1915phaa.proj:2

KG
11366
v.996

CXLIV

144

No.	Date	Page
10073	Dec. 21. 1915	1
10103	Dec. 22. 1916	21

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6 Stars

	+5.5%			+3.8% 14909	resid
14766	+109	= 14875	+ 47	= 14922	+ 13
14813	+ 22	= 14835	+ 55	= 14890	− 19
14695	+147	= 14842	+ 76	= 14918	+ 9
14779	+ 61	= 14840	+ 76	= 14916	+ 7
14637	+146	= 14783	+ 105	= 14888	− 21
14746	+ 57	= 14803	+ 119	= 14922	+ 13

	+6%			+6.9%	resid
9192	+ 74	= 9266	+ 136	= 9402	− 5
9378	+ 87	= 9465	+ 31	= 9496	+ 89
9171	+120	= 9291	+ 185	= 9475	+ 68
9234	+120	= 9354	+ 77	= 9431	+ 24
9143	+166	= 9309	+ 183	= 9492	+ 85
9185	+188	= 9373	+ 72	= 9445	+ 38

9407

all but 2996

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5 Stars.

037)	12.3203	19.7611	14766	9192
038	14.4540	4.0634	~~14813~~	~~9378~~
044)	20.0264	26.6355	14695	9171
045)	20.1108	11.1686	14779	9234
3976) AC	27.6360	26.5489	14637	9143
AC 0975)	31.2582	10.4331	14746	9185
2996 AC	34.43.81	18.8315	14685	9245
	17.48	19.19	14747	9199
	29.44	18.49	14691	9164
	1999	24.31	14699	9169
	25.68	10.80	14762	9210

$-11.96 + 0.70 = +56 + 35$

$-5.69 + 13.51 = -63 - 41$

$+ (\quad) - 0.33 = - \quad 26.6 - 16.6$

$+ 13.18 = -89.6 = -57.6$

$-11.96 = +56 + 4.8 = +60.8$

$= +35 + 3.1 = +38.1$

$\times$

$-5.1 \quad -66.8$

$-3.2 \quad -4.4$

+0.0 +2.7 +5.3

+0.0 −0.2 −0.9

+0.0 +4.4 −1.2

−0.2 −0.5 −0.9

Table

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4 Stars

$1.85x - .08y = -8.9 = -7.5$

$1.85 - 15.79y = +96 = \times 53$

$-15.71y = 87.1 = 60.5$

$y = -5.6 = -3.9$

$1.85x = -8.5 = -7.8$

$x = -4.6 = -4.2$

$+5.6y \quad +4.6x$

$+4.2x \quad +3.9y$

$-.2 \quad -.4 \quad \overset{a-e}{+0.2} \quad \overset{b+d}{+0.7}$

$-504.6x \; -503.9y \quad -0.7 \quad -9.8 \quad 10.5$

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4724
10055
14779

3650
5584
9234

14695

456 − 4131
6,3275

+4x +4y 37+y +y/43

14695	14775	14881	14907	14933
14779	14859	14904	14915	14926
14637	14747	14853	14880	14907
14746	14871	14913	14923	14934

20	0796	18.90	14737	9202
29	44	1849	14692	9164
23	83	2659	14666	9157
25	68	1080	14762	9210

+9.37x −0.41y = −45 −38

+1.85x −15.79y = +96 +53

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5 Stars

	+6.8%		+5.1%		-14967	
1037) 14766	+ 134	= 14900	+ 63	= 14963	- 4	
1138) 14819						
1144) 14695	+ 181	= 14876	+ 102	= 14978	+ 11	
1045) 14779	+ 76	= 14855	+ 103	= 14958	- 9	
3978) 14637	+ 180	= 14817	+ 141	= 14958	- 9	
2975) 14746	+ 71	= 14817	+ 161	= 14978	+ 11	

	+3.2%		+4.4%		-9340	
9192	+ 40	= 9232	+ 87	= 9319	- 21	
9384						
9171	+ 64	= 9235	+ 117	= 9352	+ 12	
9234	+ 64	= 9298	+ 49	= 9347	+ 7	
9143	+ 89	= 9232	+ 117	= 9349	+ 9	
9185	+ 100	= 9285	+ 46	= 9331	- 9	

6.8
4.4
5 1 11.2
2.2
6.3

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+2.6x

9192	+ 32	= 9224	+	100	= 9324	−	42	−18
9378	+ 38	= 9416	+	21	= 9437	+	71	
9171	+ 52	= 9223	+	136	= 9359	−	7	+20
9234	+ 52	= 9286	+	57	= 9343	−	23	+4
9143	+ 72	= 9215	+	135	= 9350	−	16	+11
9185	+ 81	= 9266	+	53	= 9319	−	47	−20
9245	+ 90	= 9335	+	96	= 9431	+	65	

+136 − 135

135

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7 stars.

167279	154071	14738	9244
31 1108	186045	14689	9191
23.61	22.94	14696	9188
2194	8.56	14779	9266

$-14.38 \quad -3.20 \quad = + \quad 49 \quad = + \quad 53$

$+1.67 \quad +14.38 \quad = - \quad 83.0 = - \quad 78.0$

$-(\quad) \quad -0.37 \quad = + \quad 5.7 = + \quad 6.2$

x	y
-2.2	-5.4
-2.6	-5.1

$+14.0 \quad = - \quad 77.3 = - \quad 71.8$

$-14.38 = +49 - 17.3 = +31.7$

$= +53 - 16.3 = +36.7$

	+5.48		+2.2x − 14872	
14766	+107 =	14873	+27 = 14900	+28
14813	+22 =	14835	+32 = 14867	−5
14695	+144 =	14839	+44 = 14883	+11
14779	+60 =	14839	+44 = 14883	+11
14637	+138 =	14775	+61 = 14836	−36
14746	+56 =	14802	+69 = 14871	−1
14685	+102 =	14787	+76 = 14863	−9

Tables

−.2	−.4	+0.2	+0.7
−5022	−505.1	+2.9	−8
		+2.7	−8.7

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6 Stars.

15.60	16.82	14758	9247
26.33	16.05	14721	9187
19.99	24.31	14699	9169
2194	8.55	14779	9266

−10.73	+ 0.77	= + 3.7	= + 60.
− 1.95	+15.76	= − 80.0	= − 97.0
+ ( )	− 0.14	= − 6.7	− 10.9
	+15.62	= − 86.7	= − 107.9
− 10.73	= + 37 + 4.2	= +41.2	
	= + 60 + 5.3	= +65.3	

Obs.	−503.8	−506.9	+ 3.1	+ 11.5
Obs.			+ 0.2	+ 0.7
			+ 2.9	− 12.2

	x	y
	− 3.8	− 5.5
	− 6.0	− 6.9

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1915phae.proj.2

1037
1038
1044

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	x	y			stars
	20.0264	26.6355	14695	9171	1044
	20.1108	11.1686	14779	9234	1045
	27.6360	26.5489	14637	9143	3978
	31 25.82	10.4331	14746	9185	2975

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Harvard Lunar Plates

Measures and Reduction

Ernestine Fuller.

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1915phae proj. 2

10073 Drr **Star Measures** Tycho 23.6 15.7

1	18289	16882	16702	16298
12.2	16453	8712	12488	10509
26.4	53	14 } 13	88	15 } 12
	89	6872	08	6298
	12.1836	12.1838	26.4216	26.4204

2	18176	18518	17365	17754
26.6	13122	13581	16070	9026
9.1	22	79 } 80	70	28 } 27
	78	18	57	7760
	26.5055	26.5062	9.1295	9.1267

3	18238	14632	19067	13880
28.2	16222	6629	17090	5856
23.2	22	33 } 31	86 } 88	58 } 57
	42	4632	67	82
	28.2017	28.1999	23.1979	23.1975

Moon Measures

1	16718	16392	18052	17652
24.2	14783	8342	16032	9660
15.1	86 } 84	38 } 40	38 } 35−	70 } 65−
	18	90	50	52
	24.1934	24.1950	15.2017	15.2013

2			16196	16158
25			15693	6668
16.0+			01 } 97	58 } 63
			6200	6162
			16.0489	16.0501

3	16438	16700
25.2	14648	8478
16.8	46 } 47	76 } 77
	32	02
	25.1790	25.1775

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10073 Dm Star Measures Tycho 23.6 15.7

1.

1	18289	16882	16702	16298
12.2	16453	8712 (13	12488	10509 (12
26.4	53	14)	88	15)
	89	6872	08	6298
	121836	121838	264216	264204

2

2	18176	18518	17365	17754
26.6	13122	13581 (89	16070	7024 (27
9.1	22	72	70	28)
	78	518	57	7760
	265055	265062	91295	91267

3

3	18238	14632	19067	13880
28.2	16222	6629 (31	17090 (88	5856 (57
23.2	22	33)	86)	58)
	42	4632	67	82
	282017	281999	231979	231975

Iron Measures

1

1	16718	16392	18052	17652
24.2	14783 (84	8342 (40	16032 (80	9660 (45
15.1	86)	38)	38)	70)
	18	90	50	52
	241934	241950	152017	152013

2

2			16194	16158
25			15693 (97	6668 (63
16.2			01)	58)
			6200	6162
			160449	160501

3

3	16438	16700	
25.2	14648 (47	8478 (77	
16.8	46)	76)	
	32	02	
	251790	251775	

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Star 1037 Plate 10103

16440	16998	16983	17457
13230	10197	9370	15-0647
32 31	94	72	67
36	91	74	70
	96	81	53
12.32208	12.31998	19.76111	19 76 11

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10073

Moon Measures-

4 15872

25

17.6

	15942		16161
	9842		12278 } 75
	42		72
	46		6161
	17.6101		17.6114

5 15226

24.7 7720 } 19

1.8 18

24

24.7506

15292

12795

95

90

24.7504

6

24

18.5

	16592		17263
	11232		12620 } 21
	32		22
	96		63
	18.5362		18.5358

I

23.5

18.6

	15054		17448
	8450 } 51		14035 } 39
	52		43
	54		7458
	18.6603		18.6589

8

23

18.5

	15040		18856
	8770 } 71		15125
	72		25
	5040		8860
	18.6269		18.6263

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1 C 0 7 3 — Moon Measures.

4 — 1 5 8 7 2
25"
17.6

1 5 9 4 2 — 1 6 1 6 1
9 8 4 2 — 1 2 2 7 8 — 75"
4 2 — 4 2
4 6 — 6 1 8 1
17.61.01 — 17.61.14

5" — 1 5 2 2 6 — 1 5 2 9 2
24.7 — 7 7 2 0 } 19 — 1 2 7 9 5"
18 — 1 8 — 9 5"
2 4 — 9 0
24.75.06 — 24.75.04

6 — 1 6 5 9 2 — 1 7 2 6 3
24 — 1 1 2 3 2 — 1 2 6 2 0 } 21
18.5" — 3 2 — 2 2
9 6 — 6 3
18.53.62 — 18.53.58

I — 1 5 0 5 4 — 1 7 4 4 8
235 — 8 4 5 0 } 51 — 1 4 0 3 5 } 39
18.6 — 5 2 — 4 3
5 4 — 7 4 5 8
18.66.03 — 18.65.89

8 — 1 5 0 4 0 — 1 8 5 6
23 — 8 7 7 0 } 71 — 1 5 1 2 5"
18.5" — 7 2 — 2 5"
5 0 4 0 — 8 4 4 0
18.62.69 — 18.62.63

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10073 Juno Etc.

Dec. 21, 1915

Eff. to Stars	07	04			07	16	
Eff. to Moon	07	10	10.2		07	10	10.4
Clock fast		-5	21.8				
H. Sid Time	07	04	48.5		θ − α = +0h 34m		
H. Long	04	+4	31.05				
G. Sid Time	11	49	19.05				
G. Sid Time M. Noon	17	55	54.04				
Interval	17	53	25 51				
Reduction		2	55.85				
G.M.T	17	50	29.66		17.8414 57		

From Naut Almanac

	R A				Decl.			
Moon 17h	06	29	04.94		+26	01	36.1	
Motion 1m			2.1815				-3.807	
11 50.4943			1 50.15			-3	12.22	
Tabular Place	06	30	55.09		+25	58	23.9	

Moons age 15.5 days

Parallax 54' 0."27

Semi-diam 14' 44.5

R 884.5

Aug 13.4

Dec 4. − 0.6

R 897.3

R 1.9235

a R − 927

(1+a) R 1.8308

R 2 3.3519

934" = 14.9

a = −5 06

+ 24

−482

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1915phae.proj.2

10073 Times Etc.

Dec 21. 1915

Eq ☆ Stars	07	04	"		07	16	-
Eq ☾ Moon	07	10	10.2	"	07	10	10.4
Clock fast		-5	21.8	"			
☿ Sid Time	07		4	48.5	-	θ - α =	+0 34
☽ Long	04	+4	31.05	"			
☽ Sid Time	11	49	19.55	-			
~~☽ Sid Time M Noon~~	17	55	54.04	"			
Interval	17	53	25.51	"			
Reduction			2	55.85	"		
G. M. T	17	50	29.66				

From Naut Almanac

	R A				Decl.			
Moon 17h	07	29	04.94	"	26	01	36.1	-
motion 1m			2.18.15				-38.07	
" 50.4943			1 50.15	-		-3	12.22	-
Tabular Place	06	30	55.09	-	25	58	23.9	-

934" = 1.59

a = -5.06
+ 24
-4.82

Moons Age		15.5 days
Parallax		54. 0.27
Semi diam		14 44.5 -
R		884.5 "
Aug		13.4 -
Dr 4		-0.6 -
R		897.3 -
R		1.92 35 "
a R		- 92.7 "
11+1 R		1.83 08 -
R 2		3.35 19 "

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10073. Plate Constants 4

X	12.1837	26.5058	28.2008
ξ	12.2695	27.2020	29.0757
X−ξ	−.0858	−0.6962	−.8749

y	26.4210	9.1281	23.1977
η	26.7810	8.5154	23.2850
y−η	−.3600	+.6127	−.0873

X−ξ +5-06 X +66.1y +6X −705-3

−0858 + 6092 = 5-234 + 1741 = 6980 + 73 = 7053
−.6962 + 13253 = 6291 + 603 = 6894 + 159 = 7053
−.8749 + 14106 = 5351 + 1533 = 6884 + 169 = 7053
23.34544 + 11673 + 1112 + 140 = 23.93326

y−η +5-00y −68.6X +5.7y −8924

−.3600 + 13210 = 9610 − 836 = 8774 + 150 = +8924
+.6127 + 4564 = 10691 − 1818 = 8873 + 52 = 8925
−.0873 + 11599 = 10726 − 1934 = 8792 + 132 = 8924
16.82772 + 8419 − 1601 + 96 = 16.6257

Tables a = −0.2 e = −0.2 a − e = 0.0 b + d = −0.5
= −506. = −505.7 = −0.3 +2.5

O − C −505.8 −505.5 +3.0

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10073. Plate Constants 4

X	12.1837	26 5.058	28.2008
ξ	12 26 95	27 20 20	29 07 57
X-ξ	-.0858	-0.6962	-.8749

y	26 4210	9 1281	23.1977
η	26 7810	8 51 54	23.2850
y-η	-.3600	+.6127	-.0873

X-ξ +5.00 X +66.1 y +tX -705.3

-0858 + 6092 = 5234 + 1741 = 6980 + 73 - 7053
-6962 + 13253 = 6291 + 603 = 6894 + 159 = 7053
-8749 + 14100 = 5351 + 1533 = 6884 + 164 = 7053
23345.4 + 11673 + 1112 + 140 = 239326

y-η +5.00 y -68.6 X +5.7 y -8924

-3600 + 13210 = 9610 - 836 = 8774 + 150 = +8924
+6127 + 4564 = 10691 - 1818 = 8873 + 52 = 8925
-0873 + 11599 = 10726 - 1934 = 8792 + 132 = 8924
16.8272 + 8414 - 1601 + 96 = 166257

Table a = -0.1 x = -506 b = 0.1 x = -505.7 a - b = 0.0 = +0.3 f + d = -d; + 2.5

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10073 Moons Center 5

	X	$X - X_0$	$\rho^2 = (X-X_0)^2 + (Y-Y_0)^2$		O-C
1	24.1942	+ 0.8462	0.7160	3.3680	+ 161
2	25.0000	+ 1.6520	2.7291	3.3383	− 136
3 X	25.1782	+ 1.8302	3.3496	3.3496	− 23
4	25.0000	+ 1.6520	2.7291	3.3388	− 131
5	24.7505	+ 1.4025	1.9670	3.3359	− 160
6	24.0000	+ 0.6520	0.4251	3.3355	− 164
7	23.3480	+ 0.0000	0.0000	3.3474	− 45
8	23.0000	− 0.3480	0.1211	3.3489	− 30

R^2 3.3519

	Y	$Y - Y_0$	$\rho^2 = (Y-Y_0)^2$		
1	15.2015	− 1.6285	2.6520	153.0	−
2	16.0495	− 0.7805	0.6092	115.0	−
3	16.8300	+ 0.0000	0.0000	90.0	−
4	17.6108	+ 0.7808	0.6097	65.0	−
5	18.0008	+ 1.1700	1.3689	50	−
6	18.5360	+ 1.7060	2.9104	21	
7	18.6596	+ 1.8296	3.3474	0	
8	18.6266	+ 1.7966	3.2278	349	

Approx. Center

X = 25 Y = 16.0495
17.6108
33.6603
Y_0 16.8301

Y max 18.6596
R 1.8295
Com. R 1.8308
X max 25.1782
X_0 23.3482

Moon Center { X_0 23.3480
Y_0 16.8300

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1915phae.proj. 2

10073 Moons Center

	X	X − X₀	(X − X₀)²	+ Y − Y₀)²	O − C
1	24.1942	+ 0.8462	0.7160	3.3680	+ 1 61
2	25.0000	+ 1.6520	2.7291	3.3383	− 136
3	25.1782	+ 1.8302	3.3496	3.3496	− 23
4	25.0000	+ 1.6520	2.7291	3.3388	− 131
5	24.7505	+ 1.4025	1.9671	3.3359	− 160
6	24.0000	+ 0.6520	0.4251	3.3355	− 164
7	23.3480	+ 0.0000	0.0000	3.3474	− 45
8	23.0000	− 0.3480	0.1211	3.3489	− 30

R^2 3.3519

	Y	Y − Y₀	(Y − Y₀)²	
1	15.2015	− 1.6285	2.6520	153°
2	16.0495	− 0.7805	0.6092	115°
3	16.8300	+ 0.0000	0.0000	90°
4	17.6108	+ 0.7808	0.6097	65°
5	18.0000	+ 1.1700	1.3689	50
6	18.5360	+ 1.7060	2.9104	20
7	18.6596	+ 1.8296	3.3474	0
8	18.4266	+ 1.5966	2.5478	345

Approx Center

X = 25 Y = 16.0495
17.6108
33.6603
Y_0 16.8301

Y max 18.6596
R 1.8295
Com. R 1.8308
X max 25.1782
X_0 23.3482

Mean Center. X_0 23.3480
Y_0 16.8300

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Formation of normals.

1	− 1.37	+ 1370	− 261
2	− 1.29	− 2240	+ 106
3	+ 0.00	− 420	− 000
4	+ 1.29	− 2160	− 102
5	+ 1.64	− 2240	− 187
6	+ 1.10	− 1060	− 280
7	+ 0.00	− 0000	− 82
8	− 0.63	+ 105	− 54
	+ 403	+ 1475	+ 106
	− 3.29	− 8120	− 966
	+ 0.74	− 6645	− 860

				− 15
−a		−b		+Δc
+	8	−	6	− 13 v
+	16	−	3	− 2 v
+	18	+	0	+ 3 v
+	16	+	3	+ 4 v
+	14	+	4	+ 3 v
+	6	+	7	− 2 v
+	0	+	7	− 8 v
−	3	+	7	− 11 v

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10073 Conditional Equations 6

							O−C
1	+0.85	−1.63	= +161	−42	+91	= +49	+132
2	+1.65	−0.78	= −136	−86	+44	= −42	−94
3	+1.83	+0.00	= −23	−95	−00	= −95	+72
4	+1.65	+0.78	= −131	−86	−44	= −130	−1
5	+1.40	+1.17	= −160	−73	−61	= −134	−26
6	+0.65	+1.71	= −164	−34	−89	= −123	−41
7	+0.00	+1.83	= −45	−00	−95	= −95	+50
8	−0.35	+1.80	= −30	+18	−94	= −76	+46
	+7.68	+4.88				+228 −162	
						ar 49	

12.04 + 0.74 = −664.5 +7.68
+0.74 + 14.72 = −860.0 +4.88

+0.74 +0.04 = −40.8 +0.47

+14.68 = −819.2 74.41 b = −55.7 +0.30

12.04 = −664.5 + 41.4 = −623.1 a = −51.6 +0.66

arc 165

$\frac{\Sigma}{n}$

$\frac{P}{n}$ = .22 +8.2 $\frac{+8.2}{.22}$ = +37 Δ R = +0.5

Corr +0.2

True Δ R = +0.3

−15

−3R = −3.66 −2R Corr = −0.73

−4
Δb = −0.22 Δ S = −0.1

−10
Δa = −0.48 Δ α = −0.02

Corrected O−C
+119″
−96″
+75″
+3″
−23″
−43″
+42″
+35″

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10073 Conditional Equations 6

						O−C	
1	+0.85	−1.63	= +1.61	−42	+91	= +49	+132
2	+1.65	−0.78	= −136	−86	+44	= −42	−94
3	+1.83	+0.00	= −23	−95	−00	= −95	+72
4	+1.65	+0.78	= −131	−86	−44	= −130	−1
5	+1.40	+1.17	= −160	−73	−61	= −134	−26
6	+0.65	+1.71	= −164	−34	−89	= −123	−41
7	+0.00	+1.83	= −45	−00	−45	= −95	+51
8	−0.35	+1.80	= −30	+18	−94	= −76	+46
						+228	−162
						ar	49

12.04 + 0.74 = −664.5

1 +0.74 + 14.72 = −860.0

1 +0.74 +0.04 = −40.8

+14.68 = −819.2 b = −55.7

1 −12.04 = −664.5 b +41.4 = −623.1 a = −5.16

arc 165

$\frac{E}{n}$ = .22 $\frac{\Sigma K}{n}$ +8.2 $+\frac{82}{22}$ = +3.7 Δ R: +0.5

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10073. Moon's Mean Position. 7

X_0 23 34 80″
− 26″
23.3454″

Y_0 16.8300″
− 28″
16.8272″

From Plate Constants.

X 23.9326″
−22
ξ_0 +1.9326″

y 16.6257″
−1.8
$\eta_1+\eta_0$ −1.3743″

log ξ_0 0.28614″
log cos δ 9.95471″
8.50724″
log sin(α−A) 1.82419″

log tan δ 9.68824″
log ξ_0^2 0.57234
7.05534
log η_1 7.30811″

sin(X−A) 66.71″
= +1 06.71
A 06 29 16.68″
α_0 06 30 23.39″
Red +6.08″
α' 06 30 29.47″

η_1 0.00020″
η_0 −1.3763″
log η_1 0.13871″
−7.33115″
log tan($\delta-D$) 2.80756″
$\delta-D$ −642.03″
−10 42.0″
D 25 53 34.7″
δ_0 25 42 52.7″
Red +0.9″
δ' 25 42 53.6″

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10073. Hodus Mean Position.

X_0 23 34 80 −
− 26 −
23.3454 −

Y_0 16.8300 −
" − 28 −
16.8272 −

From Plate Constants.

X 23 93 26 "
−22
ξ_0 +1.9326 "

Y −16 62 5.9 "
−18
$\eta + \eta_0$ −1.3743 "

log ξ_0 0.28614 −
log cos δ 9.95471 −
8.50724 −
log 2m(A−A) 1.82411 94 −

2m(X−N) 66.71 −
= +1 06.71
A 06 29 16.68 −
α_1 06 30 23.39 −
Red +6.08 "
α' 06 30 29.47

log tan δ 9.18244 −
log ξ_0^2 0.57234 −
7.05534
log η_1 7.30811 −

η_1 0.00020 −
η_0 −1.37633 −
log η_1 0.13871 m
7.33115
log tan δ(E) 2.80756 m

δE −6 42 33 −
−100 42.0
δ 25 5 3 34.7
δ_0 25 42 52.7 −
Red +0.9 "
δ' 25 42 53.6 −

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α'	06	30	29.47	π	54'	00.27	
θ	07	04	48.50	log sin ϕ'	9.859132		
$\theta-\alpha'$		34'	19.03	log sin π	8.196144		
=	08°	34'	45".45	" Sin $(\theta-\alpha')$	9.173711		
$\frac{1}{2}(\alpha-\alpha')$		3	18.89	" Sec δ' ep	004624		
$\theta-\frac{1}{2}(\alpha+\alpha')$	08	31'	26.56	Sin $(\alpha-\alpha')$	7.285222		
log tan ϕ'	9.957271						
log cos $\frac{1}{2}(\alpha-\alpha')$	0.000000						
Sec $(\theta-\frac{1}{2}(\alpha+\alpha'))$	000482						
log tan γ	9.962091						

$\alpha-\alpha'$ + 6 37.78

= + 26.52

γ	42	30	09.2
δ'	25	42	53.6
$\gamma-\delta'$	16	47	15.6

log sin ϕ	9.826408
log sin π	8.196144
Sin $(\gamma-\delta')$	9.460644
Cosec γ	0.170300
Sin $(\delta-\delta')$	7.653484

$\delta-\delta'$		+15'	28".7	α -	06	30	55.99
δ	25°	58'	22.3	ep α	06	30	55.09
ep δ	25°	58'	23.9	O-C			+0.90
O-C			- 1.6	corr			0.00
corr			0.0				
Sud and refraction			00	Dur. Corr			- 0.02
Dur. Corr.			- 0.1	α -	06	30	55.97
δ -	+25°	58'	22.2	O-C			+0.98
O-C			- 1.7				

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10173 Juno Parallax

α'	06	30	29.47	π	57	00	27	
Θ	07	04	48.50	log sin Δ'	9.	86	91	3
$\Theta - \alpha'$		34	19.03	log sin π	8.	19	61	4
=	08°	34	45.45	" sin $(\Theta - \alpha')$	9.	17	37	1
$\frac{1}{2}(\alpha - \alpha')$		3	18.89	" sec δ' Eph	0.	04	62	4
$\Theta - \alpha' - \frac{1}{2}(\alpha - \alpha')$	08	31	26.56	sin $(\alpha - \alpha')$	7.	28	52	2
log tan Δ'	9.	95	72	7				
log cos $\frac{1}{2}(\alpha - \alpha')$	0.	00	00	0				
c $\Theta - \alpha' - \frac{1}{2}(\alpha - \alpha')$	0.	00	48	2				
log Tan Y	9.	96	20	9				

$\alpha - \alpha'$ + 6 37.78

= + 26.52

Y 42 30 09.2

δ' 25 42 53.6

Y - δ' 16 47 15.6

log sin Δ	9.	82	64	0
log sin π	8.	19	61	4
sin (Y - δ')	9.	46	06	4
Cosec Y	0.	17	03	0
sin $(\delta - \delta')$	7.	65	34	8

$\delta - \delta'$ +15' 28.7

δ 25 58 22.3

Eph δ 25 58 23.9

O - C - 1.6

Corr. 0.0

2nd Ord refraction 00

Dur Corr - 01

δ +25 58 22.2

O - C - 17

α - 06 30 55.99

Eph α 06 30 55.09

O - C +0.90

Corr 0.0

Dur Corr - 002

α 06 30 55 97

O - C +0 98

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Moon Measures

1

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Moon Measures

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10102 Times Etc.

Date Dec. 22, 1915

Diff ☽ Stars	05	19		05	31
" " Moon	05	25	12.4	05	25	12.7
Clock fast		05	23.5			
♈ Sid Time	05	19	49.05			
H Long	04	44	31.05			
G. Sid Time	10	04	20 10			
G Sid Time M N	17	59	50.60			
Interval	16	04	29.50			
Reduction			2 38.01			
G. M. T.	16	01	51.49			

$\theta - \alpha = -1^h\ 59^m$

16.031

From Nautical Alm.			RA		Decl.	
moon 16^h	07	18	37.66	+24	03	29.9
Motion 1^m			2.1219			6.47
" 1.8581			3.94			12.0
Tabular Place	07	18	41.60	+24	03	17.9

Moons Age 16 days.
Parallax 54.
Semidiam 14 46.6
R 886.6
Aug 18.0
Dr 3
R
R
aR
(1+a)R
R_2

934" = 13.5

a =
+24

Poor Plate—

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10102 Times Etc.

Date DEC 22, 1915

Exp ☆ Stars	05	19			05	31	
" " Moon	05	25	12.4		05	25	12.7
Clock fast		05	23.5				
☆ Sid Time	05	19	49.05				
☆ long	04	44	31.05				
☽ Sid Time	10	04	20 10				
☽ Sid Time M M	17	59	50.60				
Interval	16	04	29.50				
Reduction			2	38.01			
G. M. T.	16	01	51.49				

$\phi - \lambda = -1^h\ 59^m$

From Nautl Alm.			RA		Decl.	
moon 16h	07	18	37.66	24	03	29.9
Motion 1m			21219			647
" 1.8581			394			120
Tabular Place	07	18	4160	24	03	17.9

Moons Age 16 days

Parallax 54

Semidiam 14 46.6

S = 6.6

-13.0

934" = 13.5

a = +24

R

Corr

Sun 3

R

R

aR

(1+a) R

R 2

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Standard Coordinates.

Cape No	Mg	Cape No	Mg	Cape No	Mg.

Cape
E
Mean
Prec
α
A
α - A
sin A - A
log "
" cos δ
" ξ₀
ξ₀ '
ξ
x
X - ξ
Cape
E
Mean
Prec
δ
δ - D
tan δ - D
log "
" η₀
log tan δ
" ξ₀²
" η₁
η₀
η₁
η
y
y - η

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Standard Coordinates.

Cape No	Mg	Cape No	Mg	Cape No	Mg.
C					
η					
ε					

Mean
Prec
α
A
α - A
Sin α - A
log "
" δ
Cos δ
" ξ₀

ξ₁
ξ₂
ξ
X
X - ξ

C
η
ε

Mean
Prec
δ
δ - Φ
Tan δ - Φ
log "
" η₀

log tan δ
" ξ₂²
" η₁

η₀
η₁
η
y
y - η

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Formation of normals.

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1038

18642 18675
14102 13216
02 16
42 75
14.45540 14.45541

17270 17658
16634 32 18285 89
30 92
70 58
4.0638 4.0631

2996 AC. (7.9)

17355 16708
12970 11080 85
70 90
55 6708
34.43855 34.43777

17904 17410
9582 157161 19
82 22
04 7410
18.8322 18.8309

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1903.

Star Measures Tydro 23.9 14421

1	17001	15988		19933		16428	
20.	16738	6258	5-5-	13572	70	12778	
36.6	40	52		68		78	
	01	5988		31		6430	
	20.0262	20.0267		26.6362		26.6348	
2	18504	16651		18032		16218	
20.1	17390	7753	56	16332		7886	90
11.1	96	59		32		94	
	00	6651		36		6218	
	20.1111	20.1106		11.1700		11.1672	
3	17408	18918		17008		14070	
27.7	11052	15282	81	11512	10	95 5-0	52
26.6	48	80		08		95 54	
	04	8918		10		4076	
	27.6356	27.6363		26.5499		26.5479	
4	15450	17253		17830		17732	
31.3	12864	9823	21	13491	95-	12060	
10.4	58	19		99		62	
	40	7253		26		7732	
	31.2597	31.2568		10.4333		10.4330	

Moon Measures.

1	15217	18851					
24.5-	97011	14378	76				
14.	11	74					
	19	8851					
	24.5512	24.5525					
2				16676		16194	
25-				13250	57	10424	19
14.3				52		14	
				70		6994	
				14.3423		14.3425	

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10103.

Star Measures Tycho 23.9 14421

1	17001	15982		19933		16428	
20.1	16738	6258	53	13572	70	12758	56
6.6	40	52		68		88	
	01	5988		31		6430	
	20.0262	20.0267		21.6362		26.6378	
2	18504	16651		18032		16218	
20.1	18390	7753	56	16332	90	7886	
1.1	96	59		32		94	
	00	6651		36		6218	
	20.1111	20.1108		11.1700		11.1672	
3	17408	18918		17008		14070	
22.7	10052	15282	81	11512	10	12550	52
26.6	48	80		08		9054	
	04	8918		10		4176	
	27.6356	27.6363		26.5499		26.5479	
4	15450	17253		17830		17732	
31.3	12764	9823	21	13491	95	12050	
10.44	58	19		99		62	
	40	7253		26		7732	
	31.2597	31.2568		10.4333		10.4330	

Moon Measures.

1	15217	18851					
24.5	97011	14378	76				
14	11	74					
	19	8851					
	24.5512	24.5525					
2				16676		16494	
25				13250	37	10424	19
14.3				52		14	
				70		6944	
				14.3423		14.3425	

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10103 Moon measures. 22

3.
25.4
15.0

	17108	15438
	13062	9478 } 79
	62	80 }
	7102	5438
	25.4044	25.4041

4.
25.4
15.5
X

	17453	16199
	12330 } 32	11304 } 09
	34 }	14 }
	51	91
	25.5120	25.5114

5.
25.4
16.0

	17881	16830
	13182 } 87	11522 } 21
	92 }	20 }
	77	6826
	25.4692	25.4693

6.
25.
16.9

	16250	17052
	7463 } 63	15854 } 52
	67	50 }
	60	52
	16.8794	16.8800

7
24
17.3

	16020	15436
	11852 } 50	9590 } 94
	48 }	98 }
	22	30
	17.4171	17.4163

8
23.6
17.4
4 max

	16564	15040
	12074 } 78	9514
	82	14
	58	5040
	17.4482	17.4474

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10163 Moon Measures. 22

	17408	15438	
54	11306 12	17478 } 7.9	
0	12	80	
	7102	5438	
	254044	254041	

	17453	16197
55	12330 } 32	11304 } 09
55	34	04
	51	91
	25.5120	255114

	17881	16830
54	13182 } 87	11522 } 21
60	92	20
	77	26
	254692	254698

6	16250	17052
25	7463 } 65	15854 } 5
6.9	67	50
	60	52
	16.8794	16.8800

7	16020	15436
24	11852 } 50	9590 } 9
17.3	48	98
	22	30
	17.4171	17.4163

8	16564	15040
23.6	12074 } 78	9504
17.4	82	14
	58	5040
	174482	174474

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10103 Venus Etc. 23

Date. Dec 22. 1910

Exp't Stars	05	36			05	48		
" " Moon	05	41	52.1		05	41	52.7	
clock fast		−05	23.5					
M. Sid Time	05	36	28.9		θ−α =	−1	42	
M Long	04	44	31.05		"			
G. Sid. Time	10	20	59.95					
G. " Time M.N	17	59	50.60					
Interval	16	21	09.35					
Reduction		2	40.74					
G. M.T	16	18	28.61		16.3079	4		

From Naut Almanac			R A			Decl.		
Moon 16h.	07	18	37.66		+24	03	29.9	
Motion m 1m			2.1214			−	6.485	
" " 18.4768			39.20		−	01	59.8	
Tabular Place	07	19	16.86		+24	01	30.1	

Moons Age 16+ days.

Parallax 54' 08.21

Semi-Diam 14' 46.7

R 886.7

Aug. 12.6

Dur 4 −0.6

R 898.7

R 1.9264

aR −919

(1+a)R 1.8345

R2 3.3654

α34" = 13.9

a = −501.3
+24
−477.3

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10103 Jupiter Eta.

Date Dec 22. 1915

Exp't Stars	0 5ʰ	36		0 5ʰ	48ᵐ	
" Moon	0 5ʰ	41	52.1	0 5ʰ	41	52.7
Clock fast		0 5ᵐ	23.5ˢ			
M Sid Time	0 5ʰ	36	28.9	ϕ - λ =	-1ʰ	42ᵐ
M Long	0 4	44	31.05ˢ		"	
G. Sid Time	10	20	59.95ˢ			
G. " Time M N	17	59	50.60			
Interval	16	21	09.35ˢ			
Reduction		2	40.74			
G M.T	16	18	28.61			

From Nautical Almanac			R A			Decl.
Moon 16ʰ	07	18	37.66	24	03	29.9
Motion m 1ᵐ			2.1214			6.48ˢ
" " 18.4768			39.20		- 01	59.81
Tabular Place	07	19	16.86	24	01	30.1

Moons age 16+ days.
Parallax 54' 08.21
Semi-Diam 14' 46.7
R 486.7
Aug 12.6
Dur 4 -0.6
R 898.7
R 1.9264 -
a R -917 -
11 Rad R 1.8345 -
R² 3.3654 -

434" = 13.9

a = -5013
+24
-4989

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Cäfe no. 1037 mg 8.8

C	07 12 47.38	
Σ	47.49	
e	47.36	
m	07 12 47.41	
P	+ 54.67	
α	07 13 42.08	
A	07 19 41.61	
α-A	− 05 59.53	
δm	− 359.49	
log	2.55569n	
cos δ	9.99598	
log ξ,	1.02273n	
S,	−10.5373	
S,	− 30	
S,	11.4597	
χ	12.3203	
χ-S	+ .8606 14766	

AG 2996 7.9 mg.

	07 25 59.55	
	+ 54.49	
	07 26 54.04	
	07 19 41.61	
	+ 07 12.43	
	+ 432.36	
	2.63585	
	9.96025	
	1.10334	
	+12.6865	
	+ 50	
	34.6915	
	34.4381	
	−2534 14685	

C	+24 17 58.0	
ϑ	24 17 58.3	
ζ	56.8	
ζ	+24 17 57.7	
ρ	− 01 34.4	
δ	+24 16 23.3	
δ	24 02 33.7	
δ-δ'	+ 13 49.6	
	+ 829.6	
log	2.91887	
log n₀	0.25002	
log δ	9.65411	
S, ²	2.0455	
n,	8.7530	
n₀	+1.7783	
n,	+0.0566	
n	19.8349	
y	19.7611	
y-n	− .0738 9142	

	+24 10 20.4	
	− 1 48.9	
	+24 08 31.5	
	24 02 33.7	
	+ 05 57.8	
	+ 357.8	
	2.55364	
	9.88479	
	9.65515	
	2.2067	
	8.9116	
	+0.7670	
	+0.0816	
	18.8486	
	18.8315	
	− 0171 9245	

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10103

X		Y
20.0264		26.6355
20.1108		11.1686
27.6360		26.5489
31.2582		10.4331
99.0314	4	74.7861
24.7578		18.6965
92		18
-2.7578		-.6965
3[5]		466.5

Plate Center.

	R.A.			Decl.		
07	21	52.47		25	12	06.3
07	18	16.88		25	12	53.5
07	18	21.76		23	06	35.6
07	24	57.31		23	00	19.1
4 29	24	28.42	4	96	31	54.5
07	21	07.10	+	24	07	58.6
	-01	25.49			-05	24.9
07	19	41.61		24	02	33.7

Plate Center { A = 07 19 41.61
Φ = +24 02 33.7

3.916 1.324

X-5 +500X +4.02Y +1.33X -14840

+4683 +10013 = 14696 +107 = 148.03 +27 = 14830
+4724 +10055 = 14779 +45 = 14824 +27 = 14851
+0890 +13818 = 14708 +107 = 14805 +37 = 14852
-0883 +15629 = 14746 +42 = 14788 +41 = 14829
23.6763 +11838 +63 +31 = 23.3855

4.22 3.85

y-7 +5004 +4.22X +3.85Y -9359

-4147 +13317 = 9170 +84 = 9254 +102 = 9356
+3650 +5584 = 9234 +85 = 9319 +43 = 9362
-4131 +13274 = 9143 +117 = 9260 +102 = 9362
+3969 +5216 = 9185 +132 = 9317 +40 = 9357
15.6103 +7805 +100 +60 = 15.4709

Table a = -.2 e = -.4 a-e = +0.2 b+d = +0.7
= -5-0.1.3 = -503.8 = +2.52 = -8.2

O-C -501.1 -503.4 -8.9

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10103

Plate Center

	X	Y	RA.	Decl.
	20.0264	26.6355"	07 22 5.247	25° 12 04.3
	20.1108	11.1686	07 18 16.88	25° 12 53.5"
	27.6360	26.5489	07 18 21.76	23 06 35.6
	31.2582	10.4331	07 24 5.731	23 00 19.1
4	199.0314	474.7861	4 29 24 28.42	4 96 31 54.5"
	24.75785"	18.6965"	07.21 0.710	24 07 58.6
	22	18	-11 25.49	-05 24.1
	-2 75" 78	+ .6965"	07 19 41.61	24 02 33.
	31"	466"5"		

Plate Center { A = 07 19 41.61
B = 24 02 33.7

X-ξ +5"00X +4.02Y +1.33X -14840

+4683	+10013 = 14696	+107 = 14803	+27 = 14830
+4724	+10055" = 14779	+45" = 14824	+27 = 14851
+0891	+13818 = 14708	+107 = 14815"	+37 = 14852
-0883	+15629 = 14746	+42 = 14788	+31 = 14821
23.6763	+11838	+63	+31 = 23.3865"

Y-η +5"00Y +4.22X +3.85Y -935"1

4147	+13317 = 9170	+84 = 9254	+102 = 9357
3650	+5584 = 9234	+85" = 9318	+43 = 9362
4131	+13274 = 9143	+117 = 9260	+102 = 9362
3969	+5216 = 9185	+132 = 9317	+40 = 9357
5.6103	+7805"	+100	+60 = 15.4709

Table a = -.2 e = -.4 a - e = +0.2 1 - d = +07

= -5"00.313 = -503.85" = +2.52 = -4.24

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AG 2975 – mag 8.6

07	24	03.24	
		+54.07	
07	24	57.31	
07	19	41.61	
+	5	15.70	
	=	+315.68	
log sin x – A	2.49924 *		
log cos δ	9.96401		
log ξ₀	0.97049		
ξ₀	+9.3430		
ξ₁	+.0035		
ξ₂	31.3465		
x	31.2582		
x – ξ	–.0883		

23	02	06.0
	– 1	46.6
δ 23	00	19.4
D 24	02	33.7
– 1	02	14.3
		– 3734.7
		3.57225n
log η₀		0.90340n
log tan δ		9.62796
log ξ_0^2		1.94098
log η₁		8.6223
η₀		–8.0057
η₁		0.0419
η		10.0362
ψ		10.4331
ψ – η		+.3969

Curvature

–3.1 δ +.3 m –3

Δδ			
+15	–17 = –2	+3 = +1	
–6	+7 = +1	+3 = +4	
–4	+7 = +3	–2 = +1	
+36	–29 = +7	–2 = +5	
	–4	–1 = –8	

–2.427 +.695 +2

Δη			
+23	–22 = +1	+4 = +5	
+19	–22 = –3	–2 = –5	
–11	+17 = +6	–2 = +4	
–30	+18 = –12	+6 = –6	
	–3	–2 = –3	

	η	ξ
	+6.94	+5.54
	+9.65	–2.44
	–7.20	–2.36
	–6.00	+9.34
m	–2.53	+1.38

Curv { α = –0.03, δ = –0.1

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1013. A.G. Berlin — Standard Coordinates.

	Cape no 3978 mg 8.3	Cape no 1044 mg 5.1		Cape no 1045 mg. 6.0	
C	07 21 57.50	07 17	22.77	07 17	27.66
2			22.77		27.68
6			22.76		27.64
Mean		07 17	22.77	07 17	27.66
Prec	+54.97		+54.92		+54.11
α	07 22 52.47	07 18	17.69	7 18	21 77
A	07 19 41.61	07 19	41.61	07 19	41.61
α-A	+3 10.86	−1	23.92	−01	19.84
Sin(α-A)	+190.85		−83.92		−79.84
log "	2.280702	1.923872		1.902222	
" cos δ	9.956562	9.956522		9.963677	
" δ₀	0.744500	0.388763		0.373133	
ξ₀	+5.55526	−2.44413		−2.36112	
η₀	+.00155	− 5		−.00041	
ξ	27.55541	19.55822		19.63844	
Y	27.63600	20.02644		20.11085	
Y-ξ	+.08059	+0.46822		+.47241	
C	25 13 50.3	+25 14	33.7	23 08	16.1
8			34.4		16.3
E			33.7		16.6
Mean		+25 14	33.9	23 08	16.3
Prec	−01 43.96	−1	40.4	−01	40.7
δ	+25 12 06.3	+25 12	53.5	23 06	35.6
Φ	24 02 33.7	24 02	33.7	24 02	33.7
δ-Φ	+1 09 32.6	+1 10	19.8	−55	58.1
tan(δ-Φ)	+4173.1		+4220.4	−3358.4	
log "	3.620466	3.625355		3.526133	
log η₀	0.951611	0.956550		0.857288	
log tan δ	9.672666	9.6729		9.630116	
log ξ₀²	1.48902	0.77753		0.746264	
" η₀²	8.21502	7.50162		7.42988	
η₀	+8.94561	+9.04702		−7.19914	
η₀	0.01644	+ 32		+0.00027	
η	26.96200	27.05022		10.80036	
y	26.54889	26.63555		11.16863	
y-η	−.41311	−.4147		+.36501	

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10103. Moore's Center. 26

	X	X − X₀		DX	(X − X₀)² + (Y − Y₀)²		
1	24.5518	− 0.8758	−	1	0.7669	3.3622	− 32
2	25.00000	− 1.3240	−	1	1.7527	3.3621	− 33
3	25.4042	− 1.7282	−	0	2.9867	3.3600	− 54
4 X	25.5117	− 1.8357	−	0	3.3698	3.3698	+ 44
5	25.4692	− 1.7932	+	0	3.2155	3.3668	+ 14
6	25.00000	− 1.3240	+	1	1.7533	3.3629	− 25
7	24.00000	− 0.3240	+	1	0.1051	3.3656	+ 2
8	23.6760	− 0.00000	+	1	0.00000	3.3739	+ 85

R^2 = 3.3654

	Y	Y − Y₀		DY	(Y − Y₀)²	
1	14.0000	+ 1.6110	+	0	2.5953	152
2	14.3424	+ 1.2686	+	0	1.6094	134
3	15.0000	+ 0.6110	+	0	0.3733	110
4	15.6110	+ 0.00000	+	0	0.00000	90
5	16.00000	− 0.3890	−	0	0.1513	78
6	16.8797	− 1.2687	−	0	1.6096	46
7	17.4167	− 1.8057	−	0	3.2605	10
8 Y	17.4478	− 1.8368	−	0	3.3739	0

152

Approx. center.

X = 25 Y = 14.3424
16.8797
2 | 31.2221
Y_0 15.6110
Y_{max} 17.4478
R 1.8368
Corr R 1.8345

X_{max} 25.5117
X_0

Moore's Center { X_0 23.6760
Y_0 15.6110

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1915phae..proj..2

10103 Moon's Center 26

		x	$x - x_0$	Δx	$(x-x_0)^2 + (y-y_0)^2$		
1		24.55.18	− 0.18758	− 1	0.76699	3.36222	− 32
2		25.00.00	− 1.32401	− 1	1.75529	3.36221	− 33
3		25.40.42	− 1.72822	− 0	2.98677	3.36000	− 54
4	X	25.51.17	− 1.83557	− 0	3.36998	3.36998	+ 44
5		25.46.92	− 1.79332	+ 0	3.21555	3.36688	+ 14
6		25.00.00	− 1.32401	+ 1	1.75533	3.36229	− 23
7		24.00.00	− 0.32401	+ 1	0.10501	3.36556	+ 2
8		23.67.60	0.00000	+ 1	0.00000	3.37339	+ 85

$R^2 = 3.36554$

		y	$y - y_0$	Δy	$(y-y_0)^2$	
1		14.00.00	+ 1.61100	+ 0	2.59553	152°
2		14.34.24	+ 1.26886	+ 0	1.60944	134°
3		15.00.00	+ 0.61100	+ 0	0.37333	110°
4	−	15.61.10	+ 0.00000	+ 0	0.00000	90°
5		16.00.00	− 0.38900	− 0	0.15513	178°
6		16.87.97	− 1.26887	− 0	1.60946	46°
7		17.41.67	− 1.80557	− 0	3.26005	10°
8	y	17.44.78	− 1.83688	− 0	3.37339	2°

Approx. center.

$x = 25^-$ $y = 14.3424$

16.8797

$2\,|\,31\,|\,2.22\,|\,1$

y_0 15.6110

y_{max} 17.4478

R 1.8368

Corr R 1.8345

x_{max} 25.5117

x_0

Moon's Center $\begin{cases} x_0 & 23.6760 \\ y_0 & 15.6110 \end{cases}$

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Formation of Normals.

1	− 1.40	+ 27.8	− 51.0
2	− 1.68	+ 44.0	− 42.0
3	− 1.05	+ 93.0	− 33.0
4	− 0.00	− 80.0	+ 00.0
5	+ 0.70	− 25.0	− 5.5
6	+ 1.67	+ 33.0	+ 32.0
7	+ 0.57	− 0.6	− 3.6
8	+ 0.00	− 00.0	− 156.0
	+ 2.94	+ 197.8	+ 32.0
	− 4.13	− 105.6	− 291.1
	− 1.19	+ 92.2	− 189.1

− 15

− a	− b	+ Δc	
+ 9	− 2	− 8	v
+ 13	− 1	− 3	v
+ 17	− 1	+ 1	v
+ 18	− 0	+ 3	v
+ 18	+ 6	+ 3	v
+ 13	+ 1	− 1	v
+ 3	+ 2	− 10	v
+ 0	+ 2	− 13	v

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10103 Conditional Equations 27

									O − C	Corr
1	−0.87	+1.61	= −32	− 6	− 24	− 30	−	2		−10
2	−1.32	+1.27	= −33	− 9	− 19	− 28	−	5		− 8
3	−1.73	+0.61	= −54	−12	− 9	− 21	−	33		−32
4	−1.83	+0.00	= +44	−12	− 00	− 12	+	56		+59
5	−1.79	−0.39	= +14	−12	+ 6	− 6	+	20		+23
6	−1.32	−1.27	= −25	− 9	+ 19	+ 10	−	35		−36
7	−0.32	−1.80	= + 2	− 2	+ 27	+ 20	−	18		−28
8	−0.00	−1.84	= +85	− 0	+ 28	+ 28	+	57		+44
	−9.18	−1.81				+133 − 93				

13.95 − 1.19 = +92.2 −9.18 av. 28

1.19 +12.97 = −189.1 −1.81

1.19 − 0.10 = +7.84 −0.78

+13.07 = −196.94 −1.01 b = −15.0 −0.08

13.95 − 1.78 = +92.2 a = + 6.8 −0.66

arc 152 $\frac{\Sigma x}{n}$

$\frac{p}{n}$ .16 +5 $\frac{+5}{16}$ = +.31 ΔR = +0.4

Corr + 0.2

True ΔR = +0.2

−2R = − 3.67 −2R Corr − 0.73 −15

+1

Δb = + 0.06 $\Delta \delta$ = +0.0

Δa = + 0.48 $\Delta \alpha$ = +0.02

+10

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1.0103 Conditional Equations

								O-C
1	-0.87	+1.61	= -32	-16	-24	-30	-	2
2	-1.32	+1.27	= -33	-9	-19	-28	-	5
3	-1.73	+0.61	= -54	-12	-9	-21	-	33
4	-1.83	+0.00	= +44	-12	-00	-12	+	56
5	-1.79	+0.39	= +14	-12	+6	-6	+	20
6	-1.32	-1.27	= -25	-9	+19	+10	-	35
7	-0.32	-1.80	= +2	-2	+27	+20	-	18
8	-0.00	-1.84	= +85	-0	+28	+28	+	57
						+133	-	93

13.95 - 1.19 = +922 av. 28

1.19 +12.97 = -189.1

1.19 - 0.10 = + +7.84

+13.07 = -196.94 f = -15.0

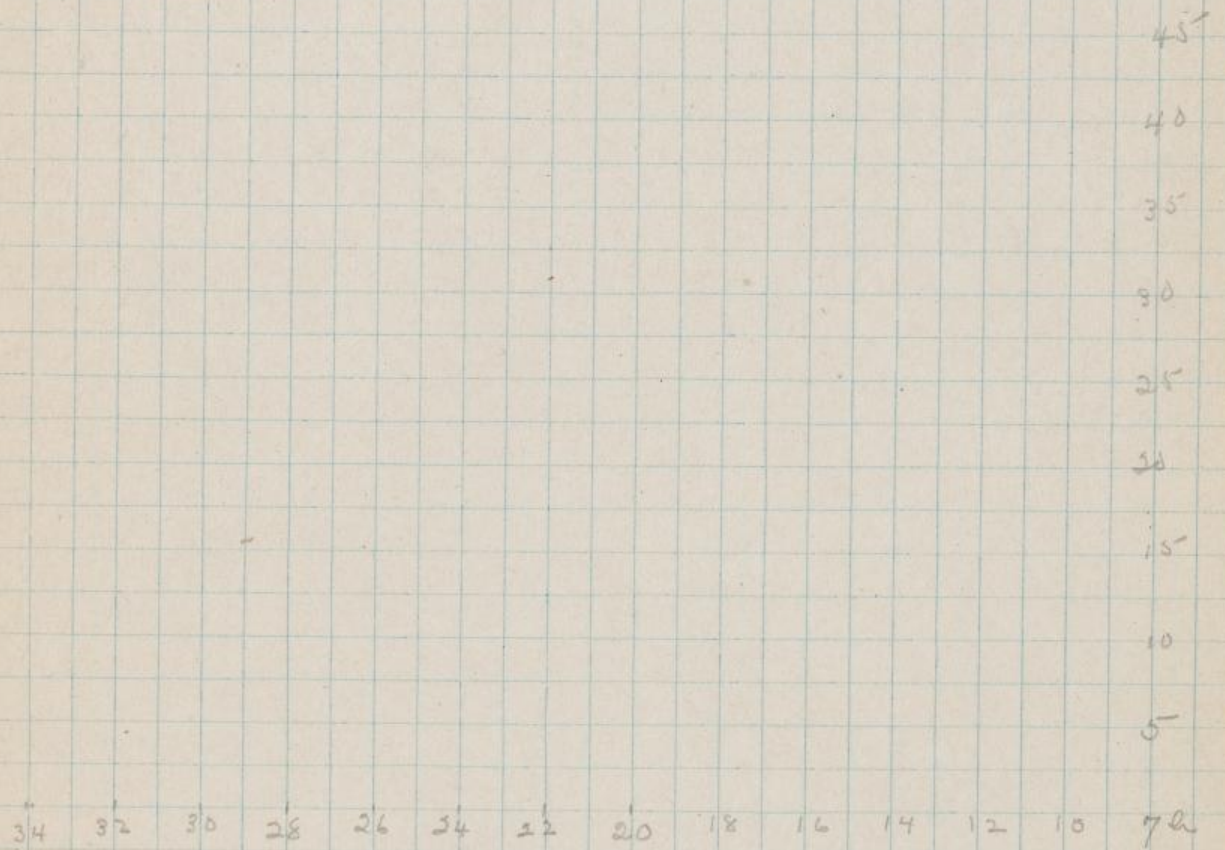
13.95 - 1.78 = +922 a = + 6.8

arc 15°2 $\frac{\Sigma V}{n}$

$\frac{\Sigma}{n}$ .16 +5 $\frac{+5}{16}$ = +.31 Δ R = +0.4

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X_0 2367.60 +3 = 23.6763

Y_0 15.6110 −7 = 15.6103

From Plate Constants.

X 23.3855

−22

ξ_0 +1.3855

log ξ_0 0.141600

log Cos δ 9.961694

850724

log Sin (A−a) 1.672677

Y 15.4709

+18

η_0 − 2.5291

log tan δ 9.642448

ξ^2 02832

7.05344

log η_1 6.97900

10

η_1 +0.00069

η_0 −2.5300

log η_0 0.403124n

7.331155

log tan δ-D 3.071497

α-A +47.06

A 07 19 41.61

α_0 07 20 28.67

Red +5.92

α' 07 20 34.59

δ-D −1180.2

−19 40.2

D 24 02 33.7

δ_0 +23 42 53.5

Red −6.3

δ' 23 42 47.2

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X_0 236760 −
+3 −
236763

Y_0 156110 −
−7 −
156103

From Plate Constants.

X 233855.4
−22
+1.38855.4

Y 15.4709 −
−18
−2.5291 −

log cos δ 0.14160
log cos δ 9.96169
8507.24
log sin A·a 1.67267

log tan δ 9.64243
δ − 0283.2
7053.4
log r. 6.97790

A-A +4706

r. 000009
r_0 −25300

A 07 19 41.61

log r. 0.40312
7.33115
log 4π·a 3.07197

A_0 07 20 28.67
Rd +5.92
A' 07 20 34.59

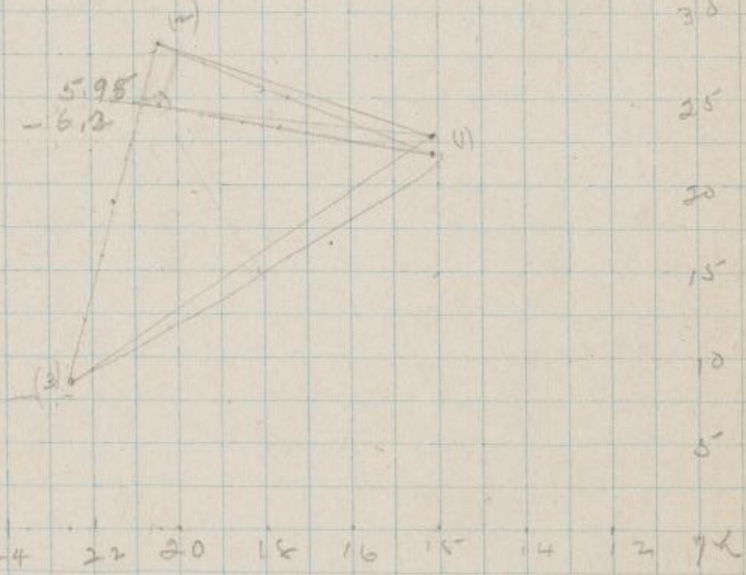
δ-E −1180.2
−19 40.2
E 24 02 33.7

δ_0 +23 42 53.3
Rd −4.3
δ' 23 42 47.2

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	07	15	08.77		22	08	18.0
(1)	07	15	02.91		22	08	23.3
			5.86				− 5.3
	07	20	33.09		27	57	58.0
	07	20	26.98		27	58	04.8
			6.11				− 6.8
	07	22	37.86		18	27	37.2
	07	22	32.54		08	27	41.2
			5.32				− 4.0
			5.79				
			1.6				



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1 0 1 0 3 Reduction to apparent Place. 29

H + α	3 1	1 9. 4	1 0 9°	5 1′	
H	2 3	5 8. 9	1 4°	4 4′	
α	0 7	2 0. 5	9 5°	0 7′	
G	2 3	1 1. 3	0 3°	0 3′	
G + α	3 0	3 1. 8	9 7°	5 7′	

log sin G+α 9.1408m
log g 1.4030
" sin G+α 9.9958
" tan δ₀ 9.6427
8 8 2 3 9

log (g)′ 0.5438m
" (g) 9.8654

(g)	3.784
(g)	0.733
h	1.402
Red.	+5.919

δ₀ +23 42.9

log cos δ₀ 9.9617
log i̇ −8.6321m
log (i) 8.5938m

log sin δ₀ 9.6044
obs (H+α) 9.5309m e′
log Δ 1.3111
sin H+α 9.9734
sec δ₀ 0.0383
8.8239

log h′ 0.4464m
" h 0.1467

(g)′	−3.498
h	−2.795
i̇	−0.039
Red.	−6.332

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H + α	31	19.4	1	19°	51′
H	23	58.9			
Δ	07	20.5			
G	23	11.3			
G + Δ	30	31.8	97°	57′	

log cos δ₀ 9 9 6 1 7
log i − 8 6 3 2 4
log (i) 8 5 9 3 8

log sin G+Δ 9.1 4 0 8
log q 1 4 0 3 0
" sin G+Δ 9 9 9 5 8
" tan δ₀ 9 6 4 2 7
8 8 2 3 9

log sin δ₀ 9 6 0 4 4
cos (H+N) 9 5 3 0 9
log k 1 3 1 1 1
sin H+N 9.9 7 3 4
sec δ₀ 0 0 3 8 3
8 8 2 3 9

log g' 0.5 4 3 8
" g 9 8 6 5 4

log k' 0.4 4 6 4
" k 0 1 4 6 7

q	3.7 8 4	
g	0.7 3 3	
k	1 4 0 2	
Red.	+5.9 1 9	

g'	−3 4 9 8
k'	−2 7 9 5
i	−0 0 3 9
Red.	−6 3 3 2

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α'	07	20	34.59
θ	05	36	28.90
$\theta-\alpha'$	−1	44	05.69
=	−26°	01′	25.35″
$\frac{1}{2}(\alpha-\alpha')$		−09	37.23
$\theta-\frac{1}{2}(\alpha+\alpha')$	−25°	51	48.12

	9.995727
log cos ½(α−α′)	0.000000
log(θ−½(α+α′))²	0.004584
log tan γ	0.000311

γ	45°	12′	19.2″
δ′	23	42	47.2
γ − δ′	21	29	32.0

log sin δ′	9.826740
log sin π	8.119726
log sin(γ−δ′)	9.556393
cosec γ	0.148966
sin δ−δ′	7.731655

δ−δ′		+18	44.5
δ	24	01	31.7
Eph δ	+24	01	30.1
O−C			+1.6
Corr.			−01
2nd Ord. Ref.			0.0
Irr. Corr.			+0.0
δ =	+24	01′	31.7
O−C =			+1.6

π	54′	08.21″	
		9.869133	
log sin π	8.119726		8.119720
" sin θ−α′	9.642221		
" sec Eph δ	0.039360		
sin(α−α′)	7.747967		
α−α′	−19′	14.46″	14.32
=	−1ᵐ	15ˢ.96	15.95

α	07	19	17.63
Eph α	07	19	16.86
O−C			+0.77
			−0.03
Irr. Corr.			+0.02
α =	07	19	17.65
O−C			+0.79

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α'	07	20	34.59
Θ	05	36	28.90
$\Theta - \alpha'$	−1	44	05.69
=	−26°	01'	25.35"
$\frac{1}{2}(x+x')$		−09	37.23"
$-x' - \frac{1}{2}(x+x')$	−25°	51	48.12"

	9.995727
$\log \cos(x-x')$	0.000000
$-(x'-\frac{1}{2}(x+x'))$	0.004588
$\log \tan \gamma$	0.000317

γ	45°	12	19.2
δ'	23	42	47.2
$\gamma - \delta'$	21	29	32.0

$\log \sin \gamma'$	9.826402
$\log \sin \pi$	8.197266
$\log \sin(\gamma - \delta')$	9.563933
$\log \cos \gamma$	0.148796
$\log \sin \delta - \delta'$	7.736555

$\delta - \delta'$		+18	44.5
δ	24	01	31.7"
Eph δ	+24	01	30.1
O − C			+1.6
Corr			−0.1
2nd Ord Ref.			00
Par Corr			+00
δ =	+24	01	31.7
O − C =			+1.6

π	54' 08.21"
	9.861913
$\log \sin \pi$	8.197266
$\log \sin(x-x')$	9.642221
$\log \cos \frac{1}{2}(\delta + \delta')$	0.003936
$\log \sin(x-x')$	7.747796

$\alpha - x'$	−19'	14.46"	17.-
=	−1m	16.96s	4.1

α	07	19	17.68
Eph α	07	19	16.86
O − C			+0.79
			−0.03
Par Corr			+00
α =	07	19	17.65s
O − C			+0.79

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