	+71	0 - 14 - 7 : -21	+92
4	-0.25	+1.95	-155	+4 - 14 - 7 : -17	-138
5	-1.25	+1.51	-44	+21 - 11 - 7 : +3	-47
6	-1.57	+1.18	+12	+26 - 9 - 7 : +10	+2
7	-1.96	+0.18	+111	+32 - 1 - 7 : +24	+87
8	-1.97	0.00	+47	+33 0 - 7 : +26	+21
9	-1.79	-0.82	-48	+30 6 - 7 : +29	-77
10	-1.25	+1.52	+91	+21 +11 - 7 : +25	+16

-496 +292

average (o-c) 59

Normal equations.

+19.62 + 2.00 - 7.72 = -288
+ 2.00 + 19.07 + 7.45 = -231
- 7.72 + 7.45 + 10.00 = +1

- 2.00 - 0.20 + 0.79 = +29
+ 7.72 + 0.79 - 3.04 = -113

+18.87 + 8.24 = -202
+ 8.24 + 6.96 = -112

- 8.24 - 3.60 = +88
+ 3.56 = -24 c = -7

- 9.25 - 8.24 = +132
+ 9.62 = -70 b = -7

+ 2.07 - 2.00 - 2.68 = -0
+19.76 - 19.07 - 25.60 = -3

+2169 - 10.40 = -288
+2176 - 18.15 = -234

-12.41 + 10.40 = +139
+ 9.28 = -154 a = -17

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Moon's Mean Position (1911.0)

$X_0 = 16.2529$ $Y_0 = 20.8190$

$\frac{1}{2}a = -8$ $\frac{1}{2}b = -4$

16.2521 20.8186

From Preliminary Constants $X = 16.2477$ $Y = 20.5502$

" Plate Constants $ax: -9$ -6

$by: -12$ -6

$c: +22$ $+12$

$X = 16.2478$

$\xi = -1.7522$

$\log \xi = 0.24358_n$

$\cos\delta = 9.99796$

const. 8.50724

$(\alpha - A) = 1.73838_m$

$\alpha - A = -\ 54.75$

$A = 13\ 07\ 34$

$\alpha_0 = 13^h\ 06^m\ 39^s.25$

Red. $= +\ 1.35$

$\alpha' = 13\ 06\ 40.60$

$\eta = -1.4498$

$\log \tan\delta = 8.99155_n$

$\xi^2 = 0.4871$

$\eta_1 = 6.5320_n$

$\eta_1 = -\ 3$

$\eta_0 = -1.4495$

$\log \eta_1 = 0.16122_n$

const. 7.33115

$(\delta - D) = 2.83007_n$

$\delta - D = -\ 11\ 16.2$

$D = -5\ 21\ 27$

$\delta_0 = -5\ 32\ 43.2$

Red. $= -\ 10.7$

$\delta' = -5\ 32\ 53.9$

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MG1041 1913 Feb. 26. 11

Moon's Mean Position (1911.0)

$X_0 = 16.2529$ $Y_0 = 20.8190$

$\frac{1}{2}a = -8$ $\frac{1}{2}b = -4$

16.2521 20.8186

From Preliminary Constants $X = 16.2477$ $Y = 20.5502$

∴ Plate Constants $ax: -9$ -6

$by: -12$ -6

$c: +22$ $+12$

$X = 16.2478$ ✓

$\xi = -1.7522$ ✓

$\log \xi = 0.24358$ n

$\cos\delta = 9.99796$ ✓

const 8.50724

$(\alpha - A)$ 1.73838 n ✓

$\alpha - A = -54.75$ ✓

$A = 13\ 07\ 34$ ✓

$\alpha_0 = 13^h\ 06^m\ 39^s.25$ ✓

Red n $+1.31$

α' $13\ 06\ 40.60$

$\eta = -1.4498$ ✓

$\log \tan\delta = 8.9915$ n

$\delta^2 = 0.4871$ ✓

$\eta_1 = 6.5320$ n

$\eta_1 = -3$ ✓

$\eta_0 = -1.4495$

$\log \eta_1 = 0.1641227$ n

const 7.3311

$(\delta - D)$ 2.830072 n

$\delta - D = -11\ 16.2$

$D = -5\ 21\ 27$ ✓

$\delta_0 = -5\ 32\ 43.2$ ✓

Red -1.07

$\delta' = -5\ 32\ 53.9$

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Red. ad. & app

$\delta = -5\ 33$

H+A	$5^h\ 31^m$	$= 82^\circ 45'$	
H	$16\ 24$		log cos δ = 9.9980
α	$= 13^h\ 07^m$		∴ L 0.8771 n
G	$18\ 26$		∴ (L) 0.8751 n
G+A	$7\ 33$	$= 113^\circ 15'$	

log cos (H+α) = 9.5963 n
∴ δ 0.8734
∴ sin ∴ 9.9632
∴ tan δ = 8.9675 n
∴ i, ∴ 8.8239

log sin δ = 8.9855 n
∴ log (H+α) = 9.1011
∴ L 12789
∴ sin ∴ 9.9965
∴ sec δ = 0.0020
∴ i, ∴ 8.8239

log (δ') 04697 n
∴ (δ) 86480 n

log (L') 9.3655 n
∴ L 0.1013

t	=	+0.13	q' = −2.97
δ	=	−0.04	α' = −0.23
Σ	=	+1.26	i = −7.50
		+1.53	
Red α =		+1.35	−10.70

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Red. ad. & app.

$\delta = -5^\circ\ 33'$

H + A	5^h	31^m	$= 82^\circ 45'$
H	16^h	24^m	
α	13^h	07^m	
G	18^h	26^m	
G + q	7^h	33^m	$= 113^\circ 15'$

log cos δ	=	9.9980	
" L		0.8771	ω
" (L)		0.8751	n

log cos (G + q)	:	9.5963	n
g		0.8734	
sin "	:	9.9632	
tan δ	=	8.9675	n
i		8.8237	

log sin δ	=	8.9815	-S
" cos (H + α)	=	9.1011	
" h		1.2789	
" sin "	:	9.9965	-
" sec δ	=	0.0020	
i		8.8239	

log (g')	:	0.4697	n
(g')		2.9480	-

log (h')		9.3655	-
" h		0.1013	

f	=	+0.13
g	=	−0.04
h	=	+1.26
		+1.35

g'	=	−2.97
h'	=	−0.23
i	=	−7.50
		−10.70

Red. to α = +1.35 −10.70

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1041 Lunar Parallax.

α' = 13h 06m 40.60s
θ = 12 51 42.2
$\theta - \alpha$ = − 14 58.4
= − 3° 44′ 36″
− 1 21
− 3 43 15

9.95727
6.00000
.000091
9.95828

δ = 42 14 44
− 5 32 54.9
47 47 38

9.82640
8.20787
9.86966
.017243
.807636

$\delta - \delta'$ = + 40 59.2

δ = − 4 51 54.7

Am Eph δ = −4 51 51.9
$\delta - c$ − 2.8
Corr to stand radius = 0.7
− 3.5

δ = − 5° 32′ 53.9″
Π = 55′ 29.0″

9.86913
8.20787
8.81483
.000157
6.89340

$\alpha - \alpha'$ = −2′ 41.37
− 10.76

α = 13 06 29.84
γ = 13 06 29.27
+ 0.57
+ 005
+ 0.62

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Lunar Parallax.

α' = 13h 06m 40.60s

$\odot$ = 12 51 42.2

$\odot - \alpha$ = − 14 58.4

= − 3° 46′ 36″

− 1 21

− 3 45 15

9.95727
0.00000
000093
995820

δ = 42 14 48.5

− 5 32 53.9

97 47 42

9.82640
8.20787
9.86967
017242
807636

$\delta - \delta'$ = +40 59.2

δ = − 4 51 53.7

Am Eph δ = −4 51 53.9

$\odot - \zeta$ − 2.8

Corr to stand radius − 0.7

− 3.5

δ = 5° 32′ 53.9

π = 5′ 5″ 29″.0

9.86913
8.20787
8.81963 ~
000157
6.89340 ~

$\alpha - \alpha'$ = −2′ 41.37

− 10.76

α = 06 29.8 57

α' = 13 06 29.27

+ 048
57

+ 005

+ 0.62

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NAC 1042 1913 Jan 8. 16

Comp. Stars - Standard Coordinates.

	1h				2h			
x	13	01	58.20		13	05	08.52	
A	13	08	54.		13	08	54	
x-A		− 7	15.80			− 3	45.48	
sin(x-A)		−	435.73			−	225.47	
log		2.639222n				2.353074n		
" cosδ		9.999903				9.996588		
" ξ₀		1.145499n				0.856892n		
ξ₀		−13.9794				− 7.1927		
ξ₁		−	123			−	37	
ξ		4.0083				10.8036		
x		4.0866				10.6936		
x-ξ		+	763			−	1100	

δ	−5°	49′	56.5″		−7°	10′	50.4″	
D	−5	33	00		−5	33	00	
δ-D	+1	43	035		−1	37	504	
tan(δ-D)	+		6185.4		−		5872.0	
log		3.791377				3.768799n		
" η₀		1.122522				1.099944n		
" Tanδ		8.82260n				9.10003n		
" ξ²		2.29107				1.71387		
" η₁		8.17044n				7.86755n		
η₀		+13.25944				−12.58744		
η₁		−	148			−	74	
η		35.24466				9.40527		
ψ		35.32788				9.44966		
ψ-η		+	832			+	444	

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NAC 1642 — 1913 Jan 8

Comp Stars — Standard Coordinates

x	13h 01m 58.20s	13h 05m 08.52s
A	13 08 54.	13 08 54
	− 7 1580	− 3 45.48
(x−A)	− 43.573	− 225.47
	2.639226	2.353074
cos δ	9.999035	9.999658
ξ₀	1.14549 n	0.856894
ξ₀	−13.9794	−7.1927
ξ₁	− 123	− 37
ξ	4.0083	1.08036
ξ²	4.0866	1.16936
x − 3	+ 7'63	− 1100

δ	−3° 49′ 56.5″	−7° 10′ 50.4″
D	−5 33 00	−5 33 00
D	+1 43 03.5	−1 37 50.4
(δ−D)	+ 6185.4	− 5872.0
	3.791371	3.768791 n
η₀	1.12252	1.09994 n
cos δ	8.82600 n	9.10053 n
ξ²	2.2910	1.7138
η²	8.17044 n	7.86753 n
η₀	+13.25944	−12.58744
η₁	− 148	− 74
η	35.24476	9.40528
η²	35.32788	9.44496
η − η	+ 832	+ 444

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MC1042 1913 Jan 8. 17

Comp. Stars - Stand. Words.

	3	4
α	$13^h\ 11^m\ 26^s.51$	$13^h\ 12^m\ 11^s.77$
A	13 08 54	13 08 54.
α − A	+ 2 32.51	+ 3 17.77
sin(α − A)	+ 152.51	+ 197.76
log ..	2.18330	2.29614
.. cos δ	9.99821	9.99723
.. Ξ_0	0.68875	0.80061
Ξ_0	+48837	+63184
Ξ_1	+ 3	+ 13
Ξ	22.88409	24.31197
χ	22848	24507
χ − Ξ	+ 8	− 690

δ	−5° 11′ 51″.0	−6° 27′ 54″.2
D	−5 33 00.0	−5 33 00
δ − D	+ 21 09.0	− 54 54.2
tan(δ − D)	+ 1269.0	− 3294.5
log ..	3.10346	3.51779 m
.. η_0	0.43461	0.84894 m
.. tan δ	8.95589 m	9.05433 m
Ξ_0^2	1.37755	1.60122
η_1	7.38898 m	7.70899 m
η_0	+2.72033	−7.06222
η_1	− 25	− 51
η	24.71178	14.93277
y	24658	14.87666
y − η	− 520	− 561

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Comparison Star - Standard Worlds

	3	4
A	$13^h\ 11^m\ 26^s.51$	$13^h\ 12^m\ 11^s.77$
A	13 08 54	13 08 54.
x - A	+ 2 32.51	+ 3 17.77
sin(x-A)	+ 152.51	+ 197.76
log..	2.183330	2.296144
δ cosδ	9.919821	9.919723
log	0.688751	0.800061
	+4883.7	+6318.4
	+ 3	+ 13
	24.8840	243197
	22.8848	242507
x - 3	+ 1 8.	- 690

δ	$-5^\circ\ 11'\ 51''.0$	$-6^\circ\ 27'\ 54''.2$
D	− 5 33 00.0	− 5 33 00
δ - D	+ 21 09.0	− 54 54.2
tan(δ-D)	+ 1269.0	− 3294.5
log..	3.103461	3.517794
η_0	0.434761	0.548944
tanδ	9.958971	9.054331
ξ_0^2	1.38775	1.60122
η'	1.38988	7.70899
η_0	+2.72033	−7.06225
η_1	− 25	− 51
η	24.71758	14.93275
η_2	24.66588	14.87666
$\eta_2 - \eta$	− 522	− 561

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MC1042 1912 Dec. 12. 18

Comparison Stars - Measures. Reseau revised on plate

	4					×			plate turned 90° & measure
1/		d		N		d		N	
4.1	18900		84.80 (computed)		18938		14548		
35.4	15618	25	11760	60	9800	10	13680	81	
~~10.7~~	16		55		06		74		
	05		8485		42		50		
	35.3282		.3275		4.0863		.0870		
2/									
10.7	18508		15697		18211		15305		
9.5	14017	15	10200	99	15139	41	837	167	
	19		99		45		70		
	18		08		07		02		
	9.4495		.4496		10.6938		.6934		
3/									
27.9	16922		17990		16388		18472		
24.7	10266	72	14649	41	15227	29	9638	30	
	69		45		29		32		
	36		95		04		92		
	24.6662		.6653		22.8838		.8857		
4/									
24.3	18500		15665		15250		17194		
14.9	9730	39	14426	24	7750	62	14680	88	
	31		26		55		86		
	06		75		59		17		
	14.8772		.8759		24.2499		.2515		

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1911phae.proj.1

MC 1072

Comparison star - reseau

Reseau reversed on plate

1	a	n	d	N
4.1	18900	8480 (computed)	18938	14548
8.4	15618 25	11760 60	18800 10	13680 81
	16	55	06	74
	05	8485	42	50
	35.3262	.3275	4.0863	.0870
2/				
10.7	18508	15697	18211	15305
8.5	14017 15	10209 99	15137 41	837167
	19	99	45	70
	14	08	07	02
	9.4495	.4496	10.6935	.6934
3/				
23.1	16922	17990	16388	18472
24.1	10666 72	14649 141	15227 29	9638 30
	69	45	29	32
	36	995	04	92
	24.6662	.6653	22.8838	.8857
4/	18500	15665	15250	17194
24.3	9730 39	14466 24	7750 62	146980 88
4.9	31	26	55	86
	06	75	59	17
	14.8772	.8759	24.2499	.2515

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1911phae.proj.1

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1911phae.proj.1

MC 1042.

1912 December 12. 19.

known + measured.

Reseau reversed on plate

						x			
		y					d		N
1	15.5						18140		14787
	23.0						13830	39	9103
							30		9900
							41		03
							15.5693		.5695
2	15.0	16482		17369					
	23.4	12308	12	11581	80				
		01		83					
		00		90					
		23.4182		.4199					
3	14.1	16429		17385					
	23.6	10302	76	13539	40				
	y=	70		42					
	max	37		98					
		23.6151		.6150					
4	14.0	15480		16397					
	23.6	9400	04	12483	83				
		90		80					
		89		11					
		23.6087		.6077					
5	13.0	15655		16329					
	23.3	13152	53	8831	31				
		63		32					
		60		39					
		23.2500		.2494					
6	12.7						14661		16026
	23.0						11751	49	8914
							41		10
							59		33
							12.7087		.7123

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1911phae.proj.1

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1911phae.proj.1

MC 1042.

1912 December 12. 19.

	a	N	d	N
1			18140	14787
15.5			13830 34	9103 00
23.0			30	99
			41	03
			15.5693	.5695
2				
15.0	16482	17369		
23.4	13088 12	11581 80		
	01	83		
	00	90		
	23.4187	.4199		
3				
14.1	16429	17385		
23.6	10302 76	13539 40		
	70	42		
	37	98		
	23.6151	.6150		
4				
14.0	15480	16397		
23.60	9400 04	12485 83		
	90	89		
	89	11		
	23.6087	.6077		
5				
13.0	15655	16329		
23.2	13152 53	8831 31		
	68	32		
	60	39		
	23.2500	.2494		
6				
13.7			14661	16026
23.0			11751 49	8914 00
			41	10
			39	33
			12.7087	.7133

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MC1042. 1912 Dec. 12. 20.

Lehmann – Lucasius. Reseau reversed on plate

	a		N		
7					
12.2				18630	15955
22.0				10705 02	13892 90
				01	89
				43	69
				12.2063	.2068
8					
12.2				18643	14931
21.7				10409 17	13155 65
+ =				02	60
Prime				51	44
				12.1760	.1773
9					
12.3				17685	14878
21.0				10560 51	12029 16
				38	25
				99	00
				12.2855	.2861
10					
13.0	12852		9020 46		
20.0	12424 27		26		
	21		8615		
	20.0428		.0416		
11					
13.0				13340 48	10145
20.0				60	9450
					65 46
				12714	
				13.0635	.0691

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1911phae.proj.1

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1911phae.proj.1

MC 1048.

1912 Dec. 18. 20.

Wood — Measures. Research reversed on plate

	d	N
	18630	15955
	10705 02	13892 90
	01	89
	43	69
	12.2063	.2068
	18643	14931
	10409 17	13155 65
	02	60
	51	44
	12.1760	.1773
	17655	14878
	10560 51	12979 16
	38	25
	99	00
	12.2855	.2861
3.0	12552	90 20 46
2.0	12 42 9 27	26
	21	8615
	20.2428	.2416
	13340 48	10145
	60	9450
		65 46
	12714	
	13.0635	.0691

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	x	y
1	4.0866	35.3278
2	10.6936	94496
3	22.8848	24.6658
4	24.2507	14.8766
4	61.92	84.32
	15.48	21.08
	-18.	-22
	2.52	0.92
	31	465
	252	460
	756	552
	78.12	368
		427.80

mean R.A.
$13^h\ 07^m\ 36^s$
$+\quad 1\quad 18$
$13\ 08\ 54 - 4$

mean decl.
$-5^\circ\ 40'\ 08^s$
$+\quad 7\quad 08$
$-5\ 33\ 00$

Preliminary Reduction.

	x-3	-724	-x	+1788
1	+763	-2544 = -1781	-4 = -1785	= +3
2	-1100	-680 = -1780	-11 = -1791	= -3
3	+8	-1776 = -1768	-23 = -1791	= -3
4	-690	-1071 = -1761	-24 = -1785	= +3
moon	14 1425	-1559	-14	= 14.1646

	y-4	+74x	+44	-1279
1	+832	+302 = +1134	+142 = 1276	= -3
2	+444	+792 = +1236	+38 = 1274	= -5
3	-520	+1694 = +1174	+98 = 1272	= -7
4	-561	+1795 = +1234	+59 = 1293	= +14
moon	21 6471	+1046	+86	= 21.6324

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1911phae.proj.1

	x	y
1	4.0866	35.3278
2	10.6936	9.4496
3	22.8848	24.6658
4	24.2507	14.8766
	61.92	84.32
	15.48	21.08
	18.	22
	2.52	0.92
	31	46
	252	460
	756	552
	78.12	368
		427,80

Mean R.A.
$13^h\ 07^m\ 36^s$
$+\quad 1\quad 18$
$13\ 08\ 54$ +

Mean Decln.
$-5^\circ\ 40'\ 08''$
$+\quad 7\quad 08$
$-5\ 33\ 00$

Preliminary Reduction.

	x				y			
		-3	-727			-24		+1786
1	+	763	- 2544	= -1781	- 4		-1785	+ 3
2	-	1100	- 680	= -1780	-11		-1791	- 3
3	+	8	- 1776	= -1768	-23		-1791	- 3
4	-	690	- 1071	= -1761	-24		-1785	+ 3
mean		14 1425	- 1.59			-14		= 14.1640

	y	= η	+ 748			+ 44		-1279
1	+	832	+ 302	= +1134	+ 142	1276		- 3
2	+	444	+ 792	= +1236	+ 38	1274		- 5
3	-	520	+ 1694	= +1174	+ 98	1272		- 7
4	-	561	+ 1795	= +1234	+ 59	1293		+14
mean		21.6471	+ 1046			+ 66		21.6324

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MC1042 1913 Jan. 22. 22

Plate Constants.

Conditional Equations.

a	b	c		x − ξ		y − η
+ 4.09	+ 35.33	+ 1	=	+ 3		− 3
+ 10.69	+ 9.45	+ 1	=	− 3		− 5
+ 22.88	+ 24.67	+ 1	=	− 3		− 7
+ 24.25	+ 14.88	+ 1	=	+ 3		+ 14

+ 7.39	+ 22.39	+ 1	=	0	=	− 4.00
+ 23.57	+ 19.78	+ 1			=	+ 3.50
+ 17.47	+ 12.16	+ 1			=	+ 4.50
+ 13.48	+ 30.00	+ 1			=	− 5.00

− 16.18 + 2.61 = − 7.50

+ 3.99 − 17.84 = + 9.50

− 3.99 + 0.64 = − 1.85

− 17.20 b = + 7.65

b = − 0.44

− 16.18 a = − 7.50 + 1.16 = − 6.34

a = + 0.39

− 4.0	+ 3.5	+ 4.5	− 5.0
− 2.9	− 9.2	− 6.8	− 5.3
+ 9.9	+ 8.8	+ 5.4	+ 13.4
+ 3.0	+ 3.1	+ 3.1	+ 3.1

				C	O	O − C
+ ~~2~~	− 16	+ 3	=	− 11	− 3	+ 8
+ 4	− 4	+ 3	=	+ 3	− 5	− 8
+ 9	− 11	+ 3	=	+ 1	− 7	− 8
+ 10	− 7	+ 3	=	+ 6	+ 14	+ 8

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Plate Constants

Conditional Equations.

a	b	c			y − y
+ 4.09	+ 35.33	+ 1	=	+ 3	− 3
+ 10.69	+ 9.45	+ 1	=	− 3	− 5
+ 22.88	+ 24.67	+ 1	=	− 3	− 7
+ 24.25	+ 14.88	+ 1	=	+ 3	+ 14
+ 7.39	+ 22.39	+ 1	=	0	= − 4.00
+ 23.57	+ 19.78	+ 1			= + 3.50
+ 17.97	+ 12.16	+ 1			= + 4.50
+ 15.48	+ 30.00	+ 1			= − 5.00
− 16.18	+ 2.61				= − 7.50
+ 3.99	− 17.84				= + 9.50
− 3.99	+ 0.64				= − 1.85
	− 17.20 b				= + 7.65
					b = − 0.44
− 16.18 a	= − 7.50 + 1.16 = − 6.34				
					a = + 0.39

− 4.0	+ 3.5	+ 4.5	− 5.0
− 2.9	− 9.2	− 6.8	− 1.3
+ 9.9	+ 5.8	+ 5.4	+ 13.4
+ 3.0	+ 3.1	+ 3.1	+ 3.1

					c		o		o − c
+ 7	− 16	+ 1	=	− 11		− 3			+ 8
+ 4	− 4	+ 1	=	+ 3		− 5			− 8
+ 9	− 11	+ 1	=	+ 1		− 7			− 8
+ 10	− 7	+ 1	=	+ 6		+ 14			+ 8

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Times etc.

Exp. to Stars 1911 Apr. 12	13h	03m		−	13h	12m	
" " Moon	13	07	23.7	−	13	07	23.9
Clock fast		2	49.1				
M. Sid T.	13	04	34.7				
M. long.	4	44	31.05				
G. Sid T.	17	49	05.75				
Sid T. M. noon	1	18	16.64				
Interval	16	30	49.11				
Reduction		2	42.38				
G. M. T.	16	28	06.79				

From Nau. Alm.		R. A.			Decl.		
Moon 16h	13	06	00.85	−	4	48	12.8
Motion in 1m = 1.8614					14344		
" " − 28.113 =		+	52.32		−	6	43.3
Tabular place.	13	06	53.17		−4	54	56.1

Moon's parallax. 55′ 28.″8
" semidiam. 15 08.7

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1911phae..pro0.1

MC 1042

1913 Feb. 6. 23

Times etc.

Sup. T. Star 1911 Apr. 12 13h 03m — 13 12
Moon 13 07 23.7 — 13 07 23.9
Clock fast 2 49.1

H. Sid T 13 04 34.7
19 Hyd 4 44 31 05
ν Sud 17 49 05 75
Sid T. Merid 1 18 16.64
Interval 16 30 49.11
Correction 2 42.98
G.M.T. 16 28 06.74

From Nav. Calm. R.A. Decl.
Moon 16h 13 06 00.85 −4 48 12.8
Motion in 1m 1.862 14.344
" 28.113 5232 − 6 43.1
Tabular place 13 06 53.17 −4 54 55.9

Moon parallax 55′ 28.8″
" semidiam 15 06.1

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Pt.	Pos. L.	Resid
11	213°.0	-6
10	215.6	+92
9	250.8	-70
8	270.0	-84
7	280.3	-8
6	313.2	+89
5	324.5	+22
4	355.9	-42
3	0.0	+19
2	25.7	+39
1	46.3	-56

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MC1042 1913 Feb 7.

Moon's Center.

	x	x − X₀	Δx	(x−X)²	(x−X₀)²+(y−Y₀)²	O−C
1	15.5694	+1.4266	0	2.0352	3.8620	− 94
2	15.0000	+0.8572		0.7348	3.8705	− 11
3	14.1428	0.0000		0.0000	3.8683	− 33
4	14.0000	−0.1428		0.0204	3.8624	− 92
5	13.0000	−1.1428		1.3060	3.8705	− 11
6	12.7105	−1.4323		2.0515	3.8783	+ 67
7	12.2066	−1.9362		3.7489	3.8723	+ 7
8	12.1766	−1.9662		3.8660	3.8660	− 56
9	12.2858	−1.8570		3.4484	3.8696	− 20
10	13.0000	−1.1428		1.3060	3.8887	+ 171
11	13.0663	−1.0765		1.1588	3.8790	+ 74
					mean 3.8716	+2

	y	y − Y₀	Δy	(y−Y₀)²
1	23.0000	+1.3512	+4	1.8268
2	23.4190	+1.7702	+6	3.1335
3	23.6150	+1.9662	+6	3.8683
4	23.6083	+1.9595	+6	3.8420
5	23.2497	+1.6009	+5	2.5645
6	23.0000	+1.3512	+4	1.8268
7	22.0000	+0.3512	+1	0.1234
8	21.6488	0.0000	0	0.0000
9	21.0000	−0.6488	−2	0.4212
10	20.0422	−1.6066	−5	2.5827
11	20.0000	−1.6488	−5	2.7202

Approximate Center.

x = 13.0 y = 23.2497
20.0422
43.2919
Mean y = 21.6460
y = max = 23.6150
R = 1.9690
x = min = 12.1766
X₀ = 14.1456

y = 23.0 x = 15.5694
= 12.7105
28.2799
Mean x = 14.1400
x = min = 12.1766
R = 1.9634
max y = 23.6150
Y₀ = 21.6516

Assume { X₀ = 14.1428
Y₀ = 21.6488

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MC 1042 1913 Feb 7.

Moon's Center.

	x	$x - x_0$	Δx	$(x-x_0)^2$	$(r-\delta)\cdot\Delta$	O - C
1	15.5694	+1.4266	0	2.0352	3.8620	- 94
2	15.0000	+0.8572		0.7348	3.8705	- 11
3	14.1428	0.0000		0.0000	3.8683	- 33
4	14.0000	-0.1428		0.0204	3.8624	- 92
5	13.0000	-1.1428		1.3060	3.8705	- 11
6	12.7105	-1.4323		2.0518	3.8783	+ 67
7	12.2066	-1.9362		3.7489	3.8723	+ 7
8	12.1766	-1.9662		3.8640	3.8640	- 56
9	12.2858	-1.8570		3.4484	3.8696	- 20
10	13.0000	-1.1428		1.3060	3.8887	+ 171
11	13.0663	-1.0765		1.1588	3.8790	+ 74
					3.8716	+2

	y	$y - y_0$	Δy	$(y-y_0)^2$
1	23.0000	+1.3512	+4	1.8268
2	23.4190	+1.7702	+6	3.1335
3	23.6150	+1.9662	+6	3.8683
4	23.6083	+1.9595	+6	3.8420
5	23.2497	+1.6009	+5	2.5645
6	23.0000	+1.3512	+4	1.8268
7	22.0000	+0.3512	+1	0.1234
8	21.6488	0.0000	0	0.0000
9	21.0000	-0.6488	-2	0.4212
10	20.0422	-1.6066	-5	2.5827
11	20.0000	-1.6488	-5	2.7202

Approximate Center.

x = 13.0 y = 23.2497
20.0422
43.2919
Mean y = 21.6460
y min = 23.6150
R = 1.7690
x min = 12.1766
x₀ = 14.1456

y = 23.0 x = 13.5694
12.7105
26.2799
mean x = 13.1400
x min = 12.1766
R = 1.9634
mean y = 23.6150
y₀ = 21.6516

Assume { X_0 = 14.1428
Y_0 = 21.6488

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Nº	a_t	a_m	b_m
1	+ 1.93	− 134.0	− 127.0
2	+ 1,52	− 9,5	− 19,5
3	0,00	0 0	− 65 0
4	− 0,27	+ 12,9	− 180 3
5	− 1,82	+ 12,5	− 17,6
6	− 1,93	− 95,6	+ 90,5
7	− 0,68	− 13,6	+ 2,4
8	0,00	+ 110,0	0,0
9	+ 1,22	+ 37,2	+ 13,0
10	+ 1 83	− 199 8	− 276,0
11	+ 1,78	− 80 0	− 122,0
	+ 3,58	− 354 9	− 701,5

$[aa] = +19.68$ $[bb] = +22.91$

$[ac] = -8.41$ $[bc] = +6.44$ $[cm] =$

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MC1042 1913 Feb 7. 25

Center of Mirror

Conditional Equations

	a	b	c	O		c	O − C
1	+1.43	+1.35	+1	= −94	−	8 − 47 + 17	= −38	−56
2	+0.86	+1.77	+1	= −11	−	5 − 62 + 17	= −50	+39
3	0.00	+1.97	+1	= −33		0 − 69 + 17	= −52	+19
4	−0.14	+1.96	+1	= −92	+	1 − 68 + 17	= −50	−42
5	−1.14	+1.60	+1	= −11	+	6 − 56 + 17	= −33	+22
6	−1.43	+1.35	+1	= +67	+	8 − 47 + 17	= −22	+89
7	−1.94	+0.35	+1	= + 7	+	10 − 12 + 17	= +15	−8
8	−1.97	0.00	+1	= −56	+	11 − 0 + 17	= +28	−84
9	−1.86	−0.65	+1	= −20	+	10 + 23 + 17	= +50	−70
10	−1.14	−1.61	+1	= +171	+	6 + 56 + 17	= +79	+92
11	−1.08	−1.65	+1	= +74	+	6 + 57 + 17	= +80	−6

−266 + 261

Average O − C = 48

Normal Equations

a	b	c	
+19.68	+ 3.58	− 8.41	= −355
+ 3.58	+ 22.91	+ 6.44	= −702
− 8.41	+ 6.44	+ 11.00	= + 2
− 3.58	− 0.65	+ 1.53	= + 65
+ 8.41	+ 1.53	− 3.60	= − 152
	+ 22.26	+ 7.97	= −637
	+ 7.97	+ 7.40	= −150
	− 7.97	− 2.86	= + 228
		+ 4.54	= + 78
	− 8.60	− 7.97	= + 162
	+ 13.66		= −475
+ 4.68	− 3.58	− 5.56	= − 1
+29.95	−22.91	− 39.20	= − 7
+24.36		− 13.97	= −356
+33.53		− 32.76	= −709
−14.28		+ 13.97	= +302
+10.08			= − 54

$\frac{\Delta a}{\Delta c} = +0.492$

$\frac{\Delta b}{\Delta c} = -0.358$

c = +17

b = −35

a = −51

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MC1042 1913 Feb. 7. 25

Center of Moran

Conditional Equations

	a	b	c	O		c	O−C
1	+1.43	+1.35	+1	= −94	− 8	−47 +17 = −38	−56
2	+0.86	+1.77	+1	= −11	− 5	−62 +17 = −50	+39
3	0.00	+1.97	+1	= −33	0	−69 +17 = −52	+19
4	−0.14	+1.96	+1	= −92	+ 1	−68 +17 = −50	−42
5	−1.14	+1.60	+1	= −11	+ 6	−56 +17 = −33	+22
6	−1.43	+1.35	+1	= +67	+ 8	−47 +17 = −22	+89
7	−1.94	+0.35	+1	= + 7	+ 10	−12 +17 = +15	− 8
8	−1.97	0.00	+1	= −56	+ 11	0 +17 = +28	−84
9	−1.86	−0.65	+1	= −20	+ 10	+23 +17 = +50	−70
10	−1.14	−1.61	+1	= +171	+ 6	+56 +17 = +79	+92
11	−1.08	−1.65	+1	= +74	+ 6	+57 +17 = +80	− 6

Normal Equations.

a	b	c	
+19.68	+ 3.58	− 8.41	= −355
+ 3.58	+22.91	+ 6.44	= −702
− 8.41	+ 6.44	+11.00	= + 2
− 3.58	− 0.65	+ 1.53	= + 65
+ 8.41	+ 1.53	− 3.60	= − 152
	+22.26	+ 7.97	= −637
	+ 7.97	+ 7.40	= −150
	− 7.97	− 2.86	= + 228
		+ 4.54	= + 78
	− 8.60	− 7.97	= +162
	+13.66		= −475
+ 4.68	− 3.58	− 5.56	= − 1
+29.95	−22.91	−59.20	= − 7
+24.36		−13.97	= −356
+33.53		−32.76	= −709
−14.28		+13.97	= +302
+10.08			= − 54

c = +17

b = −35

a = −51

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Mean positions of moon (1911.0)

$X_0 = 14.1428$ $Y_0 = 21.6488$

-3 -17

$X = 14.1425$ 21.6471

From preliminary Reduction. $X_0 = 14.1640$ $Y_0 = 21.6324$

plate constants a_x 0 $+6$

b_y -10

c $+3$

21.6323

$\xi_0 = -3.8360$ $\eta = -0.3677$

$\log \xi_0 = 0.58388_n$

$\log \delta = 9.99792$

corr = 8.50724_n 8.9346_n 8.9912

ξ^2 11678 1.1678

$\eta_0 = 7.1558_n$ 7.2124

η_1 -14 -16

$(\alpha - A) = 2.07872_n$

$(\alpha - A) = -119.87$

$= -159.87$

$\eta_0 = -0.3662$

$\log \eta_0 = 9.56360$

corr = 7.33115

$(\delta - D) = 2.23245_n$

$\delta - D = -166.9$

$= -246.9$

$A = 13\ 08\ 54$

$\alpha = 13\ 06\ 5413$

Red = $+1.35$

$\alpha' = 13\ 06\ 55.48$

$D = -5\ 33\ 00.0$

$\delta = -5\ 35\ 46.9$

Red = -10.7

$\delta = -5\ 35\ 57.6$

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1046 1913 Oct. 7. 26

Mean position of moon (1911.0)

$X_0 = 14.1428$ $Y_0 = 21.6488$

-3 -17

$x = 14.1425$ $y = 21.6471$

From previous Reduction: $x_0 = 14.1640$ $Y_0 = 21.6324$

Plate constants a_x $+6$

b_x -10

c $+3$

21.6323

$\xi_0 = -3.8360$ $\eta = -0.3677$

$\log r = 0.583888_n$

$\log \xi = 9.999792_n$

$\log \eta = 9.565660_n$

$(\alpha - A) = -119.27$

$-1\ 59.87$

$A = 13\ 08\ 54$

$\alpha = 13\ 06\ 54.13$

Ref. $+1.35$

$\alpha' = 13\ 06\ 55.48$

$\log \tan \delta$ 8.999472_n

11.678

$\eta_0 = 7.733115$

$M_1 = -16$

$\eta_0 = -0.3662$

$\log \eta_0 = 9.563609_n$

$(\delta - D) = 2.2.245$

$\delta - D = -166.9$

-246.9

$D = -5\ 33\ 00.0$

$\delta = -5\ 35\ 46.9$

Ref. -10.7

$\delta = -5\ 35\ 57.6$

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1042

Lunar Parallax

α' = 13h 06m 53.48s

δ = 13 04 34.7

$\delta - \alpha$ = − 2 20.8

= − 0° 35′ 12″

− 12

− 0 35

9.957727
0.000000
0.000002
9.957729

χ = 42 11 14

− 5 35 58

47 47 12

9.826400
8.207840
9.869591
0.017292
8.076791

$\delta - \delta'$ = +41 01.5

δ = − 4 54 56.1

Am Eph δ = − 4 54 56.1

O − C = − 0.0

Corr. to stand. radius 0

δ' = −5° 35′ 57.6″

π = 55 28.8

9.869913
8.207840
8.010266
0.001600
6.088833

$\alpha - \alpha'$ = − 0′ 25.31″

= − 0m 01.69s

α = 13 06 53.79

α = 13 06 53.17

+ 0.62

+ 0

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1042

Lunar Parallax

α' - 13h 06m 55s.48
δ - 13 04 34.7
$\alpha - \lambda$ - 2 20.8

- 0° 35' 12"

- 12

- 0 35

9.995727
0.000000
0.000002
995729

χ = 42 11 14

- 50 35 58

47 47 12

9.826400
8.207849
9.869559
017292
807675

$\delta - \delta'$ = +91 015

δ = -4 54 56.2

Ephem δ = -4 54 56.1

O-C = - 0.1

Corr. Hetland radius 0

δ' = -5° 35' 57.6

π - 55 28.8

9.869913
8.207849
8.010260
000160
6.048883

$\alpha - \alpha'$ = - 0' 25.31

- 0 01.69

α = 13 06 53.79

α = 13 06 53.17

+ 062

0

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	1	2
α	13 01 38.20	13 05 08.52
A	13 08 58	13 08 58
α-A	− 7 19.80	− 3 49.48
sin(α-A)	− 439.73	− 229.47
log	2.643194	2.360722
" cos δ	9.999903	9.999658
" S_0	1.149496	0.864554
β_0	−14.1077	−7.3205
β_1	− 127	− 38
β	3.8796	10.6757
χ	4.0823	10.5052
α-β	+2027	−1705

δ	−3 49 56.5	−7 10 50.4
D	−5 31 27	−5 31 27
δ-D	+1 41 30.5	−1 39 23.4
tan(δ-D)	+ 6092.3	− 5965.1
log "	3.784786	3.775622
" η_0	1.115933	1.106771
" tan δ	8.826040	9.100324
" S^2	22989	17291
" η_1	8.17833	7.88315
η_0	+13.05797	−12.78710
η_1	− 151	− 76
η	35.04466	9.20544
ψ	35.20600	9.27766
ψ-η	+1614	+722

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1911phae.pre3.1

	1	2
x	13 01 38.20	13 05 08.52
A	13 08 58	13 08 58
x-A	− 7 19.80	− 3 49.48
Sin(x-A)	− 439.73	− 229.47
log	2.643194	2.360728
cos δ	999903	999658
δ₀	1.14946 n	0.86454 n
3₀	−14.1077	−7.3205
3₁	− 127	− 38
δ	3.8796	10.6757
x	40823	10.5052
x-δ	+2027	−1705

δ	−3 49 56.5	−7 10 50.4
D	−5 31 27	−5 31 27
δ-D	+1 41 30.5	−1 39 23.4
tan(δ-D)	+ 6092.3	− 5965.1
log	3.784785	3.775621 n
cos D	1.11593	1.10677 n
tan δ	8.8260 n	9.1003 n
57	22989	17291
n₁	8.1783 n	7.8831 n
n₀	+13.0577	−12.7870
n₁	− 151	− 76
n	35.0446	9.2054
η	35.2060	9.2776
η-n	+1614	+722

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NIC 1043

1913 Jan. 8.

	3	4
α	13h 11m 26.51v	13h 12m 11.77v
A	13 08 58	13 08 58
α-A	+ 2 28.51v	+ 3 13.77v
Sin(α-A)	+ 148.51v	+ 193.76v
log "	2.17176	2.28726
" cos δ	9.99821v	9.99723v
" $\frac{3}{3}_0$	0.67721v	0.79173
$\frac{3}{3}_0$	+4.75557v	+6.19066v
$\frac{3}{3}_1$	+ 3v	+ 14v
$\frac{3}{3}'$	22.7560v	24.1920v
x	22.8048v	24.1020
x-$\frac{3}{3}$	+ 488v	- 900v

δ	-5° 11' 51".0	-6° 27' 54".2
D	-5 31 27	-5 31 27
δ-D	+ 19 36.0v	- 56 27.2
tan(δ-D)	+ 1176.0	- 3387.5
log "	3.07041v	3.52988m
" m_0	0.40156v	0.86103m
" tan δ	8.95889vm	9.0543m
" 5_0^2	1.3544	1.5834
" m_1	7.3667m	7.6911m
m_0	+2.52699v	-7.2615
m_1	- 23	- 49
y	24.5186	147356
$\frac{y}{y}$	24.4100	146076
y-y	- .1086	- .1280

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1913 Jan. 8.

MC 1043

	3	4
α	$13^h\ 11^m\ 26.51^s$	$13^h\ 12^m\ 11.77^s$
A	13 08 58	13 08 58
α-A	+ 2 28.51	+ 3 13.77
δ-A	+ 1 48 51	+ 1 93.76
	2.17176	2.28726
log	9.99821	9.99723
β_0	0.67721	0.79173
β_0	+4.7557	+6.1906
	+ 3	+ 14
β'	22.7560	24.1920
χ	22.8048	24.1020
$\chi - \beta$	+ 488	- 900

δ	$-5^\circ\ 11'\ 51.0''$	$-6^\circ\ 27'\ 54.2''$
D	-5 31 27	-5 31 27
δ-D	+ 19 36.0	- 56 27.2
Tan(δ-D)	+ 11760	- 5587.5
log	3.07041	3.52986n
η_0	04015.6	0.86103n
log	8.95689n	9.0543n
β^2	13544	1.5834
η'	7.3667n	7.6911n
η_0	+2.5209	-7.2415
η_1	- 23	- 49
η	24.5186	14.7356
η	24.4100	14.6076
η		
$\eta - \eta_1$	- 1086	-.1280

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Comparison Stars – Measures.

Reseau reversed on plate

		y		x	
1		d	N	d	N
4.0		16735	19359 (computed)	18715	17358
35.3		14665 70	11410 16	9520 30	16530 32
		71	17	22	28
		30	58	07	55
		35.2065	.2056	4.0818	.0828
2		14307	16502	15479	15898
10.5		11525 30	9267 61	10521 30	10843 38
9.4		34	61	22	36
		04	82	70	91
		9.2776	.2775	10.5049	.5055
3					
22.8		16730	15365	17420	18778
24.5		12629 35	9475 72	15462 65	10724 28
		31	77	61	28
		31	76	17	80
		24.4098	.4103	22.8044	.8053
4					
24.1		16889	16040	16928	17910
19.7		10800 01	12112 10	7930 31	16881 85
		98	10	30	81
		78	45	18	12
		14.6082	.6069	24.1011	.1028

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MC 1043. 1912 Dec 13.

Comparison Stars - Measures.

	d	N	d	N
1/				
4.0	16735	19359	18715	17358
35.3	14665 70	11410 16	95 20 30	16530 32
	71	17	22	28
	30	58	07	55
	35.2065	.2056	4.0818	.0828
	14307	16502	15479	15898
10.5	11525 30	9267 61	10521 30	10843 38
14	34	61	22	36
	04	82	70	91
	9.2776	.2775	10.5049	.5055
3/				
22.8	16730	15365	17420	18778
24.5	12629 35	9475 72	15462 65	10774 28
	31	77	61	28
	31	76	17	80
	24.4098	.4105	22.8044	.8053
2/				
24.1	16889	16040	16928	17910
14.7	10800 01	12112 10	7930 31	16881 85
	98	10	30	81
	78	45	18	12
	14.6082	.6069	24.1011	.1028

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MC 1043. 1912 Dec. 13.

Leeuw – Measures – Reseau pressed on plate.

V	a	N		a	N
16.3				18185	15196
22.0				10572 80	12782 72
				76	78
				85	89
				16.2391	.2418

2		
16.0	17646	18949
22.4	14220 45	12318 63
	30	06
	45	48
	22.3414	.3361

3		
15.0	17731	17376
22.9	8306 21	16762 70
	27	75
	37	71
	22.9419	.9393

4		
14.5	10010 00	12144
23.0	10	12079 79
mean	9941	90
in		
4		
	22.9934	.9939

5		
14.0	16262	16100
22.9	7070 66	15291 95
	65	85
	72	06
	22.9204	.9189

6		
13.0	15381	16040
22.3	12792 83	8640 48
	76	46
	84	40
	22.2598	.2605

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MG1048.

1912 Dec. 13.

Leeds - Measures - Reseau measured on plate.

	α	N	x	N
1/				
16.3			18185	15196
22.0			10572 80	12782 72
			76	78
			81	89
			16.2391	.2418
2/				
16.0	17646		18949	
22.4	14720 45		12318 63	
	30		06	
	41		48	
	22.3419		.3361	
3/				
15.0	17731		17376	
22.9	8306 21		16762 70	
	27		75	
	37		71	
	22.9419		.9395	
4/				
14.5	10010 00		12144	
23.0	10		12079 79	
	9941		90	
	22.9934		.9989	
5/				
14.0	16262		16100	
22.9	7070 66		15291 95	
	65		85	
	72		06	
	22.9204		.9189	
6/				
13.0	15381		16040	
22.3	12792 83		8640 48	
	76		46	
	84		40	
	22.2598		.2605	

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MC 1043 1912 Dec. 13. 35.

Wow - Measures.

	d	N	dc	Nc
I				
12.8			16022	16492
22.0			14270 50	8240 36
			60	20
			10	78
			12.8240	.8249
8				
12.6			16095	15402
21:0			11743 52	9700 01
mid			45	00
in			01	86
26			12.5649	.5693
9				
12.9			15171	14302
20.0			13720 20	5713 19
			30	24
			65	97
			12.8553	.8579
10				
13.0	19049		18161	
19.8	11126 48		16050 49	
	36		38	
	58		55	
	19.7920		.7886	

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MC 1043 1912 Dec. 13. 35

Wolf - Lucasmes

	d	N	x d	x N
I				
12.8			16022	16492
22.0			14276 50	8240 36
			60	20
			10	78
			12.8240	.8249
II				
12.6			16095	15402
1.0			11943 52	9700 01
			45	00
			01	86
			12.5649	.5693
V				
12.9			15171	14302
20.0			13720 20	5713 19
			30	24
			65	97
			12.8553	.8579
X				
13.0	19049	18161		
19.8	11126 48	16050 49		
	36	38		
	58	55		
	9.7920	.7886		

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MC1043. 1913 Jan. 8.

Comp. Stars - mean measured coords

	x	y
1	4.0823	35.2060
2	10.5052	9.2776
3	22.8048	24.4100
4	24.1020	14.6076
4 |	61.49	83.50
	15.37	20.88
	-18.80	-22
	2.63	1.12
	31	465
	263	560
	789	672
	81.53	448
		520.80

Mean R.G.

$13^h\ 07^m\ 36^s$
$+\quad 1\ 22$
$13\ 08\ 58 = A$

Mean Decl.

$-5^\circ\ 40'\ 08''$
$+\quad 8\ 41$
$-5\ 31\ 27 = D.$

Preliminary Reduction

	x-3	-1444	-2x	+3060
1	+2027 - 5070 = -3043	- 8 = -3051		= +9
2	-1705 - 1336 = -3041	- 21 = -3062		= -2
3	+488 - 3515 = -3027	- 46 = -3073		= -13
4	-906 - 2104 = -3004	- 48 = -3052		= +8
Mean	14.5332 - 3028	- 29		= 14.5335

	y-4	+1452x	+1.54	-2258
1	+1614 + 592 = +2206	+ 53 = 2259		= +1
2	+ 722 + 1523 = +2245	+ 14 = 2259		= +1
3	-1086 + 3307 = +2221	+ 36 = 2257		= -1
4	-1260 + 3494 = +2234	+ 22 = 2256		= -2
Mean	21.0272 + 2107	+ 32		= 21.0153

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1911phae..proj.1

MC 1043. 1913 Jan. 8. 36

Comp. Stars - mean places & corrs

1	4.0823	35.2060	Mean K.G.
2	10.5052	9.2776	13h 07m 36s
3	22.8048	24.4100	+ 1 22
4	24.1020	14.6076	13 08 58 = A
4	61.49	83.50	
	15.37	20.88	
	-18.60	2	Mean Decl. "
	2.63	1.12	-5° 40' 08"
	31	4.65	+ 8 41
	263	560	-5 31 27 = D.
	789	672	
	81.53	448	
		5720.80	

Preliminary Reduction

	x		y		
	-3 - 1444		-2.22		+3060
1	+027 - 5070	= -3043	- 8	= -3051	= +9
2	-1705 - 1356	= -3061	- 21	= -3082	= -2
3	+4888 - 3515	= -3027	- 46	= -3073	= -13
4	-900 - 2104	= -3004	- 48	= -3052	= +8
Mean	14.5332 - 3028		-29		= 14.5335

	y - 4	+1.452	+1.54		-2.218
1	+1614 + 5972	= +2206	- 53	= 2259	= +1
2	+ 722 + 1523	= +2245	+ 14	= 2259	= +1
3	-1086 + 3307	= +2221	+36	= 2257	= -1
4	-1260 + 3494	= +2234	+22	= 2256	= -2
Mean	21.0272 + 2107		+32		= 21.0153

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1911phae_proj.1

MC1043 1913 Feb. 26 37

Plate Constants

Conditional Equations

a	b	c	x − x	y − y
9.08	+ 35.21	+ 1	= + 9	+ 1
10.51	+ 9.28	+ 1	= − 2	+ 1
22.80	+ 24.41	+ 1	= − 13	− 1
24.10	+ 14.61	+ 1	= + 8	− 2

Mean Equations.

a	b	c		
+ 7.30	+ 22.24	+ 1	= + 3.50	+ 1.00
+ 23.45	+ 19.51	+ 1	= − 2.50	− 1.50
+ 17.30	+ 11.94	+ 1	= + 3.00	− 0.50
+ 13.44	+ 29.81	+ 1	= − 2.00	0.00
− 16.15	+ 2.73		= + 6.00	+ 2.50
+ 3.86	− 17.87		= + 5.00	− 0.50
− 3.86	+ 0.65		= + 1.43	+ 0.60
	− 17.22		= + 6.43	+ 0.10
		b	= − 0.37	− 0.01
− 16.15	= + 6.00	+ 1.0 a	= + 7.07	= + 2.50 + 0.03 = + 2.53
		a	= − 0.44	− 0.16

+ 3.5	− 2.5	+ 3.0	− 2.0	+ 1.0	− 1.5	− 0.5	0.0
+ 3.2	+ 10.2	+ 7.5	+ 5.8	+ 1.1	+ 3.7	+ 2.7	+ 2.1
+ 8.3	+ 7.3	+ 4.4	+ 11.1	+ 0.7	+ 0.2	+ 0.1	+ 0.3
15.0	+ 15.0	− 14.9	+ 14.9	+ 2.3	+ 2.4	+ 2.3	+ 2.4

				c	o	o − c
− 2	− 13	+ 15	=	0	+ 9	+ 9
− 5	− 3	+ 15	=	+ 7	− 2	− 9
− 10	− 9	+ 15	=	− 4	− 13	− 9
− 10	− 5	+ 15	=	0	+ 8	+ 8
− 1	+ 0	+ 2	=	+ 1	+ 1	0
− 2	+ 0	+ 2	=	0	+ 1	+ 1
− 4	+ 0	+ 2	=	− 2	− 1	+ 1
− 4	+ 0	+ 2	=	− 2	− 2	0

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MC1043 1913 Feb. 26. 37

Plate Constants

Conditional Equations

a	b	c	x − x	y − y
9.08	+ 35.21	+ 1 =	+ 9	+ 1
10.51	+ 9.28	+ 1 =	− 2	+ 1
22.80	+ 24.41	+ 1 =	− 13	− 1
24.10	+ 14.61	+ 1 =	+ 8	− 2

Mean Equations

a	b	c		
+ 7.30	+ 22.24	+ 1 =	+ 3.50	+ 1.00
+ 23.45	+ 19.51	+ 1 =	− 2.50	− 1.50
+ 17.30	+ 11.94	+ 1 =	+ 3.00	− 0.50
+ 13.44	+ 29.81	+ 1 =	− 2.00	0.00
− 16.15	+ 2.73	=	+ 6.00	+ 2.50
+ 3.86	− 17.87	=	+ 5.00	− 0.50
− 3.86	+ 0.65	=	+ 1.43	+ 0.60
	− 17.22	=	+ 6.43	+ 0.10
		b =	− 0.37	− 0.01
− 16.15	= + 6.00	+ 1.02 =	+ 7.02	= + 2.50 + 0.03 = + 2.53
		a =	− 0.44	− 0.16

+ 3.5	− 2.5	+ 3.0	− 2.0	+ 1.0	− 1.5	− 0.5	0.0
+ 3.2	+ 10.2	+ 7.5	+ 5.8	+ 1.1	+ 3.7	+ 2.7	+ 2.1
+ 8.3	+ 7.3	+ 4.9	+ 11.1	+ 0.2	+ 0.2	+ 0.1	+ 0.3
+ 15.0	+ 15.0	− 14.9	+ 14.9	+ 2.3	+ 2.4	+ 2.3	+ 2.4

			C	O	O − C
− 2	− 13	+ 15 =	0	+ 9	+ 9
− 5	− 3	+ 15 =	+ 7	− 2	− 9
− 10	− 9	+ 15 =	− 4	− 13	− 9
− 10	− 5	+ 15 =	0	+ 8	+ 8
− 1	+ 0	+ 2 =	+ 1	+ 1	0
− 2	+ 0	+ 2 =	0	+ 1	+ 1
− 4	+ 0	+ 2 =	− 2	− 1	+ 1
− 4	+ 0	+ 2 =	− 2	− 2	0

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MC1043 1913 Feb 6.

Times Etc.

Ex of the Stars	1911 Apr 12	13	16		-	13	25	
" " Moon		13	20	56.8	-	13	20	57.0
Clock fast			2	49.1				
W. Sid. T.		13	18	07.8				
W long.		4	44	31.05				
G Sid T.		18	02	38.85				
Sid T. M. noon		1	18	16.64				
Interval		16	44	22.21				
Reduction			2	44.54				
G M T.		16	41	37.67				

From Naut. Alm.		R.A.			Decl.		
moon 16h	13	06	00.85		-4°	48	12.8
motion r^m = 1.8612			14341				
" " 41.628		+1	17.48		-	9	57.0
Tabular place.	13	07	18.33		-4	58	09.8

moon's	parallax	55' 28.5"
"	semidiam.	15 08.6

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MC 104 S

1913 T.H. 6.

38

Transcription

Crft Stars 1911 Apr 12 13 1 [illegible] − 17 25 [illegible]
Nova 13 20 56.8 − 13 20 57.0
Clock fast 2 49.1

H.S.d.T 13 18 07.8
H long. 4 44 31.85
G Sid T. 18 02 38.85
Sid T Nova 1 18 16.64
Interval 16 44 22.21
Reduction 2 49.54
G.M.T. 16 41 37.67

From Grant. Calcn Rate Corr.
Nova 16h 13 06 00.85 − 4° 48 12.8
Motion in [illegible] = 1.8012 1.3 41
41.628 + 1 17 48 − 9 57.0
Tabular place 13 07 18.33 − 4 58 09.8

Nova's parallax 55 28.5
Displacement 15 08.6

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Pt.	Pos ∠	Resid.
10	231°.2	+10″
9	238.5	−41
8	270.0	−34
7	299.6	−40
6	308.6	+13
5	344.3	−26
4	0.0	+3″
3	13.7	+111
2	48.1	+24
1	60.4	−93

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MC1043. 1913 Feb. 8.

Moon's Center.

	x	$x-X_0$	Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O−C
1	16.2404	+1.7064 ✓	0	2.9118 ✓	3.8597	−128
2	16.0000	+1.4660		2.1492	3.8721	− 4
3	15.0000	+0.4660		0.2172	3.8829	+104
4	14.5340	0.0000		0.0000	3.8732	+ 7
5	14.0000	−0.5340		0.2852	3.8709	− 16
6	13.0000	−1.5340		2.3532	3.8758	+ 33
7	12.8244	−1.7096		2.9227	3.8706	− 19
8	12.5671	−1.9669		3.8687	3.8687	− 38
9	12.8566	−1.6774		2.8137 ✓	3.8686	− 39
10	13.0000	−1.5340 ✓		2.3532	3.8829	+104
				mean	3.8725	− 3

	y	$y-Y_0$	Δy	$(y-Y_0)^2$ ✓
1	22.0600	+0.9733 ✓	+3	0.9479 ✓
2	22.3388	+1.3121	+5	1.7229
3	22.9406	+1.9139	+7	3.6657
4	22.9936	+1.9669	+7	3.8732
5	22.9196	+1.8929	+7	3.5857
6	22.2602	+1.2335	+4	1.5226
7	22.0000	+0.9733	+3	0.9479
8	21.0267	0.0000	0	0.0000
9	20.0000	−1.0267 ✓	−4	1.0549 ✓
10	19.7903	−1.2364	−4	1.5297

Approximate Center.

$x = 13.0$ $y = 22.2602$
19.7905
42.0505
mean $y = 21.0252$
y max $= 22.9936$
$R = 1.9684$
x min $= 12.5671$
$Y_0 = 14.5355$

$y = 22.0$ $x = 16.2404$
12.8244
29.0648
mean $x = 14.5324$
x min $= 12.5671$
$R = 1.9653$
y max $= 22.9936$
$Y_0 = 21.0283$

Assume $\begin{cases} X_0 = 14.5340 \\ Y_0 = 21.0267 \end{cases}$

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Nearest Center

	x	$x - x_0$	Δ	$(x-x_1)^2$	$(x-x_0)^2+(y-y_0)^2$	O − C
1	16.2404	+1.7064	0	2.9148	3.6597	−1.28
2	14.0000	+1.4660		2.1490		− 4
3	15.0000	+0.4660		0.2173		+1.07
4	14.5340	0.0000		0.0000		+ 7
5	14.0000	−0.5340		0.2853		− 16
6	13.0000	−1.5340		2.3532		+ 33
7	12.8244	−1.7096		2.9227		− 19
8	12.5671	−1.9669		3.8687		− 38
9	12.8566	−1.6774		2.8137		− 39
10	13.0000	−1.5340		2.3532		+1.09

mean 3.8725

	y	$y - y_0$	Δ	$(y-y_1)^2$
1	22.0000	+0.9733	+3	0.9479
2	22.3388	+1.3121	+5	1.7229
3	22.9406	+1.9139	+7	3.6637
4	22.9936	+1.9669	+7	3.8737
5	22.9196	+1.8929	+7	3.5857
6	22.2602	+1.2335	+4	1.5226
7	22.0000	+0.9733	+3	0.9479
8	21.0267	0.0000	0	0.0000
9	20.0000	−1.0267	−4	1.0549
10	19.7903	−1.2364	−4	1.5297

Approximate Center.

x = 13.0 y = 22.2602
19.7903
42.0505
mean y = 21.0252
y − max = 22.9936
R = 1.9684
x − min = 12.5671
Y = 14.5355

y = 21.0 x = 16.2404
12.8749
29.0648
mean x = 14.5324
x − min = 12.5671
1.9653
y − max = 22.9936
Y_0 = 21.0283

Assume $\begin{cases} x_0 = 14.5340 \\ Y_0 = 21.0267 \end{cases}$

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Formation of Normals.

No		ab		ac		bw
1	+	1.66	-	218.8	-	124.0
2	+	1.92	-	5.9	-	5.2
3	+	0.90	+	48.9	+	198.8
4		0.00		0.0	+	13.8
5	-	1.00	+	8.5	-	30.3
6	-	1.88	-	50.5	+	40.6
7	-	1.66	+	32.5	-	18.4
8		0.00	+	76.9	-	0.0
9	+	1.73	+	65.5	+	40.2
10	+	1.89	-	159.0	-	129.0
	+	3.56	-	201.9	-	13.5

$[aa] = +19.87$ $[bb] = +18.85$

$[ac] = -5.30$ $[bc] = +7.98$ $[cw] = -3$

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MC1043 1915 Feb 8. 40

Center of moon.

Conditional Equations

	a	b	c	O		c	O−C
1	+1.71	+0.97	+1	−128	−28 + 9 − 16	−35	−93
2	+1.47	+1.81	+1	−4	−24 + 12 − 16	−28	+24
3	+0.47	+1.91	+1	+104	−8 + 17 − 16	−7	+111
4	0.00	+1.97	+1	+7	0 + 18 − 16	+2	+5
5	−0.53	+1.89	+1	−16	+9 + 17 − 16	+10	−26
6	−1.53	+1.73	+1	+33	+25 + 11 − 16	+20	+13
7	−1.71	+0.97	+1	−19	+28 + 9 − 16	+21	−40
8	−1.97	0.00	+1	−38	+32 0 − 16	+16	−54
9	−1.68	−1.03	+1	−39	+27 − 9 − 16	+2	−41
10	−1.53	−1.24	+1	+104	+25 − 10 − 16	−1	+105

+258 −254

Average (O−C) = 51

Normal equations.

a	b	c	
+19.87	+3.56	−5.30	= −202
+3.56	+18.85	+7.98	= −14
−5.30	+7.98	+10.00	= −3
−3.56	−0.64	+0.95	= +36
+5.30	+0.95	−1.42	= −54
	+18.21	+8.93	= +22
	+8.93	+8.58	= −57
	−8.93	−4.39	= −11
		+4.19	= −68
	−9.30	−8.93	= +59
	+8.91		= +81
+2.37	−3.56	−4.97	= +1
+12.52	−18.85	−23.62	= +7
+2224		−9.77	= −201
+1608		−15.64	= −7
−1004		+9.77	= +4
+12.20			= −197

$\frac{\Delta a}{\Delta c} = +0.354$

$\frac{\Delta b}{\Delta c} = -0.490$

c = −16

b = +9+

a = −16

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1911phae.pfc).1

MC 1047

Center of Moon.

Conditional Equations

	a	b	c	o	o − c
1	+ 1.71	+ 0.97	+ 1 =	− 128	− 28 + 9 − 16 = − 35	− 93
2	+ 1.47	+ 1.31	+ 1 =	− 4	− 24 + 12 − 16 = − 28	+ 24
3	+ 0.47	+ 1.91	+ 1 =	+ 104	− 8 + 17 − 16 = − 7	+ 111
4	0.00	+ 1.97	+ 1 =	+ 7	0 + 18 − 16 = + 2	+ 5
5	− 0.53	+ 1.89	+ 1 =	− 16	+ 9 + 17 − 16 = + 10	− 26
6	− 1.53	+ 1.38	+ 1 =	+ 33	+ 25 + 11 − 16 = + 20	+ 13
7	− 1.71	+ 0.97	+ 1 =	− 19	+ 28 + 9 − 16 = + 21	− 40
8	− 1.97	0.00	+ 1 =	− 38	+ 32 0 − 16 = + 16	− 54
9	− 1.68	− 1.03	+ 1 =	− 39	+ 27 − 9 − 16 = + 2	− 41
10	− 1.53	− 1.24	+ 1 =	+ 104	+ 25 − 10 − 16 = + 1	+ 105

+258 − 214

Average (or) 51

Normal Equations.

a	b	c	
+ 19.87	+ 3.56	− 5.30	= − 202
+ 3.56	+ 18.85	+ 7.98	= − 14
− 5.30	+ 7.98	+ 10.00	= − 3
− 3.56	− 0.64	+ 0.95	= + 36
+ 5.30	+ 0.95	− 1.42	= − 54
	+ 18.21	+ 8.93	= + 22
	+ 8.93	+ 8.58	= − 57
	− 8.93	− 4.39	= − 11
		+ 4.19	= − 68
	− 9.30	− 8.93	= + 59
	+ 8.91		= + 81

c = − 16

b = + 9

+ 2.37	− 3.50	− 4.47	= +	1
+ 12.52	− 18.85	− 23.62	= +	7
+ 22.24		− 9.77	= −	201
+ 16.08		− 15.64	= −	7
− 10.04		+ 9.77	= +	4
+ 12.20			= −	197

a = − 16

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MC 1043 1913 Feb 26. 41

Moon's Mean Position (1911.0)

$X_0 = 14.5340$ $Y_0 = 21.0267$

log a = 8 / 14.5332 — $\frac{1}{2}b$ = +5 / 21.0272

From Preliminary Reduction $X = 14.5335$ $Y = 21.0153$

$\Delta x = -6$ -0

$\Delta y = -8$ -3

$a = +15$ $+2$

14.5336 21.0152

$\zeta = -3.4664$

$\log \zeta = 0.53988_n$

$\cos\delta = 9.99788$

$\cos\alpha = 8.50724$

$(\alpha - A) = 20346_m$

$\alpha - A = -148.33$

$A = 13\ 08\ 58$

$\alpha_0 = 13\ 07\ 09.67$

$+ 1.35$

$\alpha' = 13\ 07\ 11.02$

$\eta = -0.9848$

$\log \tan\delta = 8.99145_m$

$\log^2 = 10798$

$\eta_1 = 7.1247_m$

$m_1 = -13$

$m_0 = -0.9835$

$\log = 9.99277_m$

$7.331\ 15$

$(\delta - D) = 266162_n$

$\delta - D = -7\ 38.8$

$D = -5\ 31\ 27$

$\delta_0 = -5\ 39\ 05.8$

$- 10.7$

$\delta' = -5\ 39\ 16.5$

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Moon's Mean Position (1911.0)

X_0 =	14.5340	Y_0 = 21.0267
Δ_{1911} =	− 8	Δ_b = + 5
	14.5332	21.0272

From Preliminary Reduction

X =	14.5335	Y = 21.0153
a_x =	− 6	− 0
b_y =	− 8	− 3
c =	+ 15	+ 2
	14.5336	21.0152

ξ = − 3.4664
log ξ: 0.539888 n
cos δ: 9.99788
cos δ': 8.507724

(α − A) = 20476 n

α − A = − 1 48.33

A = 13 08 58

α_0 = 13 07 09.67
+ 155

α' = 13 07 11.02

η = − 0.9848

log tan ζ − 8.9915 n
ζ^2 = 1098
η_1 = 7.1247 n

n_1 = − 13

η_0 = − 0.9835

log = 9.99277 n
7.33115

(δ − D) = 26162 n

δ − D = − 7 38.8

D = − 5 31 27

δ_0 = − 5 39 05.8
− 10.7

δ' = − 5 39 16.5

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1043

Lunar Parallax

$\alpha' =$ 13h 07m 11s.02

$\odot$ 13 18 07.8

T 1D 56.8

+ 2° 44' 12"

0 0 59

2 43

9.95727
0.00000
0.00049

9.95776

$\delta' = -5\ 39\ 16.5$

$\pi = 55\ 28.5$

9.86913
8.20780
8.67894
0.00163

6.75750

$\alpha - \alpha' = +1'\ 58.01$

$= +07^s.87$

$\delta = A2\ 13\ 05$

$-5\ 39\ 16$

47 52 21

9.82640
8.20780
9.87020
0.17266

8.07706

$\delta - \delta' = +41\ 03.2$

$\delta = -4\ 58\ 13.3$

Sid Elds $\delta = -4\ 58\ 09.8$

O-C -3.5

Corr to stand. radius -0.4

Final (O-C) -3.9

$\alpha = 13\ 07\ 18.89$

$\alpha = 13\ 07\ 18.33$

$+0.56$

$+0.02$

$+0.58$

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1043

Lunar Parallax

α' = 13h 07m 11.02s
δ 13 18 07.8
T 10. 56.8
+ 2° 49' 12"

0 0 59

2 43

9.95727
000000
000049
995776

δ = 42 13 0.5"
− 5 39 16

47 52 21

9.82640
820780
467020
017266
807706

δ − δ' = +41 03.2

δ' = −5 39 16.5
π = 55 28.5"

9.86913
820780
687699
000163
675750

α − α' = +1' 58".04
= +07s.87

δ = −4 58 13.3
Sin Ephs δ' −4 58 09.8
O−C − 3.5
Corr to Stand. readings − 0.4
Final O − C − 3.9

α = 13 07 18.89
α' 13 07 18.33
+ 0.56
+ 0.02
+ 0.58

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MC1078 1912 Dec. 17. 46

Comparison stars - Standard coords.

	1	no	mag.	2	no.	mag.
		1203	6.8		1209	4.7
R.A. C		$8^h\ 32^m$	$52^s.57$		$8^h\ 37^m$	$30^s.01$
L			.57			.04
E			.56			.02
mean			52.57			30.02
Prec		+	38.87		− +	38.28
1911		8 33	31.44		8 38	08.30
A		8 41	51		8 41	51
α − A:		− 8	19.56		− 3	42.70
sin(α − A)		−	499.45		−	222.69
log			2.698449n			2.347701n
− cos δ			9.996073			9.996781
ξ₀			1.166646n			0.822751n
η₀		−14.6710			−6.6489	
η₁		−	83		−	33
η			3.3207			11.3478
x			3.4066			11.1701
x − η		+	859			−1777
Decl.						
C		+24° 02′	23.″5		+21° 49′	41.″6
L			24.2			.5
E			23.2			.3
mean			23.6			41.5
Prec		− 2	18.2		− 2	20.6
1911		+24 00	05.4		+21 47	20.9
D		+23 23	58		+23 23	58
δ − D:		+ 36	07.4		−1 36	37.1
tan(δ − D)		+	2167.5		−	5798.6
log			3.335961			3.763321n
η₀			0.66711			1.09447n
tan δ			9.6486			9.6018
3″			2.3329			1.6455
η₁			9.0349			8.3007
η₀			+4.6463			−124300
η₁			+ .1084			+ 200
η			26.7547			9.5900
y			26.9160			9.6276
y − η			+ 1613			+ 376

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Comparison stars - Standard coords.

	1	no.	wag.	2	no.	wag.
C		1203	6.8		1209	4.7
C	8^h	32^m	$52^s.57$	8^h	37^m	$30^s.01$
2			.57			.04
5			.56			.02
mean			52.57			30.02
Pacc		+	38.87		−	38.28
1911	8	33	31.44	8	38	08.30
A	8	41	51	8	41	51
x-A		− 8	19.56		− 3	42.70
(x-A)		−	499.95		−	222.69
log			2.698549 n			2.347704 n
cos δ			9.996073			9.996781
δ₀			1.166468 n			0.822754 n
ξ		−14.6710			−6.6489	
η		−	.83		−	.33
ξ		3.3207			11.3478	
x		3.4066			11.1701	
x-ξ		+	859		−	1777
C	+24°	02′	23.″5	+21°	49′	41.″6
2			24.2			.5
5			23.2			.3
mean			23.6			41.5
Pacc		−	18.2		−	20.6
1911	+24	00	05.4	+21	49	20.9
D	+23	23	58.	+23	23	58
-D		36	07.4	−	1 36	37.1
log Δ		+	2167.5			5798.6
ξ		3.335966			3.763332 n	
η		0.667111			1.094477 n	
tan δ		9.6486			9.6018	
1/r		2.3329			1.6455	
η₁		91.0349			8.3007	
ξ₁		+4.6463			−12.4309	
ξ₂		+ .1084			+ 200	
ξ₃		26.7547			9.5900	
η₂		26.9160			9.6276	
η-η₂		+ 1613			+ 376	

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Comparison stars - Standard coords.

3	no.	mag
A.G.	3568	8.5
Berlin (1895)	$8^h\ 44^m\ 48^s.78$	
Prec	+ 2 07.21	
1911.	8 46 55.99	
A	8 41 51	
$\alpha - A$	+ 5 04.99	
$\sin(\alpha - A)$	+ 30497	
log "	2.484726	
" $\cos\delta$	9.958582	
" τ_0	0.950002	
ξ_0	+8.91130	
ξ_1	+ 37	
ξ	26.91167	
x	27.06855	
$x - \xi$	+ 15,18	
A.G.	$+24^\circ\ 46'\ 33''.8$	
Prec	− 7 58.0	
1911	+24 38 35.8	
D	+23 23 58	
$\delta - D$	+ 1 14 37.8	
$\tan(\delta - D)$	+ 44785	
log "	3.651133	
" η_0	0.982228	
$\tan\delta$	9.66165	
" τ	1.90000	
" η_1	8.61149	
η_0	+9.60002	
η_1	+ 412	
η	31.64114	
y	31.43888	
$y - \eta$	− 2026	

4	no.	mag.
C	1230	8.0
C	$8^h\ 48^m\ 31^s.88$	
L	.86	
E	.77	
mean	31.82	
	+ 38.22	
	8 49 10.04	
	8 41 51.	
	+ 7 19.04	
	+ 439.01	
	2.642471	
	9.965455	
	1.111516	
	+130365	
	+ 65	
	31.04430	
	30.95006	
	− 9,24	
C	$+22^\circ\ 35'\ 44''.8$	
L	45.3	
E	43.5	
mean	44.5	
	− 2 30.3	
	+22 33 14.2	
	+23 23 58.	
	− 50 43.8	
	− 3044.0	
	3.483446	
	0.814596	
	9.61844	
	2.23033	
	8.90211	
	− 6.52511	
	+ 798	
	15.55547	
	15.29036	
	− 2639	

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1912 Dec. 17

Comparison Stars - Standard Coords.

3	No.	mag.	4	No.	mag.
a.g.	3568	8.5	c	1230	8.0
	$8^h\ 44^m\ 48^s.78$		c	$8^h\ 48^m\ 31^s.88$
			c		.46
			c		.77
			mean		31.82
	+ 2 07.21			+ 38.72	
	8 46 55.99			8 49 10.04	
A	8 41 51			8 41 51	
δ−A	+ 5 04.99			+ 7 19.04	
sum(δ−A)	+ 30497			+ 439.01	
log "	2.48426			2.64247	
cos δ	9.99552			9.96545	
ξ_0	0.95002			1.11516	
η_0	+8.91130			+1.30365	
η_1	+ 37			+ 65	
η	26.91167			31.0430	
ξ	27.06852			30.9506	
ξ − η	+ 15718			− 9724	
dec.	+ 24° 46′ 33.8″		c	+ 22° 35′ 44.8″	
			c		45.3
			c		43.5
			mean		44.5
α	− 7 58.0			− 2 30.5	
	+ 24 38 35.8			+ 22 33 14.3	
D	+ 23 23 58			+ 23 23 58.	
δ−D	+ 1 14 37.8			− 50 43.8	
sum(δ−D)	+ 4478.5			− 3044.0	
log	3.65113			3.48394n	
η_0	0.98228			0.81459n	
cos δ	9.9615			9.9184	
ξ^2	19000			22303	
η_1	86149			8.90211	
η_0	+9.60002			−6.52251	
η_1	+ 412			+ 798	
η	31.6414			15.5547	
ξ	31.4388			15.2908	
η − ξ	− 2026			− 2639	

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MC 1078 1912 Dec 16. 48

Comparison Stars - Measures.
Reseau Reversed on plate.

	y d	y N	x d	x N
1				
3.4	18012	15878	18241	15100
26.9	8864 58	15040 38	12307 10	11026 29
	60	34	09	29
mag	22	60	51	92
=				
6.8	26.9160	.9161	3.4062	.4069
2	15001	16886	16266	17850
11.1	8690 07	13150 56	D7960 51	16146 43
9.6	94	60	4849	40
	78	93	56	55
mag				
=				
4.7	9.6287	.6266	11.1694	.1708
3				
32.1	15904	17539	17189	17582
31.5	11506 01	11920 19	7855 57	16890 91
	07	21	61	89
mag	90	34	79	76
=				
6.5				
	31.4393	.4384	27.0678	.0692
4				
			18179	16325
30.9	16299	16122	17680 81	68 11 10
15.4	13394 00	9040 45	80	10
	95	41	80	21
mag	49	30		
=			30.9501	.9511
8.0	15.2903	.2914		

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MC 1078. 1912 Dec. 16. 48

Comparison Stars - measures.
Reseau Reversed on plate.

	y d	y N	x d	x N
1	18012	15878	18241	15100
69	88645 8	150403 8	12307 10	11026
	60	34	09	29 29
4	22	60	51	92
6.8	16.9160	.9161	3.4062	.4069
2	15001	16886	16246	17850
11	86900 7	131505 6	07960 51	16146 43
9.6	94	60	4849	40
	78	93	56	55
47	9.6287	.6266	11.1694	.1708
3				
21	15904	17539	19189	17582
51.5	115060 1	119201 9	7855 57	16890 91
	07	21	61	89
	90	34	79	76
5.5				
	31.4393	.4384	27.0678	.0692
4			18179	16325
10.9	16279	16122	17680 81	68 1610
15.4	13399 100	90405 45	80	21
	95	41	80	
	99	30		
8.0			30.9501	.9511
	15.2903	.2914		

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MC 1078. 1912 Dec. 17. 49.

Faint image.

Micrometer-measures. Reseau reversed on plate.

	d	N	d	N
1/				
17.0	10619	10661		
18.9	15 -29	9954 45		
	10059	40		
	18.9439	.9285		
2/			12048	9156
16.9			11536 21	9668 70
19.0			21	79
			16.9478	.9484
3				
16.6			17068	15110
20.0			12513 09	9641 59
			05	52
			78	05
			16.5437	.5456
4/				
16.5			16040	15131
20.3			11298 95	9850 60
Omin			92	55
in			38	40
x				
			16.5256	.5281
5/				
16.6			15981	18692
21.0			12665 60	11997 85
			68	89
			78	91
			16.6684	.6701
6/				
17.0	17887	16191		
21.5	12180 95	11850 55		
	00	56		
	87	98		
	21.5695	.5660		

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MC 1078. 1912 Dec. 17. 49.

Two-hour measures. Faint image. Reseau reversed on plate

4 x

	a	N	a	N
17.0	10619	10661		
18.9	15 29	9959 45		
	10057	40		
	18.9439	.9285		
			12048	9156
16.9			11536 21	9668 70
19.0			21	79
			16.9478	.9484
16.6			17068	15110
20			12513 09	9641 59
			05	52
			78	05
			16.5437	.5456
16.5			16040	15151
20.3			11798 95	9850 60
			92	56
			38	40
			16.5256	.5241
16.6			15981	18692
21.6			12665 60	11997 85
			68	89
			78	91
			16.6684	.6701
17.0	17887	16191		
21.5	12180 95	11850 55		
	00	56		
	81	98		
	21.5695	.5660		

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1911phae.pr(c).1

MC 1078. Faint limit 1912 Dec 17. 50

two — measures. Reseau Reversed on plate

4 x

2	d	N	d	N
17.5			17231	17250
22.0			12075 70	12350 63
			80	65
			21	50
			17.4849	.4891

faint limit. 1913 Apr. 15.

8			10 scratch x		
18.0	16941	15796	d		N
22.3	14682 69	58070 68	16141		18810
	76	72	11243 49		13710 10
	a54	00	42		10
	in		35		10
	22.2268	.2271	17.5107		.5100
9	very faint	15848	4		
18.5	15812	90708 2	14589		18700
22.4	12582 62	84	9691 75		13516 15
mean	70	51	7280		12
in	20		23		85
4			18.4846		.4821
	22.3243	.3229			

11 scratch				
17.2	18542	16469	17806	17815
16.7	11420 50	13540 35	9931 25	15673 80
	42	55 31	30	75
	29	63	96	10
	16.7095	.7073	17.2131	.2137

12 scratch				
16.7	15800	16195	18689	15800
19.5	11140 40	10845 50	15525 21	89515 0
	41	43	1019	48
	92	82	79	92
	19.4656	.4656	16.6833	.6844

13 scratch.				
16.8	15821	14363	15655	15178
22.3	12659 70	74890 0	13950 49	68485 3
	8867	095	4049	50
	14	56	91	62
	22.3156	.3140	18.8294	.8315

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MC 1078. Faint limit 1912 Dec. 17.

Rescan (Reversed on plate)

	x	N
2		
17.5	17231	17250
22.0	12075 70	12350 68
	80	65
	21	50
	17.4849	.4891

faint limit. 1913 Apr. 15.

8		
18.0	16941	15296
22.3	14682 69	12070 68
	74	72
	54	00
	22.2268	.2271

9 very faint.		
16.5	15812	15848
22.4	12582 62	9070 82
	70	84
	20	51
	22.3243	.3229

10 scratch.	x	N
	16141	18810
	11243 49	13710 10
	42	10
	35	10
	17.5107	.5100
	14589	18700
	9691 75	13516 15
	7280	12
	23	85
	18.4846	.4821

11 scratch.				
17.2	18542	16469	17806	17815
16.7	11420 50	13540 35	9931 25	15675 80
	4042	5531	30	75
	29	63	96	10
	16.7095	.7073	17.2131	.2137

12 scratch.				
16.7	15800	16195	18689	15800
19.3	11140 40	10845 50	15525 71	8951 50
	41	43	10 79	48
	92	82	79	92
	19.4656	.4658	16833	.6844

13 scratch.				
18.8	15821	14363	15655	15178
22.3	12659 70	7489 00	13950 49	6848 53
	5867	091	4049	50
	14	56	91	62
	22.3156	.3140	18.8294	.8315

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MC 1078 1913 Jan. 23.

Centre of Plate.

	x	y
1	3.4066	26.9160
2	11.1701	9.6276
3	27.0685	31.4388
4	30.9506	15.2908
4	72.59	83.27
	18.15	20.82
	31	-22
	15	
	45	
	4.65	

8.68
465
1840
2208
1472
1711.20
1.18
465
590
708
472
548.70

Ra Decl.

8h	33m	31s	+24	00	05"
	38	08	+21	47	21
	46	56	+24	38	36
	49	10	+22	33	14
	167	45		12	59	16
8h	41	56	23	14	49
	-	5s	+	28	31
			23h	43'	20" = D

A = 8h 41m 51s

23	14	49
+	9	09
23	23	58

B

Preliminary Reduction.

	x-3	-1514	+26	+3204
1	+ 859	-4064 = -3205	+ 3 : -3202	= +2
2	-1777	-1444 = -3221	+11 = -3210	= -6
3	+1518	-4747 = -3229	+27 = -3202	= +2
4	- 924	-2309 = -3233	+30 = -3203	= +1
Moon	186048	-3058	+19	= 18.6213

	y-M	+154.x	-24	-2084
1	+1613	+5255 = +2138	-54 = +2084	= 0
2	+376	+1720 = +2096	-19 = +2077	= -7
3	-2026	+4169 = +2143	-63 = +2080	= -4
4	-2639	+4766 = +2127	-31 = +2096	= +12
	20.2497	+2865 =	-40	= 203238

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MC1078 1913 Jan. 23.

Center of Plate.

	x	y
1	3.4066	16.9160
2	11.1701	9.6276
3	27.0685	31.4388
4	30.9506	15.2908
	4 | 72.59	8327
	18.15	20.82
	31	22
	15	1.18
	45	7.68
	4.65	9.65
		18.40
		2709
		1472
		171120
		548.7

R.A. Decl.

8^h	33^m	31^s	+24	00	05"	
	38	08	+21	47	21	
	46	56	+24	38	36	
	49	10	+22	33	14	
	167	45		12	59	16
8^h	41	56	23	14	49	
	-	5	+	25	31	
$A = 8^h$	41^m	51^s	23.	43'	20"	D
			+	9	09	

D = 23 23 58

Preliminary Reduction.

	x - 3	- 1514	+ 24	+ 3204
1	+ 859	- 4064 = - 3205	+ 3 : - 3202	: + 2
2	- 1777	- 1444 = - 3221	+ 11 : - 3210	: - 6
3	+ 1518	- 4747 = - 3229	+ 27 : - 3202	: + 2
4	- 924	- 2309 : - 3233	+ 30 : - 3203	: + 1
Mean	18.6048	- 3058	+ 19'	: 18.6213'

	4 - M.	+ 154 x	- 24	- 2084
1	+ 1613	+ 525 = + 2138	- 54 : + 2084	: 0
2	+ 376	+ 1720 : + 2096	- 19 : + 2077	: - 7
3	- 2026	+ 4169 : + 2143	- 63 : + 2080	: - 4
4	- 2639	+ 4766 : + 2127	- 31 : + 2096	: + 12
	20.2497	+ 2865 :	- 40'	: 20.3238'

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Times Etc.

Exp. to Stars	1911 May 4	11h	36m			−	11h	45m		
" " noon		11	40	26.7		−	11	40	26.9	
Clock fast			2	59.3						
H. Sid T.		11	37	27.5						
to Long.		4	44	31.05						
G. Sid T.		16	21	58.55						
Sid T m. noon		2	45	00.85						
Interval		13	36	57.70						
Reduction			2	13.84						
G. m. T.		13	34	43.86						

From Naut. Alm.

		R. A.				Decl.				
Noon 13h	8h	42m	58s.50			+23°	39′	56″.2		
Motion in 1m = 2s.42685						−8″.983				
" " 34.731	+	1	24.34			−	5	08.5		
Tabular place.	8h	44m	22s.84			+23	34	47.7		

Moons parallax 58′ 33″.3
" Semidiam. 15 58.9

Semidiam: 958.9
12.6
S = 971.5

Aug for 934 = 11.9
" 959 = 12.6

R² = 42873
+225
= 43098
R = 207.60
a = +1.09 ak = + 2
R = 9686

S = 971.5 R − S = −2.9

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MC 1078. 1913 Feb. 6.

Transits etc.

Exp. Eclipse	1911 May 4	11^h	36		11^h	45
Moon		11	40	26.7	11	40 26.9
Clock fast			2	59.3		
H. Sid T.		11	37	27.5		
H. Long.		4	44	31.05		
G. Sid T.		15	21	58.56		
Sid T. to noon		2	45	00.89		
Interval		13	36	57.7		
Reduction			2	13.84		
G. M. T.		13	34	43.86		

From Mount Wilson

Noon	13^h	$08^m\ 42^s.58$	$+23°\ 39'\ 56''.2$
Motion	$m = 2^s.485$		$8''.883$
	34731	$+\ 1\ 24.34$	$-\ 5\ 08.5$
Intercept		$8^h\ 44^m\ 22^s.84$	$+23\ 34\ 47.7$

Noon parallax $5''.3$

Semidiurnal $15\ 58.9$

Semidian: 958.9
12.6
$S = 971.5$

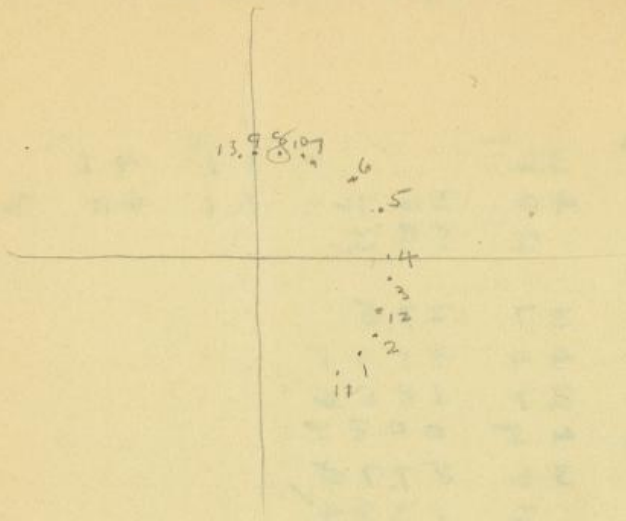
Aug for 934 = 11.9
959 = 12.6

$R^2 = 4.2873$
$+225$
$= 4.3098$
$R = 2.07760$
$a = +1.09$ $aK = +8$
$R = 968.6$

$S = 971.5$ $R - S = -2.9$

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pt	pos ∠	Resid.
11	222.°0	+ 23
1	230.5	− 88
2	232.7	− 24
12	247.6	− 46
3	263.0	− 27
4	270.0	+ 83
5	291.2	− 6
6	309.5	+ 10
7	327.5	+ 27
10	328.3	+ 81
(8)	343.2	
9	0.0	− 88
13	6.4	+ 57

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Moon's Center

	x	x − X₀		Δx	(x−X₀)²	(x−X₀)²+(y−Y₀)²	O−C
1	17.0000	−1.5984	−	3	2.5558	4.2865	−8
2	16.9481	−1.6503	−	3	2.7245	4.2920	+47
3	16.5446	−2.0538	−	1	4.2185	4.2820	−53
4	16.5268	−2.0716		0	4.2915	4.2915	+42
5	16.6692	−1.9292	+	1	3.7214	4.2809	−64
6	17.0000	−1.5984	+	3	2.5539	4.2846	−27
7	17.4870	−1.1114 ✓	+	3	1.2345	4.2900	+27
8	18.0000	−0.5984	+	4	[0.3576]	[4.2578]	reject
9	18.5984	−0.0000	+	4	0.0000	4.2911	+38

Mean (Excl. 8) 4.2873 +2

	y	y − Y₀		Δy	(y−Y₀)²
1	18.9362	−1.3158	+	1	1.7307
2	19.0000	−1.2520	+	0	1.5675
3	20.0000	−0.2520	+	0	0.0635
4	20.2520	0.0000		0	0.0000
5	21.0000	+0.7480	−	0	0.5595
6	21.5678	+1.3158	−	1	1.7307
7	22.0000	+1.7480	−	1	3.0555
8	22.2270	+1.9750	−	[1	3.9002]
9	22.3236	+2.0716	−	1	4.2911

Additional pts.

	(x−X₀)²+(y−Y₀)²	O−C
10	4.3120	+247
11	4.3013	+140
12	4.2844	−29
13	4.3087	+214

Approximate Center.

x = 17 y = 18.9362
21.5678
40.5040
mean y = 20.2520
y-max = 22.3236
R = 2.0716
x-min = 16.5268
X₀ = 18.5984

Center { X₀ = 18.5984
Y₀ = 20.2520

Additional pts.

	x	x − X₀	Δx	(x−X₀)²
10	17.5104	−1.0880	−3	1.1844
11	17.2134	−1.3850	−3	1.9190
12	16.6838	−1.9146	−1	3.6661
13	18.8304	+0.2320	+4	0.0540

	y	y − Y₀	Δy	(y−Y₀)²
10	18.4834	−1.7686	+1	3.1276
11	18.7084	−1.5436	+1	2.3823
12	19.4657	−0.7863	0	0.6183
13	22.3148	+2.0628	−1	4.2547

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MC 1078 1913 Feb 8.

Means Center:

	x	x − X₀	Δx	(x − X₀)²	(x − X₀)² + (y − Y₀)²	O − C
1	17.0000	−1.5984	− 3	2.55358	4.28865	− 8
2	16.9981	−1.6503	− 3	2.72241	4.29420	+47
3	16.5946	−2.0538	− 1	4.21835	4.28820	−53
4	16.5268	−2.0716	0	4.29115	4.29115	+42
5	16.6692	−1.9292	+ 1	3.72219	4.28809	−64
6	17.0000	−1.5984	+ 3	2.55389	4.28896	−27
7	17.4870	−1.1114	+ 3	1.23495	4.29005	+27
8	18.0000	−0.5984	+ 4	(0.35796)	(4.25718)	very far
9	18.5984	−0.0000	+ 4	0.00000	4.29111	+38

mean (9 ex. 8) 4.28713 ± 2

	y	y − Y₀	Δy	(y − Y₀)²
1	18.9362	−1.3158	+ 1	1.73107
2	19.0000	−1.2520	+ 0	1.56755
3	20.0000	−0.2520	+ 0	0.06350
4	20.2520	0.0000	0	0.00000
5	21.0000	+0.7480	− 0	0.55950
6	21.5678	+1.3158	− 1	1.73107
7	22.0000	+1.7480	− 1	3.05555
8	22.2270	+1.9750	− [1]	3.90062
9	22.3236	+2.0716	− 1	4.29111

Additional pts.

	(x − X₀)(y − Y₀)²	O − C
10	4.3120	+247
11	4.3013	+140
12	4.2844	− 29
13	4.3087	+214

Approximate Center.

x = 17 y = 18.9362
21.5678
40.5040
mean y = 20.2520
y-max = 22.3236
R = 2.0716
x-min = 16.5268
Y_0 = 18.5984

Center { X_0 = 18.5984, Y_0 = 20.2520

Additional pts.

	x	x − X₀	Δx	(x − X₀)²
10	17.5104	−1.0880	− 3	1.1844
11	17.2134	−1.3850	− 3	1.9190
12	16.6838	−1.9146	− 1	3.6661
13	18.8304	+0.2320	+4	0.0540

	y	y − Y₀	Δy	(y − Y₀)²
10	18.4834	− 1.7686	+ 1	3.1276
11	18.7084	− 1.5436	+ 1	2.3823
12	19.4657	− 0.7863	0	0.6183
13	22.3148	+ 2.0628	− 1	4.2547

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Formation of Normal Equations.

No	aa	ab	ac	bb	bc	cc
1	+ 2.11	+ 12.8	+ 10.6			
2	+ 2.06	- 7.75	- 5.88			
3	+ 0.51	+ 10.85	+ 1.32			
4	0.00	- 8.70	0.00			
5	- 1.45	+ 12.34	- 4.80			
6	- 2.11	+ 4.32	- 3.56			
7	- 1.93	- 3.00	+ 4.70			
9	0.000	+ 0.00	+ 7.85			
10	+ 1.93	- 27.00	- 4.365			
11	+ 2.14	- 19.45	- 2.160			
12	+ 1.51	+ 5.54	+ 2.29			
13	+ 0.47	+ 4.91	+ 4.405			
	+ 5.24	- 26.66	- 1.825			

[aa] = + 21.30
+ 6.82
28.12

[bb] = + 13.00
+ 10.38
+ 23.38

[ac] = - 12.01
- 4.16
- 16.17

[bc] = + 3.06
- 2.04
+ 1.02

[cc] = + 2
+ 572
+ 574

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MC1078 1913 Feb. 8. 55

Morris Center.

Conditional Equations.

	a	b	c	O		c	O−C
1	−1.60	−1.32	+1	= −8	−2.03	+61	+226 = +84	−92
2	−1.65	−1.25	+1	= +47	−209	+58	+226 = +75	−28
3	−2.05	−0.25	+1	= −53	−260	+12	+226 = +22	−31
4	−2.07	0.00	+1	= +42	−263	0	+226 = −37	+79
5	−1.93	+0.75	+1	= −64	−245	−35	+226 = −54	−10
6	−1.60	+1.32	+1	= −27	−203	−61	+226 = −33	+6
7	−1.11	+1.74	+1	= +27	−141	−81	+226 = +4	+23
9	0.00	+2.07	+1	= +38	0	−96	+226 = +130	−92
10	−1.09	−1.77	+1	= +247	−138	+82	+226 = +170	+77
11	−1.39	−1.54	+1	= +140	−176	+71	+226 = +121	+19
12	−1.91	−0.79	+1	= −29	−242	+37	+226 = +21	−50
13	+0.23	+2.06	+1	= +214	+29	−95	+226 = +160	+54

Normal Equations.

+28.12 + 5.24 − 16.17 = +267
+ 5.24 + 23.38 + 1.02 = +182
− 16.17 + 1.02 + 12.00 = +574

− 5.24 + 0.98 + 3.01 = + 50
+ 16.17 + 3.01 − 9.30 = −154

+ 22.40 + 4.03 = −132
+ 4.03 + 2.70 = +420

− 4.03 − 0.73 = + 24
+ 1.97 = +444

− 6.01 − 4.03 = −627
+ 16.39 = − 759

+83.07 − 5.24 − 61.64 = −2949
+370.63 − 23.38 − 275.05 = −1357

+111.19 − 77.81 = −3216
+375.87 −274.03 = −1339

−106.75 + 77.81 = +3788
+ 4.44 = + 572

The above residuals as should be increased by about 3 and c decreased by 6 making − residuals less by about 4 and + residuals more by about 4.

Final sum = +263 − 278

Average (O−C) = 47

$\frac{\Delta b}{\Delta c} = -0.180$

$\frac{\Delta a}{\Delta c} = +0.608$

c = +225

b = −46

a = +129

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Morris Center

Conditional Eq.

	a	b	c	O		c	O−C
1	−1.60	−1.32	+1	= −8	−2.03	+61 +226 = +84	−92
2	−1.65	−1.25	+1	= +47	−209	+58 +226 = +75	+28
3	−2.05	−0.25	+1	= −53	−260	+17 +226 = −22	−31
4	−2.07	0.00	+1	= +42	−263	+0 +226 = +87	+99
5	−1.92	+0.75	+1	= −64	−245	−85 +226 = −54	−70
6	−1.60	+1.32	+1	= −27	−203	−61 +226 = +33	+6
7	−1.11	+1.79	+1	= +27	−141	−86 +226 = +14	+23
9	0.00	+2.07	+1	= +38	0	−96 +226 = 4130	−92
10	−1.09	−1.77	+1	= +247	−138	+82 +226 = +170	+77
11	−1.39	−1.54	+1	= +140	−176	+71 +226 = +121	+19
12	−1.91	−0.79	+1	= −29	−242	+37 +226 = +21	−50
13	+0.23	+2.06	+1	= +214	+29	−95 +226 = +160	+54

Normal Equations.

+28.12 + 5.24 − 16.17 = +267
+5.24 + 23.38 + 1.02 = +182
−16.17 + 1.02 + 12.00 = +574

− 5.24 − 0.98 + 3.01 = +50
+16.17 + 3.01 − 9.30 = −154

+22.40 + 4.03 = −132
+4.03 + 2.70 = +420

+4.03 − 0.73 = +24
+1.97 = +444

−16.01 − 4.03 = −627
+16.39 = −759

The above residuals as should be increased by about 3 and c decreased by 6 making − residuals, less by about 4 and + residuals more by about 4.

Final sum = +283 − 278
Average (O−C) = 47
c = +75

b = −15
c = +225

b = −46

+8299 − 5.24 = 61.65 = −2943
+370.63 − 23.38 − 275.05 = −13149

+112.09 − 77.82 = −3216
+3758.4 −274.98 = −13329

−106.55 + 77.82 = 13788
+ 4.42 = + 573

a = +46

a = +129

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Plates 1078-1079-1080. 1913 Apr. 17.

Plate Constants

a	b	1078 x−3	1078 y−7	1079 x−3	1079 y−7	1080 x−3	1080 y−7
+ 3.32	+ 26.75 + 1 =	+ 2	0	− 4	+ 5	+ 6	+ 3
+ 11.35	+ 9.59 + 1 =	− 6	− 7	+ 5	− 8	− 11	− 23
+ 26.92	+ 31.64 + 1 =	+ 2	− 4	− 10	− 17	− 3	+ 3
+ 31.04	+ 15.55 + 1 =	+ 1	+ 12	+ 9	+ 20	+ 7	+ 16
Mean Equations:							
+ 7.34	+ 18.17 + 1 =	− 2.00	− 3.50	+ 0.50	− 1.50	− 2.50	− 10.00
+ 28.98	+ 23.60 + 1 =	+ 1.50	+ 4.00	− 0.50	+ 1.50	+ 2.00	+ 9.50
+ 21.20	+ 12.57 + 1 =	− 2.50	+ 2.50	+ 7.00	+ 6.00	− 2.00	− 3.50
+ 15.12	+ 29.20 + 1 =	+ 2.00	− 2.00	− 7.00	− 6.00	+ 1.50	+ 3.00
− 21.64	− 5.43 =	− 3.50	− 7.50	+ 1.00	− 3.00	− 4.50	− 19.50
+ 6.08	− 16.63 =	− 4.50	+ 4.50	+ 14.00	+ 12.00	− 3.50	− 6.50
− 6.08	− 1.52 =	− 0.98	− 2.11	+ 0.28	− 0.84	− 1.26	− 5.47
	− 18.15 =	− 5.48	+ 2.39	+ 14.28	+ 11.16	− 4.76	− 11.97
	b =	+ 0.30	− 0.13	− 0.79	− 0.62	+ 0.26	+ 0.66
	a =	+ 0.09	+ 0.38	+ 0.15	+ 0.29	+ 0.14	+ 0.74

Plate 1078

− 2.0	+ 1.5	− 2.5	+ 2.0	− 3.5	+ 4.0	+ 2.5	− 2.0
− 0.7	− 2.7	− 1.9	− 1.3	− 2.8	− 11.0	− 8.0	− 5.7
− 5.5	− 7.1	− 3.8	− 8.8	+ 2.4	+ 3.1	+ 1.6	+ 3.8
− 8.2	− 8.3	− 8.2	− 8.1	− 3.9	− 3.9	− 3.9	− 3.9
c for (x − 3)				c for (y − 7)			

Plate 1079

+ 0.5	− 0.5	+ 7.0	− 7.0	− 1.5	+ 1.5	+ 6.0	− 6.0
− 4.1	− 4.3	− 3.2	− 2.3	− 2.1	− 8.5	− 6.2	− 4.4
+ 14.4	+ 18.6	+ 9.9	+ 23.1	+ 11.2	+ 14.5	+ 7.7	+ 18.0
+ 13.8	+ 13.8	+ 13.7	+ 13.8	+ 7.6	+ 7.5	+ 7.5	+ 7.6
c for (x − 3)				c for (y − 7)			

Plate 1080

− 2.5	+ 2.0	− 2.0	+ 1.5	− 10.0	+ 9.5	− 3.5	+ 3.0
− 1.0	− 4.1	− 3.0	− 2.1	− 5.4	− 22.4	− 15.7	− 11.2
− 4.7	− 6.1	− 3.3	− 7.6	− 12.0	− 15.5	− 8.3	− 19.2
− 8.2	− 8.2	− 8.3	− 8.2	− 27.4	− 27.4	− 27.5	− 27.4
c for (x − 3)				c for (y − 7)			

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Plates 1078 - 1079 - 1080. 1913 Apr. 17.

Plate constants

a	b		1078 x−3	1078 y−4	1079 x−3	1079 y−4	1080 x−3	1080 y−4
+ 3.32	+ 26.75	+ 1 =	+ 2	0	− 4	+ 5	+ 6	+ 3
+ 11.35	+ 9.59	+ 1 =	− 6	− 7	+ 5	− 8	− 11	− 23
+ 26.92	+ 31.64	+ 1 =	+ 2	− 4	− 10	− 17	− 3	+ 3
+ 31.04	+ 15.55	+ 1 =	+ 1	+ 12	+ 9	+ 20	+ 7	+ 16
Mean equations								
+ 7.34	+ 18.17	+ 1 =	− 2.00	− 3.50	+ 0.50	− 1.50	− 2.50	− 10.00
+ 28.98	+ 23.60	+ 1 =	+ 1.50	+ 4.00	− 0.50	+ 1.50	+ 2.00	+ 9.50
+ 21.20	+ 12.57	+ 1 =	− 2.50	+ 2.50	+ 7.00	+ 6.00	− 2.00	− 3.50
+ 15.12	+ 29.20	+ 1 =	+ 2.00	− 2.00	− 7.00	− 6.00	+ 1.50	+ 3.00
− 21.64	− 5.43	=	− 3.50	− 7.50	+ 1.00	− 3.00	− 4.50	− 19.50
+ 6.08	− 16.63	=	− 4.50	+ 4.50	+ 14.00	+ 12.00	− 3.50	− 6.50
− 6.08	− 1.52	=	− 0.98	− 2.11	+ 0.28	− 0.84	− 1.26	− 5.47
	− 18.15	=	− 5.48	+ 2.39	+ 14.28	+ 11.16	− 4.76	− 11.97
		b =	+ 0.30	− 0.13	− 0.79	− 0.62	+ 0.26	+ 0.66
		a =	+ 0.09	+ 0.38	+ 0.15	+ 0.29	+ 0.14	+ 0.74

Plate 1078

− 2.0	+ 1.5	− 2.5	+ 2.0	− 3.5	+ 4.0	+ 2.5	− 2.0
− 0.7	− 2.7	− 1.9	− 1.3	− 2.8	− 11.0	− 8.0	− 5.7
− 5.5	− 7.1	− 3.8	− 8.8	+ 2.4	+ 3.1	+ 1.6	+ 3.8
− 8.2	− 8.3	− 8.2	− 8.1	− 3.9	− 3.9	− 3.9	− 3.9

c for (x − 3) c for (y − 4)

Plate 1079

+ 0.5	− 0.5	+ 7.0	− 7.0	− 1.5	+ 1.5	+ 6.0	− 6.0
− 4.1	− 4.3	− 3.2	− 2.3	− 2.1	− 8.5	− 6.2	− 4.4
+ 14.4	+ 18.6	+ 9.9	+ 23.1	+ 11.2	+ 14.5	+ 7.7	+ 18.0
+ 13.8	+ 13.8	+ 13.7	+ 13.8	+ 7.6	+ 7.5	+ 7.5	+ 7.6

c for (x − 3) c for (y − 4)

Plate 1080

− 2.5	+ 2.0	− 2.0	+ 1.5	− 10.0	+ 9.5	− 3.5	+ 3.0
− 1.0	− 4.1	− 3.0	− 2.1	− 5.4	− 21.4	− 15.7	− 11.2
− 4.7	− 6.1	− 3.3	− 7.6	− 12.0	− 5.5	− 8.3	− 19.2
− 8.2	− 8.2	− 8.3	− 8.2	− 27.4	− 27.4	− 27.5	− 27.4

c for (x − 3) c for (y − 4)

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Plates 1078-1079-1080. 1913 Apr. 14.

Plate Constants.
Residuals

	x	C	O	O − C	y	C	O	O − C
Plate 1078								
+0 +	8 − 8 =	0	+2	+2	+ 1 − 3 − 4 =	−6	0	+6
+1 +	3 − 8 =	−4	−6	−2	+ 4 − 1 − 4 =	−1	−7	−6
+2 +	10 − 8 =	+4	+2	−2	+ 10 − 4 − 4 =	+2	−4	−6
+3 +	5 − 8 =	0	+1	+1	+ 12 − 2 − 4 =	+6	+12	+6
Plate 1079								
+0 −	20 + 14 =	−6	−4	+2	+ 1 − 16 + 8 =	−7	+5	+12
+2 −	8 + 14 =	+8	+5	−3	+ 3 − 6 + 8 =	+5	−8	−13
+4 −	25 + 14 =	−7	−10	−3	+ 8 − 19 + 8 =	−3	−17	−14
+5 −	12 + 14 =	+7	+9	+2	+ 9 − 10 + 8 =	+7	+20	+13
Plate 1080								
+0 +	7 − 8 =	−1	+6	+7	+ 2 + 18 − 27 =	−7	+3	+10
+2 +	2 − 8 =	−4	−11	−7	+ 8 + 6 − 27 =	−13	−23	−10
+4 +	8 − 8 =	+4	−3	−7	+ 20 + 21 − 27 =	+14	+3	−11
+4 +	4 − 8 =	0	+7	+7	+ 23 + 10 − 27 =	+6	+16	+10

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Plates 1078-1079-1080. 1913 Apr. 14.

Plate Constants.
Residuals

Plate 1078

		G	O	O − C			G	O	O − C
− 0 +	8 − 8 =	0	+2	+2	+	1 − 3 − 4 =	−6	0	+6
+1 +	3 − 8 =	−4	−6	−2	+	4 − 1 − 4 =	−1	−7	−6
+2 +	10 − 8 =	+4	+2	−2	+	10 − 4 − 4 =	+2	−4	−6
+3 +	5 − 8 =	0	+1	+1	+	12 − 2 − 4 =	+6	+12	+6

Plate 1079

+ 0 − 20 + 14 =	−6	−4	+2	+	1 − 16 + 8 =	−7	+5	+12
+ 2 − 8 + 14 =	+8	+5	−3	+	3 − 6 + 8 =	+5	−8	−13
+ 4 − 25 + 14 =	−7	−10	−3	+	8 − 19 + 8 =	−3	−17	−14
+ 5 − 12 + 14 =	+7	+9	+2	+	9 − 10 + 8 =	+7	+20	+13

Plate 1080

+ 0 + 7 − 8 =	−1	+6	+7	+	2 + 18 − 27 =	−7	+3	+10
+ 2 + 2 − 8 =	−4	−11	−7	+	8 + 6 − 27 =	−13	−23	−10
+ 4 + 8 − 8 =	+4	−3	−7	+	20 + 21 − 27 =	+14	+3	−11
+ 4 + 4 − 8 =	0	+7	+7	+	23 + 10 − 27 =	+6	+16	+10

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MC 1078 1913 Apr. 14.

Groom's Mean Position (1911.0)

$X_0 = 18.5984$
$+ \quad 64$
18.6048

$Y_0 = 20.2520$
$- \quad 23$
20.2497

From Plein. Red. $X = 18.6213$ $Y = 20.3238$
∴ Plate constants $ax = +2$ $+7$
$by = +6$ -3
$c = -8$ -4

$\xi = +0.6213$
log = 9.79330
" cos δ = 9.96343
∴ const: 8.50724
∴ (α − A) = 1.32263
α − A = + 21.02
A = 8 41 51
α_0 = 8 42 12.02
Red: + 0.36
α' = 8 42 12.38

$\eta = -1.6762$
log Tan δ = 96383
" ξ^2 = 95866
∴ η_0 = 62783
η_0 = + 2
$\eta_0 = -1.6764$
log = 0.22437 m
∴ const: 7.33115
∴ (δ − D) = 2.89322 m
δ − D = − 13 02.0
D = +23 23 58
δ_0 = +23 10 56.0
Red: + 6.3
δ' = +23 11 02.3

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MC 1078 1913 April 14.

Moon's Mean Position (1911.0)

$X_0 = 18.5984 + 64 = 18.6048$ $\quad Y_0 = 20.2520 - 23 = 20.2497$

From Prelim. Red. $X = 18.6213$ $\quad Y = 20.3238$

∴ Plate constants $ax = +2$, $by = +6$, $c = -8$ $\quad +7$, -5, -4

$\xi = +0.6213$ $\quad \eta = -1.6762$

log = 9.79330 $\quad$ log Tan δ = 9.6383

" cos δ = 9.96343 $\quad$ − δ ξ^2 = 9.6866

const. 8.50724 $\quad$ η_0 = 6.3783

$\eta_0 = +2$

(α − A) = 1.32263 $\quad \eta_0 = -1.6764$

α − A = + 21.02 $\quad$ log = 0.22437

A = 8 41 51 $\quad$ ∴ const. = 7.33115

α_0 = 8 42 12.02 $\quad$ ∴ (δ − D) = 2.89322

Red. + 0.36 $\quad \delta - D = -13\ 02.0$

α' = 8 42 12.38 $\quad D = +23\ 23\ 58$

$\delta_0 = +23\ 10\ 56.0$

Red. + 6.3

$\delta' = +23\ 11\ 02.3$

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1078 Red. ad l. apb.

$\delta = +23\ 11$

H+α = 23h 38m = 354° 30'
H = 14 56
α = 8 42
G = 19 06
G+α = 3 48 57°

log (i) = 0.7703 n
ws δ = 9.9634
0.7337 n

9.7361
log g = 0.8676
9.9236
9.6317
8.8239

9.5951
9.9950
log h = 1.2918
8.9819 n
0.0366
8.8239

log (g') = 0.6037
(g) = 9.2468

log (h') 0.8849
log h = 0.0603
9.9439 n

f = +0.32
g +0.18
h = −0.14 ✓
+036

(g') + 4.02 ✓
(h') + 7.67
(i) − 5.42
+ 6.27 ✓

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Red. ad b. eqtn.

$\delta = +23\ 11$

H+A	23	38	= 35° 9′ 30″
H	14	56	
a	8	42	
G	19	06	
G+α	3	48	57°

$\log(i) = 0.7703$
$\cos\delta = 9.9634$
0.7337

$\log z = 9.7361$
0.6676
9.9236
9.6317
8.8239

$\log h = 9.5951$
9.9980
1.2914
8.9846 m
0.0366
8.8239

$\log(\delta') = 0.6037$
$(\delta') = 9.2968$

$\log(h') = 0.8849$
$\log h = 0.1603$
9.1339

$f = +0.32$
$g = +0.18$
$h = -0.14$ ✓
$+0.36$

$(\delta') + 4.02$
$(R') + 7.67$
$(i) - 5.42$ ✓
$+ 6.27$

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1078

Lunar Parallax.

α' = 8h 42m 12s.38 ✓
δ = 11 37 27.5 ✓
$\Theta - \alpha$ = +2 55 15.1 ✓
= + 43° 48' 46" ✓

16 22 ✓

+ 43 32 24 ✓

9.995727 ✓
0.000000
0.013973 ✓
0.009700 ✓

δ' = +23° 11' 02".3 ✓

Π = 58' 33".3 ✓

9.869913 ✓
8.231127 ✓
9.840830 ✓
0.003787 ✓
7.978857 ✓

$\gamma - \alpha'$ = +32' 43".36 ✓
= +2m 10s.89 ✓

γ = 51 20 46 ✓
δ = 23 11 02 ✓
$\gamma - \delta$ = 28 09 44 ✓

9.826400 ✓
8.231127 ✓
9.673925 ✓
0.010738 ✓
7.838897 ✓

$\delta - \delta'$ = + 23 43.6 ✓

δ = +23 34 459 ✓ α = 8 44 23.27 ✓

Nautical δ = +23 34 477 ✓ α = 8h 44m 22s.84 ✓

O - C	−	1.8 ✓	+ 0.43 ✓
Cor. to Stand. radius	−	0.7 ✓	+ 0.17 ✓
O - C	−	2.5 ✓	+ 0.60 ✓

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1078.

Lemaw Parallax.

α' = 8h 42m 12s.38
δ = 11 37 27.5"
$\Theta - \alpha$ = +2 45 15.1
= + 43° 48' 46"

16 22

+ 43 32 24

9.95727
0.00000
0.13973
0.09700

δ' = 51 20 46
δ = 23 11 02
$\delta' - \delta$ = 28 09 44

9.82640
8.23127
9.67392
0.10738
7.83897

$\delta - \delta'$ = + 23 43.6

δ = + 23 34 45.9

hautalum δ = + 23 34. 47.7

O - C — 1.8

Cor. t. stand. radius — 0.7

O - C — 2.5

δ' = + 22° 11' 02.3

π = 58' 33".3

9.84913
8.23127
9.84080
0.00787
7.97857

$\alpha - \alpha'$ = + 3 2' 43.36
= + 2m 10s.89

α = 8 44 23.27

α = 8h 44m 22s.84

+ 0.43

+ 0.17

+ 0.60

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1913 Feb. 18.

Remeasure xs

	d	N
1	15611	17830
	6605-97	16849-55
	05-97	55
	28	27
	3.0976	.0977
2	7424-15	13485-96
	10	80
	7370	135-26
	11.0046	11 0039
3	17726	165-49
	1495-159	9301-13
	61	69
	29	50
	26.7230	.7242
4	15-643	15860
	13029-31	84778-1
	33	85
	45	70
	30.7387	7386

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MC 1079 1912 Dec 18. 63.

Comparison Stars - measures. Reseau reversed on plate

4

	d	N
3.1	17998	16829
26.8	98787979	14952 58
mag	79	57
=	08	31
6.8		
	26.81279	.81279

x

	d	N
	15181	18500
	6149 50	17508 03
	50	02
	86	98
	3.0964	.0996

4

	14921	16098
30.8	10815 11	10725 34
15.5	11	52
mag	22	06
=		
8.0	15.4109	.4127

x

	15621	16275
	13000 00	8880 79
	98	887
	25	79
	30.7377	.7396

3

26.7	18029	17613
31.6	12748 50	12905 07
mag	47	10
= 5	31	20
	31.5282	.5291

x

	16436	18341
	13645 44	11075 76
	47	79
	24	36
	26.7215	.7260

2

11.0	16394	16041
9.5	10554 50	11890 94
mag	55	00
=	99	49
9.7		
	9.5844	.5850

x

	9855	14664
	53 50	58 63
	9825	
		12710
	11.0028	.0048

notice 2 and 4 are interchanged.

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MC 1079 1912 Dec. 18. 63.

Comparison Stars - measures
Reseau reversed on plate

	d	N	d	N
3.1	17998	16829	15181	18500
26.8	98778 79	149525 8	61495 0	175086 3
	79	57	50	02
	04	31	86	98
	26.8127	.8127	3.0969	.0996
			15621	16275
4	14921	16098	13000000	68880
10.8	108151 1	102755 34	98	187 79
15.5	11	32	25	79
	22	06		
	15.4109	.4127	30.7377	.7396
3				
26.7	18029	17613	16436	18341
31.6	127485 0	129050 7	126454 4	110757 6
	47	10	47	79
	31	20	24	36
	31.5282	.5291	26.7215	.7260
2				
11.0	16394	16041	9855	12664
9.5	105549 50	118909 4	55 50	58 63
	55	00	9825	
	99	49		12710
9.7			11.0028	.0048
	19.5844	.5850		

Notice 2 and 4 are interchanged.

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remeasure Feb 18

J

d
14723
10178
28
158
37
20.4596

n
14641
927667
99
48
4637

b

15802
499295
99
92
17.2201

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1911phae.proj.1

MC 1079.

1912 Dec. 18. 64

Micron Measures - Reseau Reversed on Plate.

	y			x	
	d	N		d	N
1	18.0	18170	15120		
	18.2	16747 39	6560 50		
		50	50		
		72	22		
		18.1425	.1431		
2	17.2			18177	13955
	19.0			97908 88	12728 35
				80	40
				09	61
				17.1676	.1722
3	17.0	19269	18351		
	19.5	14917 20	12720 21		
		85	17	very oblique.	
		80	61		
		19.4366	.4362		
4	16.9			11847	13615
	20.0			11171 60	98 96
				70	12950
				16.9320	.9347
5	17.0	18582	17054		
	20.5	13553 80	11645 60		
		71	57	very oblique	
		00	58		
		20.4827	.4599		
6	17.3			17578	17437
	21.0			97657 8	15195 00
				69	00
				75	35
				17.2195	.2239

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MC 1079.

1912 Dec. 18. 64

Rozan Reversed. — Plate.

Upon Measures.

.4

	a	N
80	18170	15120
82	16747 39	6560 50
	50	50
	72	22
	18.1425	.1431

	18117	13955
	99090 88	17228 35
	80	40
	09	61
	17.1676	.1722

7.0	19269	18381
9.5	14917 20	12720 21
	85	17
	80	61
	19.4366	.4362

very obliged.

.9	11847	13615
1.0	1117160	9896
	70	12960
	169320	.9347

7.0	18882	17059
0.5	13553 80	11645 60
	71	57
	00	58
	20.4827	.4599

very obliged

7.3	17578	17437
11.0	9765	15195 00
	69 78	00
	75	35
	17.2195	.2239

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1913 Feb. 27.

Remeasure

	d	n
7	18083	13631
	10356 49	11366 71
	55	69
	82	28
	21.7729	.7736
8	11290	10032 45
	10954 60	48
	55	9712
	22.0334	.0330

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MC 1079. 1912 Dec. 18. 65.

Unmeasured - Rescan reversed on plate

	4		x	
γ	d	N	d	N
18.0	16236	17113		
21.7	85293 0	14851 41		
	30	50		
	46	23		
	21.7714	.7732		
δ				
19.0	10947	11875 70		
~22.0	10546 41	72		
max	47	11530		
in				
4	22.0402	.0348		

Possibly on phase limb.

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MC 1079.

1912 Dec. 18. 65.

41

	d		ν	
18.0	16236		17113	
21.7	8529	30	14851	41
	30		50	
	40		23	
	21.7714		.7732	

9.0	10947		11875	70
12.0	10576	41	72	
mean	47		11530	
	22.0402		.0342	

possibly a phase limit

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MC1079

1913 Jan 27

	1	2	3	4
x	3.0976	11.0042	26.7236	30.7386
ξ	3.3207 ✓	11.3478 ✓	26.9167 ✓	31.0430 ✓
x-ξ =	-2231	- 3436	- 1931	- 3044

	1	2	3	4
	y = 26.8127 ✓	y = 9.5847 ✓	y = 31.5286 ✓	y = 15.4118 ✓
	η = 26.7547 ✓	η = 9.5900 ✓	η = 31.6414 ✓	η = 15.5547 ✓
y-η =	+ 580	- 53 ✓	- 1128 ✓	- 1429 ✓

Preliminary Reduction.

x-ξ	-704	-2	+2	+4101
-2231	-1877 = -4108	+3	= -4105 ✓	= -4
-3436	- 671 = -4107	+11	= -4096	= +5
-1931	-2207 = -4138	+27	= -4111	= -10
-3044	-1079 = -4123	+31	= -4092	= +9
mean	19.0138 ✓ -1397 ✓		+19 ✓	= 19.2861 ✓

y-η	+72x	-34	-718
+580	+223 = +803	-80 = +723	= + 5
-53	+792 = +739	-29 = +710	= - 8
-1128	+1924 = +796	-95 = +701	= - 17
-1429	+2213 = +784	-46 = +738	= + 20 ✓
mean	19.9556 ✓ +1369 ✓	-60 ✓	= 20.0147

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MC1079

1913 Jan. 27

	1	2	3	4
x	3.0976	1.0092	26.7236	30.7236
y	3.3207	11.3478	26.9167	31.0430
y − x	−2231	−3436	−1931	−3044

	1	2	3	4
	y = 26.8127	y = 9.5847	y = 31.5286	y = 15.4118
x	26.7547	x = 9.5900	x = 31.6414	x = 15.5547
y − x	+ 580	− 53	− 1128	− 1429

Preliminary Reduction.

x − ξ	− 704	− η	+ ζ		+ 4101
−2231	−1877	= −4108	+ 3	= −4105	= −4
−3436	− 671	= −4107	+ 11	= −4096	= +5
−1931	−2207	= −4138	+ 27	= −4111	= −10
−3044	−1079	= −4123	+ 31	= −4092	= +9
19.0138	−1397		+ 19		= 19.2861

y − η	+ 72x		− 34		− 718
+580	+223	= +803	−80	= +723	= + 5
− 53	+792	= +739	−29	= +710	= − 8
−1128	+1924	= +796	−95	= +701	= − 17
−1429	+2213	= +784	−46	= +738	= + 20
19.9556	+1369		− 60		= 20.0147

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MC 1079 1913 Feb. 6

Times etc.

Eph. to Elias 1911 May 4	11	4	6.0	−	11	57	0
" Moon	11	52	28.2	−	11	52	28.5
clock fast		2	59.3				
H. Sid T.	11	49	29.05				
H Long	4	44	31.05				
G Sid T.	16	34	00.10				
Sid T, M noon	2	45	00.85				
Interval	13	48	59.25				
Reduction		2	15.81				
G. M. T.	13	46	43.44				

	R. A			Decl		
From Am Eph						
Moon 13h	8	42	58.50	+ 23	39	56.2
Motion in 1m : 2.4276			8896			
" " 46.724	+ 1	53.43		−	6	55.7
Tabular place	8	44	51.93	+ 23	33	00.5
Moon's parallax		58	32.9			
" Semidiam		15	58.8			

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MC 1079. 1913 Feb. 6.

Times etc.

Sup. Titan 1911 May 4	11	48		−11	57
Moon	11	52	28.2	−11	52 28.5
Clock fast		2	59.3		
M. Sid T.	11	49	29.05		
M. Long	4	44	31.05		
G Sid T.	16	34	00,10		
Sid T. of noon	2	45	00.85		
Interval	13	48	59.25		
Reduction		2	1581		
G.M.T.	13	46	43.44		

from Conn Eph.		R. A.		Decl.	
Moon 13h	8	42	58.50	+23	39 50.2
Moon in 1m : 2.427 C			8944		
" : 46.724		+1	53.43	−	6 557
Tabular place	8	44	51.93	+23	33 005

Moon parallax	58	32.9
Semidiam	15	58.8

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No	at	am	bm
1	+ 1,84	+ 318,0	+ 563,0
N	+ 1,76	+ 2535	+ 130,0
3	+ 1,04	- 117,0	- 29,8
4	- 0,10	- 367,0	+ 8,8
5	- 1,03	- 58,5	+ 14 8
6	- 1,89	+ 55,7	- 32,6
7	- 1,86	- 216,0	+ 386,5
8	- 0,09	- 0,2	+ 18,8
	- 0,28	- 131,5	+1059,5

[aa] : + 21,25 [bb] : + 13.46

[ac] : - 11.83 [bc] : + 2.25 cm = +.4

Pt.	Pos L.	Resid.
1	209°.4	-21
2	242.9	-45
3	255.7	+79
4	270.0	+125
5	284.2	-64
6	300.3	-158
7	330.6	+96
8	0.0	-12

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MC 1079. 1913 Feb 26. 69

Onomo Center

	x	x − X₀	Δx	(x − X₀)²	(x − X₀)² + (y − Y₀)²	O − C
1	18.0000	− 1.0200	− 4	1.0420	4.3076	− 3.12
2	17.1699	− 1.8501	− 2	3.4236	4.3251	− 1.37
3	17.0000	− 2.0200	− 1	4.0808	4.3446	+ 5.8
4	16.9334	− 2.0866	+ 0	4.3539	4.3564	+ 17.6
5	17.0000	− 2.0200	+ 1	4.0800	4.3417	+ 2.9
6	17.2217	− 1.7983	+ 2	3.2338	4.3357	− 3.1
7	18.0000	− 1.0200	+ 4	1.0396	4.3600	+ 27.2
8	19.0000	− 0.0200	+ 5	0.0004	4.3397	+ 9
				mean	4.3388	+ 4

	y	y − Y₀	Δy	(y − Y₀)²
1	18.1478	− 1.8072	+ 1	3.2657
2	19.0000	− 0.9550	+ 0	0.9025
3	19.4364	− 0.5136	+ 0	0.2638
4	20.0000	+ 0.0500	− 0	0.0025
5	20.4616	+ 0.5116	− 0	0.2617
6	21.0000	+ 1.0500	− 0	1.1025
7	21.7723	+ 1.8223	− 1	3.3204
8	22.0372	+ 2.0872	− 1	4.3593

Approx Center

x = 18.0 y = 18.1478
21.7723
39.9151
Mean y: 19.9576
Mean y: 22.0372
R = 2.0796
x − min = 16.9334
X₀ = 19.0130

x = 17.0 y = 19.4364
20.4616
39.8980
Mean y: 19.9490
Mean y: 22.0372
R = 2.0882
x − min = 16.9334
X₀ = 19.0216

X₀ = 19.0200
Y₀ = 19.9500

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MS 1079 1913 Feb 26. 69

Moons Center.

	x	$x - X_0$	Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O-C
1	18.0000	-1.0200	-4	1.0420	4.3076	-312
2	17.1699	-1.8501	-2	3.4236	4.3251	-137
3	17.0000	-2.0200	-1	4.0808	4.3446	+58
4	16.9334	-2.0866	+0	4.3539	4.3564	+176
5	17.0000	-2.0200	+1	4.0800	4.3417	+29
6	17.2217	-1.7983	+2	3.2332	4.3357	-31
7	18.0000	-1.0200	+4	1.0396	4.3600	+272
8	19.0000	-0.0200	+5	0.0004	4.3397	+9
				mean	4.3388	

	y	$y - Y_0$	Δy	$(y-Y_0)^2$
1	18.1428	-1.8072	+1	3.2656
2	19.0000	-0.9500	+0	0.9025
3	19.4364	-0.5136	+0	0.2638
4	20.0000	+0.0500	-0	0.0025
5	20.4616	+0.5116	-0	0.2617
6	21.0000	+1.0500	-0	1.1025
7	21.7723	+1.8223	-1	3.3204
8	22.0372	+2.0872	-1	4.3598

Approx. Center

x = 18.0 y: 18.1428
21.7723
39.9151
mean y: 19.9576
mean y: 22.0372
R = 2.0796
x - mm: 16.9334
X_0 = 19.0130

x = 17.0 y: 19.4364
20.4616
39.8980
mean y: 19.9490
mean y: 22.0372
R = 2.0882
x - mm = 16.9334
X_0 19.0216

X_0 = 19.0200
Y_0 = 19.9500

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MC 1079 1913 Apr. 25. 78

Moon's Center.

Conditional Equations.

	a	b	c	O					C	O − C
1	−1.02	−1.81	+1	= −312	+126	−203	−214	=	−291	−21
2	−1.85	−0.95	+1	= −137	+229	−107	−214	=	−92	−45
3	−2.02	−0.51	+1	= +58	+250	−57	−214	=	−21	+79
4	−2.09	−0.05	+1	= +176	+259	+6	−214	=	+51	+125
5	−2.02	+0.51	+1	= +29	+250	+57	−214	=	+93	−64
6	−1.80	+0.05	+1	= −31	+223	+118	−214	=	+127	−158
7	−1.02	+1.82	+1	= +212	+126	+204	−214	=	+116	+96
8	−0.02	+2.08	+1	= +9	+2	+233	−214	=	+21	−12

+300 − 225

Average (O−C) = 75

Normal Equations

$$+21.25 - 0.28 - 11.83 = -132$$
$$-0.28 + 13.46 + 2.25 = +1060$$
$$-11.83 + 2.25 + 8.00 = +4$$

$$\frac{\Delta a}{\Delta c} = +0.555$$

$$+0.28 - 0.00 - 0.16 = -2$$
$$+11.83 - 0.16 - 6.59 = -73$$

$$\frac{\Delta b}{\Delta c} = -0.155$$

$$+13.46 + 2.09 = +1058$$
$$+2.09 + 1.41 = -69$$

$$-2.09 - 0.32 = -164$$
$$+1.09 = -233$$

$$c = -214$$

$$-3.10 - 2.09 = +102$$
$$+10.36 = +1960$$

$$b = +1112$$

$$-1.47 + 0.28 + 1.00 = +0$$
$$+70.74 - 13.46 - 47.84 = -24$$

$$+19.78 - 10.83 = -132$$
$$+7046 - 45.59 = +1036$$

$$+16.73 + 10.83 = -246$$
$$+3.05 = -378$$

$$a = -124$$

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MC 1079 1913 Apr. 25. 70

Moon's Center.

Conditional Equations

	a	b	c	O				C	O − C
1	−1.02	−1.81	+1	= −312	+126	−203	−214	= −291	−21
2	−1.85	−0.95	+1	= −137	+279	−107	−214	= −92	−45
3	−2.02	−0.51	+1	= +58	+250	−57	−214	= −21	+79
4	−2.09	+0.05	+1	= +176	+259	+6	−214	= +51	+125
5	−2.02	+0.51	+1	= +29	+250	+57	−214	= +93	−64
6	−1.80	+1.05	+1	= −31	+223	+118	−214	= +127	−158
7	−1.02	+1.82	+1	= +212	+126	+204	−214	= +116	+96
8	−0.02	+2.08	+1	= +9	+2	+233	−214	= +21	−12
								+300	−300

Average (O − C) = 75

Normal Equations

$$+21.25 - 0.28 - 11.83 = -132$$
$$-0.28 + 13.46 + 2.25 = +1060$$
$$-11.83 + 2.25 + 8.00 = +4$$

$$+0.28 - 0.00 - 0.16 = -2$$
$$+11.83 - 0.16 - 6.59 = -73$$

$$+13.46 + 2.09 = +1058$$
$$+2.09 + 1.41 = -69$$

$$-2.09 - 0.32 = -164$$
$$+1.09 = -233 \qquad c = -214$$

$$-3.10 - 2.09 = +102$$
$$+10.36 = +1460 \qquad b = +111$$

$$-1.47 + 0.28 + 1.00 = +0$$
$$+70.74 - 13.46 - 47.84 = -24$$

$$+19.78 - 10.83 = -132$$
$$+70.46 - 45.59 = +1036$$

$$-16.73 + 10.83 = -246$$
$$+3.05 = -378 \qquad a = -124$$

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MC 1079 1913 Apr 28 71

Moon's Mean Position (1911.0)

$x_0 = 19.0200$ $y_0 = 19.9500$
$-\ 62$ $+\ 56$
19.0138 19.9556

From Prelim Reduction $x = 19.2861$ $y = 20.0147$
∴ Plate Constants ax $+\ 3$ $+\ 6$
by $-\ 16$ $-\ 12$
c $+\ 14$ $+\ 8$
$x = 19.2862$ 20.0149

$\xi = +1.2862$ $\eta = -1.9851$
$\log \xi = 0.10931$
∴ $\cos\delta = 9.96357$
∴ const $= 8.507\,24$
∴ $(\alpha - A) = 1.63850$ $\log \tan \xi = 9.6317$
$\xi^2 = 02186$
∴ $\eta_1 = 6.9037$
∴ $\eta_0 = +8$
∴ $\eta_0 = -1.9859$
$\log \eta_0 = 0.29796$n
const $= 7.33115$
$(\delta - D) = 2.96681$n
$\alpha - A = +\ 43.50$
$A = 8\ 41\ 51.$
$\alpha_0 = 8^h\ 42^m\ 34^s.50$
$\delta - D = -\ 15\ 26.4$
$D = +23\ 23\ 58$
$\delta_0 = +23^\circ\ 08'\ 31''.6$
Red $= +\ 0.37$ Red $= +\ 6.2$
$\alpha' = 8\ 42\ 34.87$ $\delta_1 = +23\ 08\ 37''.8$

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MC 1079 1913 Apr 28 71

Moon's Mean Position (1911.0)

$X_0 = 19.0200$ $Y_0 = 19.9500$
$-\ 62$ $+\ 56$
19.0138 19.9556

From Prelim Reduction $X = 19.2861$ $Y = 20.0147$
Platt Constants $ax = +\ 3$ $+\ 2$
$by = -\ 16$ $-\ 12$
$c = +\ 19$ $+\ 8$
$x = 19.2862$ 20.0149

$\xi = +1.2862$
$\log \xi = 0.10931$
$\cos \delta = 9.96357$
const $= 8.50724$
$(\alpha - A) = 1.63850$
$(\alpha - A) = +\ 43.50$
$A = 8\ 41\ 51.$
$\alpha_0 = 8^h\ 42^m\ 34^s.50$
Red $= +\ 0.37$
$\alpha' = 8\ 42\ 34.87$

$\eta = -1.9851$
$\log \tan \delta = 9.63117$
$\delta^2 = 0.2186$
$\eta_1 = 6.9037$
$\eta_0 = +\ 8$
$\eta_0 = -1.9859$
$\log \eta_0 = 0.29796$
const $= 7.52115$
$(\delta - D) = 2.96681$
$\delta - D = -\ 15\ 26.4$
$D = +23\ 23\ 58$
$\delta_0 = +23^\circ\ 08'\ 31.6''$
Red $= +\ 6.2$
$\delta_1' = +23\ 08\ 37.8$

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1079

Red. ad Locum obs.

$\delta_0' = +23^\circ\ 08'$

H+α	23ʰ	39ᵐ	= 354° 45′
H	14	56	
α	8	43	
G	19	06	
G+α	3	49	= 57° 15′

l cos S			99636
(i)			07710 m
(i)			0.73466 m

l cos(G+α)	9.73372
ζ	0.86730
sin ::	9.92488
tan ζ	9.63088
$\frac{1}{r_0}$	8.62239
(δ')	0.60005
(δ)	9.24688

f	+0.32
	+0.16
g	−0.13
	+0.37″

l sin S	9.59943
cos(H+α)	9.99822
h	1.29017
sin ::	8.96814 m
sec S	0.03664
$\frac{1}{r_0}$	8.62239
(h')	0.88842
(h)	9.11346 m

	+3.99
	+7.66
	−5.43
	+6.22″

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1911phae.proj.1

1079

Red. ad Locum apht.

$\delta_0' = +23^\circ\ 08'$

H + α	23ʰ	39ᵐ	= 354° 45′
H	14	56	
α	8	43	
G	19	06	
G + λ	3	49	= 57° 15′

$\ell \cos S$			9.9636
(c)			0.7710 n
(i)			0.7346 n

$\ell \cos(G+\lambda)$			9.7332
ζ			0.8673
sin ..			9.9248
tan C			9.6308
$\frac{1}{15}$			8.8239
(δ')			0.6005
(δ)			9.2468
f			+0.32
g			+0.16
z			−0.13
			+0.37

$\ell \sin S$			9.5943
$\cos(H+\alpha)$			9.9982
h			1.2917
sin ..			8.9614 n
sec S			0.0364
$\frac{1}{15}$			8.8239
(h')			0.8842
(h)			9.1134 n
ξ'			+3.99
ξ			+7.66
c			−5.43
			+6.22

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1911phmo.proj.1

1079

Lunar Parallax.

$\alpha' = 8^h\ 42^m\ 34^s.87$ ✓

$\Theta = 11\ 49\ 29.05$ ✓

$\delta - \alpha = +3\ 06\ 54.2$ ✓

$= +46^\circ\ 43'\ 33''$ ✓

$+ \quad 17\ 12$ ✓

$+46\ 26\ 21$ ✓

9.957127 ✓
9.999999
0.161700 ✓
0.118896 ✓

$\gamma = 52^\circ\ 45'\ 02''$ ✓

$23\ 08\ 38$ ✓

$29\ 36\ 24$ ✓

9.826400 ✓
8.231222 ✓
9.693777 ✓
0.099099 ✓
7.850498 ✓

$\delta - \delta' = +24\ 21.9$ ✓

$\delta = +23\ 32\ 59.7$ ✓

Hamilton $\delta = +23\ 33\ 00.5$ ✓

O − C $- 0.8$ ✓

Corr. to Island Radius $- 0.4$ ✓

O − C $- 1.2$ ✓

$\delta' = +23^\circ\ 08'\ 37''.8$ ✓

$\Pi = 58'\ 32''.9$ ✓

9.869133
8.231222
9.862188 ✓
0.037777 ✓
8.000030 ✓

$\alpha - \alpha' = +34'\ 24''.10$ ✓

$= +2^m\ 17^s.61$ ✓

$\alpha = 8\ 44\ 52^s.48$ ✓

$\alpha = 8\ 44\ 51^s.93$ ✓

$+0.55$ ✓
$+0.08$ ✓
$+0.63$ ✓

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1079

Lunar Parallax.

$\alpha' = 8^h\ 42^m\ 34^s.67$

$\Theta = 11\ 49\ 29.05$

$\Theta - \alpha = +3\ 06\ 54.2$

$= +46^\circ\ 43'\ 33''$

$+\quad 17\ 12$

$+46\ 26\ 28$

9.957727
9.999999
0.161710
0.118896

$\delta' = +23^\circ\ 08'\ 37''.8$

$\pi = \quad 8'\ 32''.9$

9.869113
8.231222
9.662178
0.037777
8.000030

$\alpha - \alpha' = +34'\ 24''.10$

$= +2^m\ 17^s.61$

$\delta = 52^\circ\ 45'\ 02$

$23\ 08\ 38$

$29\ 36\ 24$

9.826400
8.231222
9.693777
0.099909
7.855048

$\delta - \delta' = \quad +24\ 21.9$

$\delta = +23\ 32\ 59.7$

$\alpha = 8\ 44\ 52.48$

Hartwell $\delta = +23\ 33\ 00.5$

$\alpha \quad 8\ 44\ 51.93$

$O - C \quad -0.6$

$+0.55$

Corr. to Island radius -0.4

$+0.08$

$O - C \quad -1.2$

$+0.63$

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