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11366
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11286 Star Measures.

1	17454	19840	17131	18982
13.1	16288 89	11009	79302 7	18172 75
11.9	90	09	24	78
	54	40	29	82
	13.1162	13.1169	11.9206	11.9193
2	18158	18098	18522	18442
18.5	13287 89	12957 54	14828 30	12120 25
28.4	91	51	32	30
	58	90	21	38
	18.4869	18.4864	28.3691	28.3687
3	18150	17321	18613	17455
30.9	97141 3	15740 45	18439 40	76355 37
8.0+	12	50	41	39
	48	23	15	51
	30.8435	30.8422	8.0173	8.0186

Moon Measures.

1	18760	17355
23	11253 57	14870 64
14.8	61	58
	66	61
	14.7507	14.7503

2	16868	18533
22.3	14190 5	11208
16.0	90	08
	68	31
	22.2678	22.2678
3	18252	17594
22.2	15850	10002
16.3	50	02
	52	98
	22.2402	22.2404

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11286 Star Measures.

1	17454	19840	17131	18982
131	16288 89	11009	79302 7	18172 75-
11.9	16 90	09	24	78
	54	40	29	82
	13.1062	13.1149	11.9208	11.9193
2	18528	18098	18522	18442
185	13287 89	12957 54	14828 30	10220 25-
284	91	51	32	30
	88	98	21	38
	18469	18464	28.3691	28.3687
3	18150	17321	18613	17455
30.9	9714 13	15740 45	18439 40	76355 37
80-	12	54	41	39
	48	23	15-	51
	30843 5-	30842 2	8.0173	8.0186

More Measures.

1	18760	17350
23	11253 57	14870 64
148	61	58
	66	61
	14.7507	14.7503

2	11686 58	11853 33
223	11459103 57	11208 24
16.1	910	08
	69	31
	22.2678	22.2678
3	11852	17594
222	15850	10002
16.3	56	02
	52	98
	22.2403	22.2404

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4
22.4 18290 17550
17.0 14630 11236 32
28 28
94 58
22,3662 22,3676

5
23.
17.9 18059 18030
19480 83 16592
86 92
61 38
178578 178560

6
24
18.2 18582 17495
15970 4 10092 93
70 94
88 97
18.2614 18.2598

7
24.2 17092 17022
18.3 14370 71 9736 38
72 40
00 30
18.2723 18.2710

8
25. 17982 16572
18.0 16936 7613 14
36 15
88 80
18.1047 18.1035

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1128 Mean Measures 2

4
22.4 18290 17550
17.0 14638 11236 32
28 28
94 58
223662 223676

5
23
17.9 11805.9 18030
19480 3 16592
86 92
61 38
178578 178560

6
24
18.2 13582 17495
15870 + 10092 93
70 94
88 97
18614 18298

7
24.2 17192 17022
18.3 14378 71 9736 38
72 40
60 30
18273 18270

8
25
18.0 17982 16572
16936 7613 14
36 15
38 80
18047 18035

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Times

Eph Stars	12	40		02	52	
" " Moon	02	46	00.5	02	46	00.6
Clock fast		10	29			
H. Sid. Time	2	35	31.55	$\Theta = +1^h\,45^m$		
H. Long	04	44	31.05			
G. S. Time	07	20	02.60			
G. Sid T.M.N.	13	15	01.43			
Interval	18	05	01.17			
Reduction		02	57.75			
G. M. T.	18	02	03.42	18.03428		

From Nept. Alm				= R.A.		Decl.	
Moon	18h	0	55	06.17	+11°	16	29.5
Motion 1m				2.1427		+ 13.731	
2m.057				.0441		.28.2	
Tabular Place		0	55	10.58	+11°	16	57.7

Moon's age 14d

934" = 12.3

$$a = -499.$$
$$+24$$
$$-475$$

Parallax	58	10.65
Semi-diam	15	52.7
R		952.7
Aug		12.8
Syz. 6		-1.1
R		964.4
R		20673
(1+a) R		9824
R		1.9691
R2		3.87744

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11286
Oct. 10 '16

Times

Expl. Stars	12	40		02	52	
" " Moon	12	46	00.5ˢ	02	46	00.6ˢ
Clock fast		10	29			
			3			
71 Sid. Time	2	35	31.55ˢ	Θ = +1ʰ 45ᵐ		
71 Transit	04	44	31.05ˢ			
5 S. Time	07	20	02.60ˢ			
5 Sid. T. M.N.	13	15ˢ	01.43ˢ			
Interval	18	05	01.17ˢ			
Reduction		02	57.75ˢ			
G. M. T.	18	02	03.42	18.03428		

From Appt. Calc				s R. A.		Decl.	
Moon	18ʰ	0	55ˢ	16.17ˢ	+11°	16	29.5ˢ
Motion 1ʰ				2.1427ˢ		+	13.731
" 2ᵐ.057				04.41ˢ			28.2
Tabular Place	0	55		10.584ˢ	11°	16	57.7ˢ

Moon age 14ᵈ

9.34" = 12.3

a = −499.
+24
−475

Parallax	58	10.65ˢ
Semi-diam	15	52.7
R		952.7
Aug		12.8
Dpc		−1.1
R		964.4
R		2.0673
(1+q) R		982
N		1.9691
N 2		3.8774

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11286 Plate Constants

X	13.1166	18.4866	30.8729
ξ	12.4327	17.9074	31.0823
X-ξ	+.6839	+.5792	−.2394
y	11.9199	28.3689	8.0179
η	11.6986	29.0293	7.7818
y-η	+.2213	−.6604	+.2361

X-ξ	+500X	−99.3y	−1.X	−12200
+.6839	+6558	= 13397	−1183 = 12214	−13 = 12201
+.5792	+9243	= 15035	−2817 = 12218	−18 = 12200
−.2394	+15421	= 13027	−796 = 12231	−31 = 12200
24.2105°	+12105″		−1619″	−24″ = 24.0367

y-η	+500y	+102.3X	+2.7y	−9547
+.2213	+5959	= 8172	+1342 = 9514	+32 = 9546
−.6604	+14184	= 7580	+1891 = 9471	+76 = 9547
+.2361	+4009	= 6370	+3155 = 9525	+22 = 9547
16.3128°	+8151″		+2479″	+44″ = 16.4153

Tables a = 0. c = −1.5 a−c = +1.5 b+d = −1.6
−499.0 −502.7 = +3.7 = −3.0

a−c −499.0 −501.2 −1.7

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11286 Plate Constants 4

X 13.1166	18.4866	30.8429
S 12.4327	17.9174	31.1823
X-S +.6839	+.5792	−.2394

y 11.9199	28.3689	8.0179
η 11.6786	29.0293	7.7818
y-η +.2213	−.6604	+.2361

X-S	+5.00 X	−99.3 y	−11 x² −12200
+.6839	+6.5558 =	13397 − 1183 =	12214 − 13 = 12201
+.5792	+9243 =	15035 − 2817 =	12218 − 18 = 12200
−.2394	+15.421 =	13027 − 796 =	12231 − 31 = 12200
24210.5	+12105	−1619	−24 = 24.12367

y-η	+5.00 y	+112.3 x	+2.7 y −95.47
+.2213	+595.9 =	8172 + 1342 =	9514 + 32 = 95.46
−.6604	+1418.4 =	7558 + 1891 =	9447 + 76 = 95.47
+.2361	+40.09 =	6370 + 3155 =	4525 + 22 = 95.47
16.3028	+815.1	+2479	+44 = 16.4153

Tables a: 0 c = −1.5 a − c = +1.5 b + d = −1.6
−499.0 −502.7 = +3.7 = −3.0

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11286 Morris Center. 5

	X	X-X₀	ΔX	(X-X₀)²	+ (Y-Y₀)²	
1	23.00000	-1.20918	-2	1.46222	3.87688	- 6
2	22.26782	-1.94112	-0	3.76883	3.86074	-167
3	22.24023	-1.96887	-0	3.87558	3.87558	- 16
4	22.36869	-1.84211	+1	3.39300	3.87776	+ 2
5	23.00000	-1.20918	+2	1.46122	3.87790	- 44
6	24.00000	-0.20918	+3	0.04376	3.87726	- 48
7	24.20900	0.00000	+3	0.00000	3.87726	- 48
8	25.00000	+0.79110	+2	0.62601	3.86711	-103

3.87774

	Y	Y-Y₀	ΔY			
1	14.75057	-1.55335	-1	2.41476	218	✓
2	16.00000	-0.30392	-0	0.09234	261	✓
3	16.30400	0.00000	-0	0.00000	270	✓
4	17.00000	+0.69960	+1	0.48946	291	
5	17.85769	+1.55529	+1	2.41118	322	✓
6	18.26066	+1.95566	+2	3.82290	354	✓
7	18.27177	+1.96677	+2	3.87126	0	✓
8	18.10411	+1.80001	+2	3.24111	24	✓

Range 166

approx. Center.

X= 23 Y= 14.75057
17.85769
32.60774
Y₀ 16.30387

Y max 18.27177
R 1.96780
Corr R 1.96911

X min 22.24023
X₀ 24.20890

Morris Center { X₀ 24.20900
Y₀ 16.30400

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11286 Moons Center. 5

	X	X-X₀	ΔX	(X-X₀)²		(Y-Y₀)²	
1	23.00000	-1.21910	-2	1.48622		3.87688	-6
2	22.26878	-1.94712	-0	3.79683		3.86071	-167
3	22.24003	-1.96887	-0	3.87558		3.87558	-16
4	22.36699	-1.85421	+1	3.39300		3.87776	+2
5	23.00000	-1.21910	+2	1.48612		3.87330	-44
6	24.00000	-0.21910	+3	0.04836		3.87226	-48
7	24.21990	0.00000	+3	0.00000		3.87226	-48
8	25.00000	+0.77910	+2	0.60680		3.86711	-103

3.87274

	Y	Y-Y₀	ΔY	(Y-Y₀)²	
1	14.75505	-1.55535	-1	2.41466	218
2	16.00000	-0.31040	-0	0.09924	261
3	16.31040	0.00000	-0	0.00000	270
4	17.00000	+0.69960	+1	0.48946	292
5	17.85769	+1.55529	+1	2.41818	322
6	18.26066	+1.95566	+2	3.82290	354
7	18.27117	+1.96677	+2	3.87226	0
8	18.10411	+1.80001	+2	3.24111	24

Range 166

Approx Center.

X: 23 Y: 14.75505
17.85769
32.60274
Y₀ 16.30137

Y max 18.27117
R 1.96880
Corr R 1.96691

X min 22.24003
X₀ 24.20890

Moons Center { X₀ 24.20900
Y₀ 16.30140

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Normals

1	+1.88	+ 7.3	+ 9.3
2	+0.58	+324.0	+ 50.1
3	+0.00	+ 31.6	+ 00.0
4	-1.29	- 3.6	+ 1.4
5	-1.88	+ 533	- 682
6	-0.40	+100.8	- 94.2
7	-000	+ 0.0	- 94.8
8	+1.42	- 79.0	-185.8
	+3.88	+517.0	+ 608
	-3.57	- 82.6	-4430
	+0.31	+434.4	-382.2

-11
-58

-a	-b	+Δc
+41	-33	-50
+66	- 6	+ 2
+67	- 0	+ 9
+63	+15	+20
+41	+33	+16
+ 7	+41	-10
+ 0	+41	-17
-27	+38	-47

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11286 Conditional Equations 6

							O−C	corr
1	−1.21	−1.55	= − 6	−36	+37	+ 1	− 7	−57
2	−1.94	−0.30	= −167	−58	+ 7	−51	−116	−114
3	−1.97	−0.00	= − 16	−58	+ 0	−58	+ 42	+54
4	−1.84	+0.78	= + 2	−55	−17	−72	+ 70	+98
5	−1.21	+1.55	= − 44	−36	−37	−73	+ 29	+45
6	−0.21	+1.96	= − 48	− 6	−47	−53	+ 5	− 5
7	−0.00	+1.97	= − 48	− 0	−47	−47	− 1	−18
8	+0.79	+1.80	= −103	+23	−43	−20	− 83	−130
	−7.59	+6.13					+146 −207	
							ar 44	

1463 +0.31 = +4344 −7.59

+.31 +16.35 = −3852 +6.13

+.31 + 0 = + 92 − 0.16

16.35 = − 391.4 +5.97 b = −24 + 0.36

14.63 = +434.4 + 7.4 = +441.8 a = + 30.0 − 0.59

$\frac{\Sigma R}{n} = .22$

$\frac{\Sigma x}{n} = -7.6$

$\frac{-7.6}{22} = -.34$

ΔR = − 0.4
Corr + 0.7
Sum ΔR = − 1.1

−2R = −4.13 Δ = −2R corr = −2.89 −58

Δb = − 1.04 −21 Δδ = − 0.5
Δa = + 1.70 +34 Δα = + 0.06

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11286 Conditional Equations 6

						O-C
1	-1.21	-1.55	= - 6	- 36	+ 37	+ 1 - 7
2	-1.94	-0.30	= -167	- 58	+ 7	- 51 - 116
3	-1.97	-0.00	= - 16	- 58	+ 0	- 58 + 42
4	-1.84	+0.71	= + 2	- 55	- 17	- 72 + 70
5	-1.21	+1.55	= - 44	- 36	- 37	- 73 + 29
6	-0.21	+1.96	= - 48	- 6	- 47	- 53 + 5
7	-0.00	+1.97	= - 48	- 0	- 47	- 47 - 1
8	+0.79	+1.80	= -103	+ 23	- 43	- 20 - 83

1463 + 0.31 = +4344

+.31 + 16.35 = -3821.2

+.31 + .0 = + 9.1

16.35 = - 391.3 b = -24

14.63 = +434.4 + 7.2 = +441.6 a = +30.0

$\frac{P}{n} = .22$

$\frac{\Sigma K}{n} = -7.6$

$\frac{-7.6}{22} = -34$

DR = -0.4

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11286 Morris Mean Position. 7

X_0	24.2090	16.3040
	+15	−12
	24.2105	16.3028

From Plate Constants.

	24.03677	16.4153
	22	18
S	+2.03677	−1.5847

log S	0.308933	log tan δ	9.27774
log cos δ_0	9.992308	log S_1	0.6179
	8.507241		7.0534
log sin(α − A)	1.809398	log x_1	6.9490

α − A	64.47	x_1	0.00089
	01 04.47	x_0	−1.58556
A	0h 52 46.93	log x_0	0.200197n
α_0	0h 53 51.40		7.331155
		log tan δ − D	2.869042n

Red	+4.57	δ − D	−739.67
			−12 19.7
α′	0 53 55.97	D	+10 57 49.7
		δ_0	+10 45 30.0
		Red	+29.8
		δ′	+10 45 59.8

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11286 Means Mean Position. 7

X_0	24.2090	16.3040
	+15	−12
	24.2105	16.3028

From Plate Constants.

	24.0367	16.4153
	21	18
S	+2.0367	−1.5847

log S	0.30893	log tan δ	9.27777
log cos δ_0	9.99230	log S_1	0.61779
log Sin(x−N)	1.80939		7.05534
		log n_1	6.94490n

α − A	64.47	n_1	0.00009
	01 04.47	n_0	−1.5855
A	0h 52 46.93	log n_0	0.20019n
			7.33115
α_0	0h 58 51.40	log tan(x−N)	2.86904n
Red	+4.57	δ − δ_0	−73967
			−12 19.7
X'	0 53 55.97	D	+10 57 49.7
δ_0	+10 45 30.0		
Red	+29.8		
δ'	+10 45 59.8		

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11286 Reduction to Apparent Place 8

H+α'	05	37.6	84° 24'
H	04	43.7	
α'₀	0	53.9	
G	23	13.1	
G+α₀	0°	07.0	0° 01' 45"

log cos G+α₀	0.0000
log q	1.3385
" sin G+α₀	6.3388
" tan δ₀	9.2788
	8.8239

log (q)'	1.3385
(ζ)	5.7800

ζ	3.281
q	0.000
k	1.279
Red.	+4.560

δ₀	10° 45.5'
log cos δ₀	9.9923
log i	+0.8901
(i)	0.8824

log sin δ₀	9.2711
Cos (H+α₀)	8988 94
log h	1.2774
" Sin (H+α₀)	9.9979
Sec δ₀	0.0077
	8.8239

log h'	9.5379
h'	0.1069

q'	+21.802
k'	+0.345
i'	7.628
Red	+29.775

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11286 Reduction to Apparent Place 8

H+x'	05	37.6	84° 24'
H	04	43.7	
α_0	0	53.9	
G	23	13.1	
G+x$_0$	0	07 0	0° 01' 45"

S_0 10 − 45 5.5
log cos δ_0 9.9923
log i + 0.8901
(i) 0.8824

log Cos G+x$_0$	0.0000
log g	1.3385
" Sin G+x$_0$	6.3388
" tan δ_0	9.2788
	8.8239

log Sin δ_0	9.2711
Cos H+x$_0$	8.9894
log h	1.2774
" Sin (H+x$_0$)	9.9479
Sec δ_0	0.0077
	8.8239

log g'	1.3385
g'	5.7800

log R'	9.5379
f	0.1069

f	3281
g	0000
h	1.2779
Red.	+4.5760

g	+21.802
R'	− 0.345
i	7.628
Red	+29.775

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11286 Lunar Parallax. 9

α'	0	53	55.97
θ	02	35	31.55
$\theta - \alpha'$	01	41	35.58
=	+ 25	23	53.70
$\frac{1}{2}(\alpha - \alpha')$	+	9	24.71
$\theta - \delta' - \frac{1}{2}(\alpha - \alpha')$	25	14	28.99

	9.957277
log cos $\frac{1}{2}(\alpha + \alpha')$	0.000000
Sec $\theta - \alpha'$ = "	0.043185
log tan χ	0.000045

χ	45	01	46.1
δ'	10	45	59.8
$\chi - \delta'$	34	15	46.3

	9.826408
log Sin Π	8.228460
Sin $\chi - \delta'$	9.750502
Cosec χ	0.150202
Sin $(\delta - \delta')$	7.955556

$\delta - \delta'$	+ 31	02.0	
δ	11	17	01.8
Gh δ	+11	16	57.7
O-C			+4.1
Curv			+ 0.2
2nd ord. reg			0.0
Diu. Corr.			- 0.5
δ =	+ 11	17	01.3
O-C =			+ 3.6

Π	35	8	10.65

	9.869113
log Sin Π	8.228460
" Sin $(\theta - \chi')$	9.632336
" Sec δ	0.008848
Sin $(\alpha - \chi')$	7.738431

$\alpha - \alpha'$	18	49.42	
=	+ 01	15.29	
α	0	55	11.26
Gh α	0	55	10.58
O-C			+0.68
Curv.			- 0.03
Diu Corr			+0.06
α =	0	55	11.32
O-C			+0.74

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11286 Lunar Parallax. 9

α'	0.	53	55.97
Θ	02	35	31.55
$\Theta - x'$	01	41	35.58
$= +$	25	23	53.70
$\frac{1}{2}x - x'$	+	9+	2147.1
$\Theta - \frac{1}{2}' - \frac{1}{2}x - x'$	25	14	28.99

9.9 5 7 2 7

log cos $\frac{1}{2}x - x'$	0 0 0 0 0 0
Sec $\frac{1}{2}x - x'$ =	0 0 4 3 1 8
log tan Y	0.0 0 0 4 5

Y 45° 01' 46.1"

δ' 10° 45' 59.8"

$x - \delta'$	34	15	46.3
	9.7 2 6 4 0		
log Sin Π	8 2 2 8 4 6		
Sin $Y - \delta'$	9 7 5 0 5 0		
Csc Y	0.1 5 0 2 0		
Sin $(\delta - \delta')$	7.9 5 5 5 6		

$\delta - \delta'$ + 31 02.0

δ 11 17 01.8

Gh δ +11 16 57.1

O-C	+4.1
Corr	+0.2
2nd ord	0 0
Sun Corr.	-0.5

δ = +11 17 01.3

O-C = +1.3 6

Π 3 8 10.65"

	9.8 6 9 1 3
log Sin Π	8 2 2 8 4 6
Sin $\frac{1}{2}x''$	9.6 3 2 3 6 4
Sec δ	0 0 0 8 4 8
Sin $x - x''$	7.7 3 8 4 3

$x - x'$ 18 49.42

= +01 15.29

α 0 55 11 26

Gh α 0 55 10 58

O-C	+0.68
Corr.	-0 0 3
Sun Corr	+0 0 6

x 0 55 11.32

O-C +0.74

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11381 Dr 4

Star Measures

1	17932		16382				
11.3	15110	14	91827				
13.7	18		92				
	30		82				
	11.28 18		11.28 05				
2	16352		16570				
21.4	13173	76	97411	39			
22.5	79		37				
	52		72				
	21.31 76		21.31 68				
3	17533		17321				
30.4	13448	45	11410	11			
11.5	42		12				
	33		21				
	30.40 88		30.40 90				

Tycho

11	16582		17046				
	90737	6	14558	57			
	79		56				
	82		44				
	13.75 06		13.75 12				
	16248		17233				
	11383	82	12090	89			
	81		88				
	50		33				
	22867		22856				
	17290		17850				
	13040	37	12110	11			
	34		12				
	90		52				
	11425 3		11425 9				

Moon Measures.

1	17276		16681				
24.7	10172	71	13800	97			
15.3	70		94				
	78		83				
	24.71 05		24.71 14				
	19703		18355				
	16561		11480	81			
	61		82				
	07		53				
	15.31 44		15.31 28				
2	18232		18208				
2.5	95685		16850				
15.9	62		50				
	32		10				
	15.86 67		15.86 40				
3	17638		17801				
25.0	16619		88114				
16.5	19		14				
	38		01				
	25.10 19		25.10 13				

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1311 Dr 4

Tycho

Star Measures

L	17932	16382		16582	17046		
1.3	15110,4	9182	x7	9 8 7 3 6,	14558	57	
3.7	118	92		79	58		
	30	x2		x2	44		
	11285	11285		13.7506	13.7512		
2	16352	16570		16248	17233		
31.4	13173	97413	34	11383	12090	x9	
22.5	79	37		x1	54		
	52	72		50	33		
	21.3176	21.3168		22.4867	22.4856		
3	17533	17321		17290	17850		
30.4	13448	11410	11	13040	12110	11	
11.5	42	12		34	12		
	33	21		90	52		
	3.0402	3.0490		11425	11.4259		

Moon Measures.

	17276	16681		19703	18355		
24.7	16172	13800	97	16561	11480	81	
15.3	70	94		61	82		
	78	x3		07	53		
	24.7105	24.7114		15.3144	15.3128		
				18232	18208		
25				9568	65	16850	
15.9				62		50	
				32		10	
				15.8667		15.8640	
	17638	17801					
25.0	16619	8814					
16.5	19	14					
	38	01					
	25.1019	25.1013					

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11301 Moon Measures 12

4
25.
17.0+

17195 - 18412
16215 9395
15 95
95 14
17.0980 17.0981

5 17426 17510
24.3 136969 7 112 15 17
18.0 98 19
28 7506
243727 243709

6
24.1
18.3-

17066 18557
14710 10905 08
10 11
70 59
18.2357 18.2349

1
23.1
18.4
4

17525 18006
13180 1234847
80 46
25 10
18.4345 18.4339

8 16680 17650
21.9 74888 4 16850
18.0 80 50
76 50
21.9192 21.9200

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11301 Moon Measures 12

4
25.
7.1+

17195 18472
18215 9385
15 95
45 14
17.0980 17.0981

5 17426 17510
243 13696 11215
180 98 19
28 7506
24.3727 24.3709

6
242
18.3-

17166 18557
14710 10905
10 11
70 59
18.2357 18.2349

1
23.1
8.4

17525 18004
13180 12348
60 46
25 10
18.4345 18.4339

8 16650 17650
21.9 7485 16850
18.0 50 50
76 50
21.9192 21.9200

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11301

Times Etc

Date Oct. 11 '16

Eph Stars	01	30		01	42	
" " Moon	01	36	02.8 ✓	01	36	03.1 ✓
Clock fast		10	30.7 ✓			
H. Sid. Time	01	25	32.25 ✓			
" Young	04	44	31.05			
G. Sid. Time	06	10	03.30 ✓			
" " Time M.N.	13	18	57.98			
Interval	16	51	05.32 ✓			
Reduction		02	45.64 ✓			
G.M.T.	16	48	19.68 ✓			

G. = −0h 19m

16h 805.47 ✓

From Nput. Almanac.

				R.A.		Decl.		
Moon	16h	01	42	41.25 ✓	+ 15	5	9	35.5 ✓
Motion 1m				2.1862 ✓				+ 11.873 ✓
" 48.328 ✓		01		45.65 ✓		09		33.8 ✓
Tabular Place	01h	44		26.90 ✓	+ 16	09		09.3 ✓

Moon age 15d

934" = 14

a = −501.5
+24
−477.5

Parallax	57	34.55 ✓
Semidiam	15	42.8 ✓
R		942.8 ✓
aug		14.3 ✓
Dfr 4		−0.6 ✓
R		956.5 ✓
R		2.05.03 ✓
(1+a) R		−979 ✓
R		1.9524 ✓
R2		3.8119 ✓

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11301 Times Etc

Date Oct. 11 '16

Expl Star	01	30		01	42	
" Moon	01	36	02.8	01	36	03.1
Clock fast		10	30.7			
M Sid Time	01	25	32.25			
" Young	04	44	31.05			
S Sid Time	06	10	03.30			
" " Time M.N.	13	18	57.98			
Interval	16	51	05.32			
Reduction		02	45.64			
G.M.T.	16	48	19.68			

$\Theta = -0^h 1.9^m$

16h 80s 47

From Nautical Alm

			RA		Decl.	
Moon	16h	01	42	41 25s	+ 15s	59 35.5s
Motion 1m				2.1862		+ 11.873
" 48.28			01	45.65s		09 33.8
Tabular Place		01	44	26.90	+ 16	09 09.3

Moon age 15d

934" = 14

a = −501.5s
+24
−477.5s

Parallax	57	34.5s
Semidiam	15s	42.8
R		942.8
aug		14.3
Dr		−0.6
R		9565
R		2.0503
(1+a) R		−979
R		1.9524
R2		38119

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11301 Plate Center 2 Constants. 14

11.2812	13.7509	01	37	55.29	75	21	17.7
21.3172	22.4862	01	43	37.32	16	32	15.7
30.4089	11.4256	61	48	41.89	15	01	08.1
3|63.0073	3|47.6627	3|05	10	14.50	3|46	54	41.5
-21.0024	-15.8876	01	43	24.83	15	38	13.8
22	18.			+30.92		+16	25.4
+0.9976	+2.1124.	01	43	55.75			
31s	466.5						

Plate Center { A 01 43 55.75 ; D 15 54 39.2 }

x-ξ +500x +82.4y +1.4x -11395

+4604 + 5641 = 10245 +1133 = 11378 +16 = 11394
-1147 + 10659 = 9512 +1853 = 11365 +30 = 11395
-4794 + 15204 = 10410 + 942 = 11352 +43 = 11395
23.1471 + 11573 +1358 +32 = 23.1039

y-η +500y -86.6x +5y -599y

+0029 +6875 = 6904 -977 = 5927 +69 = 5996
-3512 +11243 = 7731 -1846 = 5885 +112 = 5997
+2859 + 5713 = 8573 -2633 = 5940 + 57 = 5997
16.4810 + 8240 -2004 +82 = 16.5131

Tables a = -0.1 l = -1.0 a - l = +0.9 b + d = 0
-501.4 -505. +3.6 +4.2

b - c -501.3 -508.0 +4.2

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11301 Plate Center 1 Constants.

11.2812	13.7509	01	37	55.29	75°	21	17.7
21.3172	22.4862	01	43	37.32	16	32	15.7
32.4089	11.4256	01	48	41.89	15°	01	08.1
63.0073	3|476627	3|0.5	10	1450	3|46	54	41.5°
21.0024	15.8876	01	43	2483	15°	38	13.8
22	18			+31.92		+16	25.4
+0.9976	+2.1124	01	43	55.75			
31	466.5						

Plate Center { A 01 43 55.75
δ 15° 54 39.2

λ-3 +500λ +82.47 +14x -11395

1604 + 5641 = 10245 + 1133 = 11378 + 16 = 11394
147 + 10659 = 9512 + 1853 = 11365 + 30 = 11395
1794 + 15204 = 10410 + 9432 = 11352 + 43 = 11395
23.1471 + 115.73 + 135.8 + 32 = 23.3139

y-η +500y -866x +5y -599.
+0029 + 6875 = 6904 - 9708 = 5927 + 69 = 5996
-3512 + 11243 = 7731 - 1846 = 5885 + 112 = 5997
+2859 + 5713 = 8573 - 2633 = 5940 + 57 = 6997
16.4810 + 8240 -2004 + 82 = 16.5131

-501.4 -505 +3.6 +4.2

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	ξ	η	Δξ	−3.45ξ	−3η	+1
	−11.17	−4.29	−39	+38 = −1	+1 = −0	
	−0.57	+4.84	−0	+0 = −0	−1 = −1	
	+8.88	−6.88	+27	−30 = −3	+2 = −1	
M	+1.30	−1.49		−4	+0	= −3

	Δη	−3.2η	+7
	−16	+9 = −7	
	+3	−12 = −8	
	−22	+15 = −7	
		+3	= +10

corr $\alpha = -0.01$

$\delta = +0.5$

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1916phae..proj..2

11301 Standard Coordinates. 15

	Cape No. 241 mg 7.8	Cape No. 255 mg 5.8	Cape No. 270 mg. 8δ
C	01 37 03.70	01 42 45.39	01 47 50.10
y	03.73	45.41	50.16
ξ	03.70	45.38	50.14
Mean	01 37 03.71	01 42 45.39	01 47 50.13
Prec	+ 51.58	+ 51.93	+ 51.76
α	01 37 55.29	01 43 37.32	01 48 41.89
A	01 43 55.75	01 43 55.75	01 43 55.75
α-A	- 06 00.46	- 18.43	+ 04 46.14
sin "	- 360.42	- 18.43	+ 286.12
log "	2.556811	1.265553	2.456544
" cosδ	9.984211	9.981655	9.984911
log g_0	1.048226	9.754422	0.948699
S_0	-11.17544	- 0.56811	+ 8.88556
S_1	- .0038	0	+ 27
S	10.82118	21.43192	30.88833
X	11.28112	21.31772	30.40894
X-S	+ .46004	- .11147	- .47939
C	+15 16 25.52	+16 27 27.02	+14 56 22.33
y	26.00	26.81	22.55
ξ	25.33	27.05	22.66
Mean	+15 16 25.55	16 27 26.96	+14 56 22.51
Prec	+ 04 52.25	+ 04 48.65	+ 04 45.61
δ	+15 21 17.75	16 32 15.55	+15 01 08.12
D	+15 54 39.25	15 54 39.25	15 54 39.25
δ-D	- 33 21.50	+ 37 36.30	- 53 31.13
tan "	- 2001.66	+ 2256.66	- 3211.44
log "	3.301385	3.353455	3.506705
log η_0	0.632533	0.684600	0.837850
log tan S	9.438695	9.472645	9.428633
" S_0^2	2.896552	9.508844	1.897382
M,	8.58886	6.0348	8.37794
η_0	-4.29077	+4.83773	- 6.88442
η_1	+0.03877	+0.00011	+ 0.02399
η	13.74880	12.83774	11.13977
y	13.75097	22.48622	11.42556
y-η	+ 00.2917	- 35.12	+ 5.8559

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11301. Standard Coordinates. 13

	Cape No. 241 mg 7.8	Cape No. 255 mg 5.8	Cape No. 270 mg. 8.0
C	01 37 03.70	01 42 45.39	01 47 57.11
9	03.73	45.41	50.16
ε	03.70	45.38	50.14
Mean	01 37 03.71	01 42 45.39	01 47 50.13
Prec	+ 51.58	+ 51.93	+ 51.76
α	01 37 55.29	01 43 37.32	01 48 41.89
A	01 43 55.75	01 43 55.75	01 43 55.75
α-A	- 06 00.46	- 18.43	+ 04 46.14
Sun "	- 36042	- 18.43	+ 28612
log "	2.556811	1.265553	2.456554
" cosδ	9.984211	9.998165	9.998491
log S_2	1.048226	9.753442	0.948869
S_1	-11.17534	- 0.56811	+ 8.88556
S_1	- .0038		+ 27
S	10.85218	21.43119	30.88833
λ	11.28112	21.31772	30.41689
λ-S	+ .4604	- .11147	- .4794
C	+15 16 25.2	+16 27 27.02	+14 56 22.3
9	26.0	26.81	22.5
ε	25.3	27.05	22.6
Mean	+15 16 25.5	16 27 26.9	+14 56 22.5
Prec	+ 04 52.2	+ 04 48.6	+ 04 45.6
S	+15 21 17.7	16 32 15.5	+15 01 08.1
D	+15 54 39.2	15 54 39.2	15 54 39.2
D-E	- 33 21.5	+ 37 36.5	- 53 31.1
tan "	- 2001.6	+ 2256.6	- 3211.4
log "	3.301358	3.353455	3.506702
log n_0	0.632553	0.684460	0.837855
log tan S	9.433864	9.472644	9.428632
" S_0^2	2.196552	9.508884	1.897338
m_1	8.55486	6.0348	8.37794
n_0	-4.2907	+4.8373	- 6.8842
n_1	+0.0387	+0.0001	+ 0.0239
n	13.7480	22.8374	11.1397
4	13.7809	22.4862	11.4256
4-n	+ 0.0329	- 0.3512	+ 0.2859

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11301 Mauis Center. 16

		Δx			O − C
1	24.7110	+ 1.56300	2.4430	3.80844	− 35
2	25.0000	+ 1.85200	3.4299	3.8101	− 18
3 x	25.1016	+ 1.95360	3.8165	3.81651	+ 46
4	25.0000	+ 1.85200	3.4299	3.8094	− 25
5	24.3719	+ 1.22390	1.4979	3.80251	− 94
6	24.0000	+ 0.85200	0.7259	3.8003	− 116
7	23.1480	+ 0.00000	0.0000	3.8115	− 4
8	21.9196	− 1.22840	1.5090	1.8136	+ 17

R^2 = 3.8119

		Δy			
1	15.3136	− 1.16844	− 1.13654		127.0
2	15.8654	− 0.61666	− 0.38021		108.
3	16.4820	− 0.00006	− 0.00000		90.
4	17.0980	+ 0.61688	+ 0.37950		72 v
5	18.0000	+ 1.51800	+ 2.30460		39
6	18.2353	+ 1.75333	+ 3.07744		26 v
7 y	18.4342	+ 1.95222	+ 3.81151		0 v
8	18.0000	+ 1.51800	+ 2.30460		321.

Range 163

X = 25 y 15.8654 y = 18 X = 24.3719
17.0980 21.9196
32.9634 46.2915
y_0 16.4817 X_0 23.1457
y max 18.4342 X max 25.1016
R 1.9525 R 1.9559
Com R 1.9524

Plate Center X_0 23.1480
y_0 16.4820

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11301 Plate Center. 16

												O − C
1	24.7110	+	1.5630	0	2.4430		3.8084		3.8084	−		3.5
2	25.0000	+	1.8520	0	3.4299		3.8101			−		1.8
3	25.1016	+	1.9536	0	3.8165		3.8165			+		4.6
4	25.0000	+	1.8521	0	3.4299		3.8094			−		2.5
5	24.3719	+	1.2239	0	1.4979		3.8025			−		9.4
6	24.0000	+	0.8520	1	0.7259		3.8003			−		11.6
7	23.1481	+	0.0000	0	0.0000		3.8115			−		0.4
8	21.9196	−	1.2284	0	1.5090		1.8136			+		1.7

R = 38119

1	15.3136	−	1.1684	−	1.3654		125.0	
2	15.8654	−	0.6166	−	0.3802		108	
3	16.4820	−	0.0000	−	0.0000		90	
4	17.0980	+	0.6160	+	0.3795		72	
5	18.0000	+	1.5180	+	1.2304		38	
6	18.2352	+	1.7532	+	1.3744		26	
7	18.4342	+	1.9522	+	1.3815		0	
8	18.0000	+	1.5180	+	1.2304		322	

Range 163

X = 25.4 15.8654 4 = 18 X = 24.3719

17.0980 21.9196

32.9634 46.2915

Y_0 16.4817 X_0 23.1457

Y max 18.4342 X max 25.1016

X − R 1.9525 R 1.9559

Com R 1.9524

Plate Center X_0 23.1480

Y_0 16.4820

Point 8 to small sun into phase.

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Normals

1	-1.82	- 54.7	+ 40.9
2	-1.14	- 33.3	+ 11.1
3	-000	+ 89.6	- 000
4	+1.14	- 46.2	- 15.5
5	+1.86	-122.0	-143.0
6	+1.49	- 98.6	-203.0
7	+000	- 000.0	- 7.8
8	-1.87	- 209	+ 259
	+4.49	+ 89.6	+ 77.9
	-4.83	-3757	-369.3
	-0.34	-286.1	-291.4

-a	-b	+ac
+12	- 8	- 12 v
+14	- 4	- 6 v
+15	- 0	- 1 v
+14	+ 4	+ 2 v
+10	+10	+ 4 v
+ 6	+12	+ 2 v
+ 0	+13	- 3 v
-10	+10	-16 v

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11301 Conditional Equations 17

						O−C	corr
1	+ 1.56	− 1.17	= − 35	− 27	+ 24	− 54	− 71
2	+ 1.85	− 0.62	= − 18	− 32	+ 13	− 31	− 37
3	+ 1.95	− 0.00	= + 46	− 34	+ 0	+ 46	+ 45
4	+ 1.85	+ 0.62	= − 25	− 32	− 13	− 12	− 10
5	+ 1.22	+ 1.52	= − 94	− 26	− 32	− 62	− 58
6	+ 0.85	+ 1.75	= − 116	− 15	− 37	− 79	− 77
7	+ 0.00	+ 1.95	= − 4	− 0	− 41	+ 37	+ 34
8	− 1.23	+ 1.52	= + 17	+ 21	− 32	+ 49	+ 33
	+ 8.05	+ 5.57				+ 132 − 243	
						av 47	

16.85 − 0.34 = − 286.1 + 8.05

− 0.34 + 13.62 = − 291.4 + 5.57

+ 0.34 − 0 = − 5.7 + 0.16

+ 13.62 = − 285.7 + 5.73 b = − 20.9 + 0.42

16.85 = − 286.1 − 7.1 = − 293.2 a = − 17.4 + 0.48

arc 163

$\frac{p}{n} = 24$

$\frac{\Sigma v}{n} = -14$

$\frac{-14}{24} = -58$

$\Delta R = -0.7$

corr = + 0.2

Tme $\Delta R = -0.9$

$-2R = -4.10$ $\Delta = -2R\,corr$ − 0.82 − 16

$\Delta b = -0.34 - 1\,\Delta J = -0.2$

$\Delta a = -0.39 - 8\,\Delta\alpha = -0.01$

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11301 Conditional Equations 11

						O−C
1	+ 1.56	− 1.17	= − 35	− 27	+ 24	− 54
2	+ 1.85	− 0.62	= − 18	− 32	+ 13	− 31
3	+ 1.95	− 0.00	= + 46	− 34	+ 0	+ 46
4	+ 1.85	+ 0.62	= − 25	− 32	+ 13	− 12
5	+ 1.22	+ 1.52	= − 94	− 26	− 32	− 62
6	+ 0.65	+ 1.75	= − 116	− 15	− 37	− 79
7	+ 0.00	+ 1.95	= − 4	− 0	− 41	+ 37
8	− 1.23	+ 1.52	= + 17	+ 21	− 32	+ 49
						+ 132 − 243
						a = 47

$16.85 - 0.34 = -286.1$

$-0.34 + 13.62 = -291.4$

$-0.34 + 0 = -7.57$

$+13.62 = -2857$ $\quad b = -20.9$

$16.85 = -286.1 - 71 = -293.2$ $\quad a = -17.4$

$\frac{\beta}{n} = .24$

$\frac{\Sigma v}{n} = -14$

$\frac{-14}{24} = -58$

$\Delta R = -0.4$

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11301 Moores Mean Position

23.14801
−9
23.14711

16.48280
−10
16.48180

From Plate Constants.

23.30391
22
S +1.30391

16.5-1131
18.
-1.48869

log S	0.11529
log cos δ_0	9.99345
	8.50724
log sin (A-A)	1.62436
α−A	+42.13
A	01 43 55.75
α_0	01 44 37.88
Red	+4.70
α	01 44 42.58

log tan δ	9.44888
log S_0	0.23051
	7.05934
log n	6.73271
n	+0.00005
n_0	−1.48741
log n_0	0.17243
	7.33115
log tan (δ-Δ)	2.84128
(δ-Δ)	−693.87
	−11 33.9
Δ	15 54 39.2
δ_0	15 43 05.3
Red	+28.0
S'	+15 43 33.3

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11301 Means Mean Position

23.14780
−9
23.14771

16 48 20
−10
16.48810

From Plate Constants.

23.30399
22
+1.30399

16.51131
18
−1.48869

log S_0 0.11525
log cos δ_0 9.98345

log sin α-A 1.62456

α − A +42.12

A 01 43 55.75

α_0 01 44 37.88

+4.70

α' 01 44 42.58

log tan δ 9.94488
log S_0 2 0.23055

log η_1 6.73277

η_1 +0.00005
η_0 −1.48774

log $\Delta\eta_0$ 0.17243n

log tan δ-D 2.84128n

δ-k −693.87
−11 33.9

D 15 54 39.2

δ_0 15 43 05.3

+27.0

δ' +15 43 32.3

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1916phae.proj.2

1. 01 41 01.965 ✓
40 57.351 ✓
+4.614 ✓

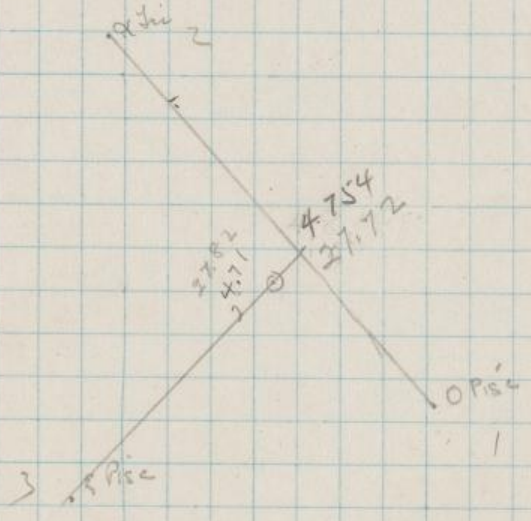
2. 01 48 22.272 ✓
17.332
+4.940 ✓

3. 01 49 16.878 ✓
12.319
+4.559 ✓

08 44 35.90 ✓
44 7.28 ✓
+28.62

29 10 38.97 ✓
12.50 ✓
+26.47

02 46 52.54 ✓
23.92
+28.62 ✓



30
25
20
15
10
5
0
-5

52 50 48 46 44 42 40 38 36 34

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1916phec.proj.2

11301 Reduction to Apparent Place 19

$\alpha_0 + H$	06	24.2	96°	31.5	δ_0	75°	43.1
H	04	39.6			log cos δ_0		99834
α_0	01	44.6			log i		0.8878
G	23	13.7			(i)		0.8712
$G+\alpha_0$	24	583	14°	34.5			
					log sin δ_0		94328
log cos $G+\alpha$		9.9858			Cos $4+x$,		9.0228
log g		1.3387			log h		1.2778
$\frac{1}{2}$ sin $G+x$,		9.4008			sin $H+x$		9.9976
log tan δ_0		9.4494			sec δ_0		0.0166
		88239					88239
log g'		1.3245			log f'		9.7334
g		9.0128			h		0.1159

α	+3287	g'	+21.110
g	+0.103	h'	−0.541
h	+1.306	i	+7.434
Red	+4.696	Red	+28.003

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$\alpha_0 + H$	06ʰ	24.2	96°	8′ 5″	δ_0	75° 43′ 41″
H	04	39.61			log cos δ_0	9.98341
α_0	01	44.6			log λ	0.4478
G	23	13.77			λ'	0.8712
$G+x$	24	58 3	14°	34.51 5″		

log sin δ_0	9.43328
G_0 $H+x$	9.62288 n
log λ	1.27778
α $H+x$	9.99766
Dec δ_0	90 16 6
	8.8.239

log $G+x$	9.98158
log g	1.33887
" sin $G+x$	9.40008
log $\lambda \sin i$	9.44994
	8.8239

log g'	1.32455
g	9.01128

log λ'	9.73342 n
λ	0.11159

g +3287
g +0.008
λ 1.3066
Red +4.5665

g' +
λ − 0.5471
i + 7.4334
Red

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11301 Lunar Parallax 20

α'	01	44	42.58
θ	01	25	32.25
$\theta - \alpha'$	− 19′	10.33	
=	− 4°	47′	34.95
$\frac{1}{2}(\alpha - \alpha')$		01	51.14
$\theta - (\frac{1}{2}\alpha + \alpha')$	− 4°	45	

	9.95727
log cos ½(α + α′)	0.00000
Sec (θ − α′)	0.00149
log tan χ	9.95876

χ 42 17 02.3

δ′ 15° 43 34.0

χ − δ′	26	33	28.3
	9.82640		
log sin π	8.22394		
Sin χ − δ′	9.65041		
Cosec χ	0.17212		
Sin δ − δ′	7.87287		

δ − δ′ + 25′ 39.″2

δ +16 09 13.2

Eph δ +16 09 09.3

O − C	+ 03.9
2nd ord. reg.	+ 0.0
curv.	+ 0.5
Dec. Corr.	− 0.2

δ 16 09 13.8

O − C = + 3.7

π 57 34.55

	9.86913
log sin π	8.22394
" Sin (θ − α′)	8.92200
" Sec δ	0.01749
Sin (α − α′)	7.03256

α − α′ − 3′ 42.32

= − 14.82

α 01 44 27.76

Eph α 01 44 26.90

O − C	+ 0.86
curv.	− 0.01
Dec. Corr.	− 0.01

α 01 44 27.75

O − C + 0.85

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11301 Lunar Parallax 20

α'	0.1	44	42.58
θ	01	25	32.25
$\theta - x'$	-	19'	10.33
=	- 4°	47'	34.95
$\frac{1}{2}(x - x')$		01	57.14
$\theta - x' - \frac{1}{2}(x - x')$	- 4'	45	[illegible]

π 57 34.55"

	9.869913
log Sin π	8.223394
" Sin $(\theta - x')$	8.922000 n
" Sec δ'	0.017499
Sin $(\alpha - x')$	7.032256 n

$\alpha - x'$ - 3' 42.32

= - 14.82

	9.995727		
log Cos $\frac{1}{2}(x + x')$	0.000000		
Sec $\frac{1}{2}(\theta - x')$	0.000149		
log tan γ	9.995876		
γ	42	17	02.3
δ'	15°	43	34.0
$\gamma - \delta'$	26	33	28.3
	9.826400		
log Sin π	8.223394		
Sin $\gamma - \delta'$	9.650411		
Cosec γ	0.172112		
Sin $\delta - \delta'$	7.872287		
$\delta - \delta'$	+ 25'	39.2	
δ	+16	09	13.2
Eph δ	+16	09	09.3
O - C		+ 03.9	
2nd diff		+ 0.0	
curv.		+ 0.5	
Tri. Corr.		- 0.2	
δ	16	09	13.0
O - C =		± 3.7	

α	01	44	27.76
Eph α	01	44	26.90
O - C			+ 0.86
curv.			- 0.01
Tri. Corr.			- 0.01
α	01	44	27.75
O - C		±	0.85

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11382 Star Measures 21

1	17890	18304	16280	18048
11.6	12498 95	13708	6582	17725 27
13.9	92	00 04	82	29
	90	00	76	42
	11.5395	11.5402	13.9698	13.9680
2	16108	18558	17686	18288
21.7	96013	15505 46	11478 81	14462
22.6	05	42	84	62
	04	52	82	80
	21.6502	21.6494	22.6203	22.6177
3	16410	19039	17292	18650
30.6	99178	15513	12460	13490 88
11.5	19	13	60	86
	06	33	7288	46
	30.6490	30.6476	11.4830	11.4840

Moon Measures

1	16715	17810	17006	18412
25.4	12420 22	12082 86	10959 58	14438 39
15.6	24	90	57	40
	09	02	00	08
	25.4291	25.4281	15.6044	15.6030
2	17471	18768		
25.7	19380 85	15840 45		
16.0	90	50		
	63	60		
	25.7090	25.7079		
3	17540	19674		
25.9	8038	19160 61		
16.8	38	62		
	34	68		
	25.9497	25.9488		

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11312 Star Measures 21

1	17890	18304		16280		18048	
11.6	12498	95 13708		6582		17725	27
13.9	92	004		82		29	
	90	00		76		42	
	11.5395	11.5402		139698		139680	
2	16108	18558		17686		18288	
21.7	96011	03 15505	46	11478	81	14462	
22.6	05	42		84		62	
	04	52		82		50	
	216502	21.6494		226203		226177	
3	16410	19039		17292		18650	
31.6	99117,8	15513		12460		13490	81
11.5	19	13		60		56	
	06	33		7288		46	
	306490	306476		114830		114840	

Moon Measures

4	16715	17810		17006		18412	
25.4	12420	22 12082	56	10959	58	14438	3
13.6	24	90		57		40	
	09	02		00		08	
	254291	254281		156044		156030	
3	17471	18768					
25.7	10380	55 15540	45				
16.0	90	50					
	63	60					
	257090	257079					
3	17540	19674					
25.9	8038	1916061					
16.8	38	62					
	34	68					
	259497	259488					

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11302 Moon Measures' 22

4 18618 18412
25.9 12326 23 14704
18.1 20 04
12 06
25.6291 25.6294

5 18565 19614
25.0 12470 15691 95
18.6 70 00
70 68
18.6095 18.6083

6 16150 19104
24 8796 16436 38
18.7 96 40
46 00
24.7351 24.7335

18565 19614
17580 16450
1015960 13850 55
61 60
74 46
18.7416 18.7406

1 16908 17081
24. 8018 15960
18.9 18 60
04 75
18.8887 18.8890

8 16363 17760
23. 10201 13901 10
18.6 01 11
59 56
18.6160 18.6152

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11302 Moon measures' 2.

4 18618 18412
25.4 12326 22 14704
188 20 04
12 06
256291 256294

5 18558 19614
259 12470 15690 4
186 70 00
70 68
18.6095 18.6083

6 16150 19104
24 8796 16436 38
186 96 40
46 00
24.7351 24.7335

18580 16450
10159 60 13850 5
61 60
74 46
187416 187406

1 16908 17081
24. 8018 15960
184 18 60
04 75
18.8887 18.8890

8 16363 17760
23. 10201 13904 10
18.6 01 11
59 56
18.6160 18.6158

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11302 Times Etc 23

Date Oct. 11 '16

Eph ☆ Trans	01	44			01	56	
" " Moon	01	49	33.0		01	49	33.2
Clock fast		10	30.7				
☿ Sid Time	01	39	02.4				
☿ Sons	04	44	31.05				
S. Sid. Time	06	23	33.45		$\Theta = -0^h\ 05^m$		
" " " M.N	13	18	57.98				
Interval	17	04	35.47				
Reduction		02	47.85				
S. M.T	17	01	47.62		17.01 2989		

From Naut. Alm			RA		Decl.		
Moon	17h	01	44	52.43	+16	11	27.3
Motion 1h				2.1875			+11.85
" 01.7937				+ 3.92			+21.2
Tabular Place		01	44	56.35	+16	11	48.5

Moon age 15d

9.34" = 14

a = −499.4
+ 2.4
−475.4

Parallax		57 34.2
Semidiam		15 42.7
R		942.7
Aug		14.2
Dr	4	− 0.6
R		956.3
R		2.0499
(1+a)R		− 974
R		1.9525
R^2		3.8123

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1916phae..proj..2

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1916phae.proj.2

Date Oct 11 '16

Appl. Star	01	44		01	56	
" Moon	01	49	33.0"	01	49	33.2
Clock fast		10	30.1			
Sid Time	01	39	02.4"			
Sun	04	44	31.05"			
Sid time	06	23	33.45"	Θ =	-0h	05m
" M.N	13	18	57.98			
Interval	17	04	35.47"			
Reduction		02	47.85"			
G M.T	17	01	47.62"	17.01989		

			RA		Decl.	
Moon	17h	01	44	52.43"	+16	11 27.3"
Motion 1m				2.1875"		+ 11.75"
" 01.7937				+ 3.92"		+ 21.2"
Tabular Place		01	44	56.35"	+16	11 48.5"

Moon's age 15d

934" = 14

	-494.4	
	+24	
	-475.4	

Parallax	51	34.2"
Semidiam	15	42.7
R		942.7
Arg		14.2
Sun "		- 0.6
R		4543
R		2.0499
(1+a)R		- 974
R		1.9525
R^2		3.8123

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18.8442

25.9672

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11302 Plate Constants 24

11.5398	13.9690	01	37	55.33	15	21	18.5	
21.6490	22.6190	01	43	37.32	16	32	15.5	
30.6483	11.4835	01	48	41.97	15	01	08.0	
63.8371 3	48.0715	3 05	10	14.62	3 46	54	42.0	
21.2790	16.0238	01	43	24.87	15	38	14.0	
22.	18			+22.35			+15 21.9	
+.7210	+1.9762							
31	466.5							

Plate Center A 01 43 47.22

δ +15 53 35.9

X-S +500x	-6.2y	-.6x	-10207
+.4531 + 5770 = 10301	-87 = 10214	-7 = 10207	
+.0955 + 9422 = 10377	-159 = 10218	-11 = 10207	
~~+.0458 + 10824 = 10366~~			
+.5028 + 15324 = 10296	-71 = 10225	-18 = 10207	
23.9957 + 11998	-105	-14 =	24.1629

y-η +500δ	+4.9x	+4.1y	-7987
+.0888 + 6484 = 7872	+ 57 = 7929	+ 57 = 7986	
+.5196 + 12984 = 7788	+ 92 = 7880	+ 107	7987
~~+.3535 + 11309 = 7774~~			
+.5048 + 5742 = 7790	+ 150 = 7940	+ 47 = 7987	
16.9343 + 8467	+118	+70	= 17.0011

Tables a = -0.9 e = -1.7 a - e +0.8 b + d 0

- 499.4 -504.1 = +4.7 = +1.3

b - c -898.5 -502.7 +1.3

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11312 Plate Constants 24

11. 53981 +3.96.90 = 01137 5-5. 38.6 15321 18.5
21.64900 22.6790 = 01448 37.32 14332 15.5'
30.64.83 11.4535 +01148 41.47 15'01 05'6
6383721 14.0715 3105 10 1462 346 54 42.0
21.2790 16.238 01 43 2487 15' 38 14.0
22 15 +22.35' 15 21.9
+.7210.3 +1.99 6223 61 3 9 1.1 48 35'
3 31 7 4 = 46.15' 3 37 1 1.1 3 7 7
4 = 1 + 2 = 4 1 = 2 1 = 4 + 34 3 5

A 011 43 47.22
Plate Center
δ +15 53 35.9

X-15 +500x -6.2y -.6x -10207
.4531 + 5771 = 10301 -81 = 10214 - 7 = 10207
.0955 + 9922 = 10377 -159 = 10218 - 11 = 10207
.0458 + 10824 = 10666 -141
.5728 + 15324 = 10396 -71 = 10235 - 18 = 10207
23.9957 + 11998 -105 -14 = 24.1629

y-7 +500y +4.9x +4.1y -7787
+0888 + 6444 = 7872 + 57 = 7929 + 57 = 7986
-.194 + 12984 = 7788 + 92 = 7880 + 107 7987
-.2534 + 11301 = 7774
.2048 + 5742 = 7790 + 150 = 7941 + 47 = 7987
16.9343 + 8467 +118 +70 = 17.0011

Tables a = -09 b = -1.7 a - b +0.8 b + d 0
- 4994 -5041 = +4.7 = +1.3

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Cyc 25-2 mg. 64

C	01	41	9.52
S	01	41	9.56
E			9.53
Mean	01	41	9.54
Prec.		+ 51.97	
α	01	42	01.51
A	01	43	47.22
	−	01	45.71
		−	105.71

2.024111

9.998061

0.511962

S_0 −3.2506

S_1 − .0007

S 18.74487

X 18.84422

X−S +.0955

	16	54	43.29
			42.82
			42.67
	16	54	42.93
		+ 04	49.8
S	+16	59	32.7
E	+15	53	35.9
	+ 1	05	56.8
		+	3957.4

3.597411

0.928556

9.48351

1.02239

7.56124

η_0 +8.48322

η_1 +.00036

η 26.47868

y 25.96722

y−η −.51196

X

	17	100	
		8665	63
			61
			08
	18.	8437	

	16	203	
	14	652	
			48
			03
	18.	8447	

18.8442

	167	50	
		70	80
			80
			54
	25.	9674	

y

	17	517	
		1718	87
			86
			17
	25.	9678	

25.9672

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11312 Standard Coordinates. 25

	Cafe no 241 mg 7.8	Cafe no. 255 mg 5.8	Cafe no. 271 mg 8.5
C	01 37 03.70	01 42 45.39	01 47 50.10
1	03.73	45.41	50.16
2	03.70	45.38	50.14
Mean	01 37 03.71	01 42 45.39	01 47 50.13
Prec	P.m. +0.025 + 51.62	+ 51.93	P.m. +0.052 + 51.68
α	01 37 55.33	01 43 37.32	01 48 41.81
A	01 43 47.22	01 43 47.22	01 43 47.22
α − A	− 05 51.89	− 09.90	+ 04 54.59
sin α−A	− 351.85	− 9.90	+ 294.57
log ν₀	2.546364	0.995-64n	2.46919
log ν sin δ	9.98421	9.98165	9.98491
log S₀	1.037811	9.48453	0.96134
S₀	−10.9097	−0.3052	+9.1482
S₁	− .0036	0	+ 00.29
S	11.0867	21.6948	31.1511
x	11.5398	21.6490	30.6483
X−S	+.4531	− 0458	−.5028
C	+15 16 25.2	16 27 27.0	14 56 22.3
1	26.0	26.8	22.5
2	25.3	27.0	22.6
mean	15 16 25.5	16 27 26.9	14 56 22.5
Prec	+04 51.4 P.m.	+ 04 48.6 P.m. +0.44	+ 04 46.3
S	+15 21 16.9	+16 32 15.5	+15 01 08.8
D	15 53 35.9	15 53 35.9	15 53 35.9
S−D	− 32 19.0	+ 38 39.6	− 52 27.3
ξ	− 1939.1	+ 2319.7	− 3147.3
log ν	3.287605n	3.36543	3.49794n
log λ₁	0.618755n	0.69658	0.82909n
log δ	9.4387	9.4726	9.4286
log S₀²	2.0756	8.9691	1.9227
log λ	8.5677	5.4951	8.4047
η₀	− 4.1567	+ 4.9725	− 6.7467
η₁	+0.0369	+.0000	+0.0254
η	13.8802	22.9725	11.2787
y	13.9690	22.6140	11.4835
y−η	+.0888	−.3585	+.2048

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11312 Standard Coordinates. 25

	Cafe no 241 mg 7.8			Cafe no 255 mg 5.8			Cafe no 270 mg 5.5		
C	01	37	03.70	01	42	45.34	01	47	50.10
1			03.73			45.41			50.16
2			03.70			45.38			50.14
mean	01.	37	03.71	01	42	45.34	01	47	50.13
Prec			+ 51.62			+ 51.93			+ 51.88
α	01	37	55.33	01	43	37.32	01	47	41.81
A	01	43	47.22	01	43	47.22	01	43	47.22
x-A		-05	51.89			-09.90		+04	54.59
Δx-A			-351.85			- 9.90			+294.57
log		2.546361			0.995641			2.469191	
log sin		9.984211			9.998165			9.998491	
log 30		1.037515			9.484583			0.961134	
S.		-10.9097			-03.52			+9.1482	
S.		- .0036						+ 0029	
S		11.0461			21.6948			31.1511	
x		11.5398			21.6490			31.6483	
x-S		+.4531			- 0458			-.5028	

C	+15	16	25.2	16	27	27.0	14	56	22.3
1			26.0			26.8			22.5
2			25.3			27.0			22.6
mean	15	16	25.5	16	27	26.9	14	56	22.5
Prec		+04	51.4		+04	48.6		+04	46.3
S	+5	21	16.9	-16	32	1.55	15	01	08.8
ξ	15	53	35.9	15	53	35.9	15	53	35.9
ΔD		-32	19.0		+38	39.6		-52	27.3
Δη			-1939.1			+2319.7			-3149.8
log η		3.287604			3.365434			3.497894	
log η₀		0.618755			0.646584			0.829094	
log S		9.43847			9.47126			9.42866	
log ξ		2.07556			8.96911			1.92227	
log η		8.56677			5.44751			8.40467	
η₀		-4.15697			+4.97125			-6.74667	
η₁		+0.00369			+.00008			+0.00254	
η		13.8800			22.97125			11.27787	
y		13.4490			22.61900			11.48355	
y-η		+0.0988			-.35225			+.20568	

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Morris Center

1	25.4286	+1.4316 0	2.0495	3.8275	+152
2	25.7085	+1.7115 0	2.9292	3.8055	− 68
3 X	25.9493	+1.9523 0	3.8115	3.8115	− 8
4	25.6292	+1.6322 0	2.6641	3.7962	− 161
5	25.0000	+1.0030 0	1.0060	3.8046	− 77
6	24.7343	+0.7373 0	0.5436	3.8029	−100
7	23.9968	+0.0000 0	0.0000	3.8138	+ 15
8	23.0000	−0.9970 0	0.9940	3.8154	+ 31

R^2 3.8123

1	15.6037	−1.3323 −1	1.7780		133°
2	16.0000	−0.9360 −1	0.8763		119
3	16.9360	−0.0000 −0	0.0000		90
4	18.0000	+1.0640 +0	1.1321		57
5	16.6089	+1.6729 +1	2.7986		31
6	18.7411	+1.8051 +1	3.2587		22
7	18.8888	+1.9528 +1	3.8138		0
8	18.6156	+1.6796 +1	2.8214		329

Range 164°

Approx Center

X max = 25.9493
Cm R = 1.9525
X_0 23.9968

y_{max} 18.8888
y_0 16.9363

Morris. Center { X_0 23.9970
y_0 16.9360

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Means Center

1	25.4286	+1.43160	2.0495	3.8275	+152
2	25.7085	+1.71150	2.9292	3.8055	- 68
3	25.9493	+1.95230	3.8115	3.8115	- 8
4	25.6292	+1.63220	2.6641	3.7962	- 161
5	25.0000	+1.00300	1.0060	3.8046	- 77
6	24.7343	+0.73730	0.5436	3.8023	- 100
7	23.9968	+0.00000	0.0000	3.8123	+ 15
8	23.0000	-0.99700	0.9940	3.8154	+ 31

R^2 3.8123

1	15.6037	-1.3323	-11.7780	133°
2	16.0000	-0.9360	-10.8763	119
3	16.9360	-0.0000	-0.0000	90
4	18.0000	+1.0640	+0.1132	57
5	18.6089	+1.6729	+12.7986	31
6	18.7411	+1.8051	-13.2547	22
7	18.8888	+1.9528	+13.8138	0
8	18.6156	+1.6796	+12.8214	329

Range 164°

Weighted Center

X max = 25.9493

Cen R = 1.9525

X_0 23.9968

Y max 18.xxxx

Y_0 16.9363

Means Center { X_0 23.9970

Y_0 16.9360

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Normals

1	− 1.88	+ 215	− 202
2	− 1.61	− 116	+ 64
3	− 0	− 15.6	+ 00
4	+ 1.73	− 262.	− 171
5	+ 1.67	− 77	− 129
6	+ 1.33	− 74	− 180
7	+ 000	+ 000	+ 29.
8	− 1.68	− 31.	+ 52
	+ 4.73	+ 215.	+ 145
	− 5.17	− 575.	− 682
	− 0.44	− 360	− 537

− a	− b	+ pc
+ 13	− 8	− 11
+ 15	− 5	− 6
+ 17	− 0	+ 1
+ 14	+ 6	+ 4
+ 9	+ 10	+ 3
+ 0	+ 11	− 5
+ 6	+ 11	+ 1
− 9	+ 10	− 15

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Conditional Equations

									O−C	27 corr
1	+1.41	−1.33	= +152	− 38	+ 44	+ 6	+146		+135	
2	+1.71	−0.94	= − 68	− 46	+ 31	− 15	− 53		−59	
3	+1.95	−0.00	= − 8	− 52	+ 0	− 52	+ 44		+45	
4	+1.63	+1.06	= −161	− 44	− 35	− 79	− 82		−78	
5	+1.00	+1.67	= − 77	− 27	− 55	− 82	+ 5		+ 8	
6	+0.74	+1.80	= −100	− 20	− 60	− 80	− 20		−25	
7	+0.00	+1.95	= + 15	− 0	− 65	− 65	+ 80		+81	
8	−1.00	+1.68	= + 31	+27	− 56	− 29	+ 60		+45	
	+7.44	+5.89					+335	−155		

av 61

1400 ÷ 0.44 = − 360 +7.44

−0.44 + 1648 = − 537 +5.89

+0.44 − 0.02 − 11.3 +0.22

+16.46 = − 5483 +6.11

1400 = −360 − 146 = −3746

b = −33.3 +0.37

a = − 26.8 +0.54

$\frac{P}{m} = 0.22$

$\frac{\Sigma v}{n} = +22.5$

$\frac{+22.5}{.22} = +102$

ΔR = +1.26
Corr = +0.2
ΔR = +1.06

−2R = − 4.10 − 2R Corr = −0.82 ÷ 16

Δb − 0.32 − 16 Δ S = − 0.2
Δa − 0.44 − 9 Δα = − a 0.2

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Conditional Equations

21

								O-C
1	+1.41	−1.33	= +152	− 38	+ 44	+ 6	+146	
2	+1.71	−0.94	= − 68	− 46	+ 31	− 15	− 53	
3	+1.95	−0.00	= − 8	− 52	+ 0	− 52	+ 44	
4	+1.63	+1.06	= −161	− 44	− 35	− 79	− 82	
5	+1.00	+1.67	= − 77	− 27	− 55	− 82	+ 5	
6	+0.74	+1.80	= −100	− 20	− 60	− 80	− 21	
7	+0.00	+1.95	= + 15	− 0	− 65	− 65	+ 81	
8	−1.00	+1.68	= + 31	+27	− 56	− 29	+ 60	
							+335 −155	
							av 61	

14.00 − 044 = − 360

− 044 + 1648 = − 537

+ 044 − 002 − 11.3

+1646 = − 5483

14.00 = −360 − 146 = −3746

b = − 333

a = − 268

$\frac{P}{h} = 022$

$\frac{\Sigma v}{n} = + 22.5$

$\frac{+22.5}{.22} = +102$

ΔR = +1.26

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11302 Moon's Mean Position 28

X_0 23.9970
−13
28.9957

Y_0 16.9360
−17
16.9343

From Plate Constants

17.0011
18
−0.9989

24.1629
22
+2.1629

tan δ 9.4503
log S_0^2 0.6701
7.0534
log r_1 7.1738

r_1 +00015
r_0 −1.0004

log r_1 0.000017n
7.331155
log tan δ−D 2.669021n

tan δ−D −466.7

δ−D − 07 46.7

D +15 53 35.9

δ_0 15 45 49.2

Red +2.80

δ' 15 46 17.2

log S_1 0.33504
log cos δ 9.99335
8.50724
log Sin α−A 1.84445

α−A 69.89
+01 09.89

A 01 43 47.22

α_0 01 44 57.11

Red +4.70

α' 01 45 01.81

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11302 Moon's Mean Position 28

X_0 23.9470
−13
28.9957

Y_0 16.9360
−17
16.9343

From Plate Constants

24.1629
22
+2.1629

17.0011
18
−0.9989

log S_1 0.333504
log cos δ 9.983335
8.517124
log $S_1 x \cdot \Delta$ 1.844445

tan δ 9.45503
log S_1^2 0.67101
7.05534
log η_1 7.17138

η_1 +0.00015
η_0 −1.0004

log η_1 0.000017$_n$
7.331115
log tan $\delta - \xi$ 2.669021$_n$

$x - \Delta$ 69.89
+01 09.89.

Δ 01 43 47.22

x_1 01 44 57.11

Red +4.70

x' 01 45 01.81

tan $\delta - \xi$ −466.1

$\delta - \Delta$ − 07 46.7

Δ +15 53 35.9

δ_1 15 45 49.2

Red +28

δ' 15 46 17.

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1/302

Reduction to apparent Place.

$H+\alpha'$	0h	24	5
H	04	39.5	
α'	01	45.0	
G	23	13.7	
$G+\alpha'$	24	58.7	

9h 07.5s

14° 40.5'

δ_0 15 45.8

log cos $G+\alpha'$	9.9856
log g	1.3387
" Sin $G+\alpha'$	9.4037
" tan δ_0	9.4507
	8.8239

log cos δ_0	9.9834
log i	0.8878
log (i)	0.8712
log sin δ_0	9.4345
cos $H+\alpha_0$	9.0282 n
log h	1.2778
Sin $H+\alpha_0$	9.9975
Sec δ_0	0.0166
	8.8239

log g'	1.3243
" g	9.0170

log h'	9.7400 n
" h	0.1158

f	+3.287
g	+0.104
h	+1.305
Red.	+4.696

g'	+21.100
h'	−0.550
i	+7.434
Red.	+27.984

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Reduction to Apparent Place.

H+α'	0h	24	5
H	14	39.	5
x'	01	45.	0
C-	23	13.	7
C+x'	24	58	7

T h 0 7. 5

14° 40. 5'

δ₂ 15 45' 8

log cos C+x'	9 9 8 5 6
log q	1. 3 3 8 7
log sin C-+x'	9. 4 0 3 7
log tan δ₀	9 4 5 0 7
	8 8 2 3 9

log q'	1. 3 2 4 3
log f	9 0 1 7 0

log cos δ₀	9 9 8 3 4
log i	0. 8 8 7 8
log (i)	0. 8 7 1 2
log sin δ₀	9. 4 3 4 5
cos H+x₀	9 0 2 8 2 n
log k	1 2 7 7 8
sin H+α₀	9. 9 9 7 5
sec δ₀	0. 0 1 6 6
	8. 8 2 3 9

log k'	9. 7 4 0 0 n
k	0. 1 1 5 8

f	+3. 2 8 7
g	+0. 1 0 4
k	+1. 3 0 5
Red.	+4. 6 9 6

g	+21. 1 0 0
k'	-0. 5 5 0
i	+7. 4 3 4
Red	+27. 9 8 4

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11302.

Lunar Parallax.

α'	01	45	01.81
θ	01	39	02.40
$\alpha - \alpha'$	−	05	59.41
=	−01	29	51.15
" $\alpha - \alpha'$		−	34.77
$\frac{2}{3} - \alpha' - \frac{1}{2}(\alpha - \alpha')$	−01	29	16.38

	9.95727
log Cos $\frac{1}{2}(\alpha - \alpha')$	0.00000
Sec $(\theta - \alpha') - \frac{1}{2}(\alpha - \alpha')$	0.00015
log tan χ	9.95742

χ	42	11	45.6
δ'	15	46	17.2
$\chi - \delta'$	+26	25	28.4

	9.82641
log Sin π	8.22389
Sin $\chi - \delta'$	9.64838
Cosec χ	0.17284
Sin $\theta - \alpha'$	7.87151

$\delta - \delta'$		+25	34.4
δ	+16	11	51.6
eph δ	+16	11	48.5
O − C		+	3.1
Curv.			+0.5
2nd ord eq.			0.0
Dur. Corr.			−0.2
δ	+16	11	51.4
O − C =			+2.9

π 57" 34.2

	9.86913
log Sin π	8.22389
" Sin $\theta - \alpha'$	8.41720 n
" Sec δ'	0.01759
Sin $\frac{1}{2}(\alpha - \alpha')$	8.52781 n

$\alpha - \alpha'$	−	01'	09.57
=		−	04.66

α	01	44	57.15
Eph α	01	44	56.35
O − C			+0.80
Curv.			−0.01
Dur. Corr.			−0.02
α	01	44	57.13
O − C			+0.78

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1130 2.

Lunar Parallax.

α'	01	45	06.81
$\pm$	01	39	02.40
$\theta - x'$	-	05	59.41
=	-01	29	51.15"
$\frac{1}{2}x - x'$		-	34.77
$\theta - x' - \frac{1}{2}x - x'$	-01	29	16.38

π 57 34.2

9.869913

log Sin π 8.223889

Sin $\theta - x'$ 8.417720 n

Sec δ' 0.017599

Sin $x - x'$ 8.527810 n

$x - x'$ - 01' 09.54

- - 04.66

9.995727

log Cos $\frac{1}{2}x - x'$ 0.000000

Sec $\theta - x' - \frac{1}{2}x - x'$ 0.000015"

log Tan χ 9.995742

χ 42 11 45.6

δ' 15 46 17.2

$\chi - \delta'$ +26 25 28.4

9.826641

log Sin π 8.223889

Sin $\chi - \delta'$ 9.648338

Cos χ 0.172844

Sin δ' 7.897151

$\delta - \delta'$ + 25 34.4"

δ +16 11 51.6

α 01 44 57.15

δ_1 +16 11 48.5"

α_1 01 44 56.35

O-C + 3.1

Corr. + 0.5"

Add'd up. 0.0

O-C +0.80

Corr. -0.01

Par. Corr. - 0.2

Par. Corr. -0.02

δ +16 11 51.4

α 01 44 57.13

O-C = + 2.9

O-C +0.78

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