1916phae.proj.2

KG
11366
v.1019

CLXVII

167

| Plate | Date | Pages |
|---|---|---|
| 11870 | Dec. 6 '16 | |
| 11871 | " " " | 11 |
| 11890 | " 7 '16 | 21 |

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11870 Dec Star Measures 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 16320 | 17848 | | 18823 | 16746 | | |
| 14.8 | 8605 | 15565 | | 14113 | 11455 | | |
| 9.5 | 05 | 65 | | 07 | 55 | | |
| | 20 | 48 | | 21 | 46 | | |
| | 14.77115 | 14.77117 | | 9.47112 | 9.47099 | | |
| 2 | 16961 | 17762 | | 16426 | 18162 | | |
| 25.4 | 12660 | 12061 | | 14680 | 9898 | | |
| 26.2 | 64 | 61 | | 80 | 98 | | |
| | 67 | 62 | | 26 | 60 | | |
| | 25.43801 | 25.42999 | | 26.17746 | 26.17388 | | |
| 3 | 17523 | 16632 | | 17046 | 17072 | | |
| 3.4.0 | 17454 | 67104 | | 15482 | 86180 | | |
| 12.2 | 54 | 05 | | 82 | 22 | | |
| | 23 | 34 | | 40 | 72 | | |
| | 34.00699 | 34.00669 | | 12.15631 | 12.15488 | | |

Moon

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | | | | 19624 | 16182 | | |
| 23.3 | | | | 9170 | 13631 | | |
| 14.7 | | | | 70 | 27 | | |
| | | | | 24 | 82 | | |
| | | | | 14.74554 | 14.74447 | | |
| 2 | | | | 16295 | 16865 | | |
| 23 | | | | 8601 | 14480 | | |
| 14.8 | | | | 09 | 90 | | |
| | | | | 95 | 05 | | |
| | | | | 14.76900 | 14.76805 | | |
| 3 | | | | 16418 | 16124 | | |
| 22 | | | | 13958 | 85956 | | |
| 15.3 | | | | 58 | 97 | | |
| | | | | 16 | 24 | | |
| | | | | 15.24559 | 15.24372 | | |

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11870 2nr Star Measures 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 16320 | 17848 | | 18823 | | 16746 | |
| 14.8 | 5605 | 15565 | | 14113 | 10 | 11455 | |
| 95 | 05 | 65 | | 07 | | 55 | |
| | 20 | 48 | | 21 | | 46 | |
| | 14.77.15 | 14.77.17 | | 9.4712 | | 9.4709 | |
| 2 | 16961 | 17762 | | 16.426 | | 15162 | |
| 25.4 | 12660 | 12061 | 62 | 14688 | | 9898 | 95 |
| 26.2 | 64 | 61 | | 86 | | 98 | |
| | 67 | 62 | | 88 | | 60 | |
| | 25.43.01 | 25.42.99 | | 26.1746 | | 26.1738 | |
| 3 | 17523 | 16632 | | 17046 | | 17072 | |
| 34.0 | 17454 | 6714.03 | | 15482 | | 8618 | 20 |
| 12.2 | 54 | 05 | | 82 | | 22 | |
| | 23 | 34 | | 40 | | 72 | |
| | 340064 | 340069 | | 12.1563 | | 12.1548 | |

Moon

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 16624 | | | 19624 | | 16182 | |
| 23.3 | 9170 | | | 9170 | | 136312 | 4 |
| 14.7 | 70 | | | 70 | | 27 | |
| | 24 | | | 24 | | 82 | |
| | 47454 | | | 14.7454 | | 147447 | |
| 2 | | | | 16295 | | 16805 | |
| 23 | | | | 86010 | 05 | 14480 | 03 |
| 148 | | | | 09 | | 90 | |
| | | | | 95 | | 05 | |
| | | | | 147650 | | 14.7680 | |
| 3 | 16622 | | | 16418 | | 16124 | |
| 22.3 | 13231 | 36 | | 13952 | | 85946 | |
| 15.0 | 41 | | | 54 | | 91 | |
| | 22 | | | 16 | | 24 | |
| | 22.3386 | | | 15.2459 | | 152472 | |

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1870 Moon 

4
16240 16892
216 11280 76 11860
16.0 72 60
38 92
21.4964 21.4968

5
16282 16642
21.5 12462 54 10470
16.7 56 70
82 40
21.3823 21.3829

6
16308 17126
21.6 12138 36 11282 86
17 34 90
08 22
21.4172 21.4162

7
17049 17724
2 20 16602 8160
18.0 02 60
47 24
18.0447 18.0436

8
17768 18434
23. 12540 13660
18.5' 40 60
64 30
18.5226 18.5228

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11870 Moon 2

4 16240 16892
21.6 11280 76 11560
16.0 72 60
38 92
21 49 64 21 49 68

5 16282 16642
21.5 12462 54 10470
16.7 56 70
82 40
21.38 23 21.38 29

6 16308 17126
21.6 12138 36 11282 56
17 34 90
08 22
21.41 72 21 41 62

7 17049 17724
2.20 16602 8160
18.0 02 60
47 24
18.04 47 18 04 36

8 17768 17434
23 12540 13660
18.5 40 60
64 30
18 52 26 18 52 28

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17870

# Times Etc

Date Dec. 6'16

| | | | | | | |
|---|---|---|---|---|---|---|
| Exp. h stars | 05 | 09 | | | 05 | 21 |
| " " Moon | 05 | 15 | 00.4 | | 05 | 15 | 00.6 |
| Clock fast | | 11 | 56.6 | | | | |
| | | | | | | |
| H. Sid. Time | 05 | 03 | 03.9 | | | |
| H. Sang | 04 | 44 | 31.05 | | | |
| S. Sid Time | 09 | 47 | 34.95 | | | |
| " " " M.N. | 16 | 59 | 45.11 | | | |
| Interval | 16 | 47 | 49.84 | | | |
| Reduction | | 02 | 45.11 | | | |
| to M.T. | 16 | 45 | 04.73 | | 16.7513 | |

$\theta_0 = -05^h 06^m$

| From Naut. Alm. | | | RA | | Decl. | |
|---|---|---|---|---|---|---|
| Moon 16h | 02 | 54 | 27.68 | +21 | 28 | 43.9 |
| Motion 1m | | | 2.2153 | | | +7.914 |
| " 45.07883 | | 01 | 39.86 | | 05 | 56.8 |
| Fabular Place | 02 | 56 | 07.54 | +21 | 34 | 40.7 |

Mean age 12d

934" = 13.1

$a = \frac{-500.6}{+24.}$
$-476.6$

| | | |
|---|---|---|
| Parallax | 5G | 04.00 |
| Semidiam | 15 | 18.2 |
| R | | 918.2 |
| Aug | | 12.5 |
| Drh 4.5 | | -0.7 |
| R | | 930.0 |
| R | | 1.9936 |
| (1+a) R | | -950 |
| R | | 1.8986 |
| R2 | | 3.6047 |

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11870 Times &c

Date Dec 6'16

| | | | | | | |
|---|---|---|---|---|---|---|
| Exp't Stars | 0 | 5 | 09 | | 0 | 5 21. |
| " " Moon | 0 | 5 | 15 | 06.4 | 0 | 5 15 06.6 |
| clock fast | | | 11 | 56.6 | | |
| ☿ Sid Time | 0 | 5 | 03 | 03.9 | | |
| ☿ Long | 0 | 4 | 44 | 31.05 | | |
| ☽ Sid Time | 0 | 9 | 47 | 34.95 | | |
| " " MN | 1 | 6 | 37 | 45.11 | | |
| Interval | 1 | 6 | 47 | 49.84 | | |
| Reduction | | | 02 | 45.11 | | |
| ☽ M.T. | 1 | 6 | 45 | 04.73 | | 16.751 3 |

$\theta_0 = -0^h\,06^m$

| From Naut. Alm. | | | R.A. | | Decl. | |
|---|---|---|---|---|---|---|
| Moon 16h | 02 | -54 | 27.68 | +21 | 28 | 43.9 |
| Motion 1m | | | 2 24 53 | | | +7.914 |
| " 45.07883 | 01 | 3[illegible]6 | | | 05 | 56.8 |
| Tabular Place | 03 | 56 | 07.84 | +21 | 34 | 40.7 |

Moon age 12d

934" = 13.1

a: -500.6
+24.
-476.6

| | | |
|---|---|---|
| Parallax | 57 | 04.0 |
| Semi-diam | 15 | 18.2 |
| R | | 918.2 |
| Ang Dist | | 12.5 |
| | | -0.7 |
| R | | 930.0 |
| R | | 1.9936 |
| 11+4 R | | -950 |
| R | | 1.8986 |
| R2 | | 3.60347 |

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1916phae.proj.2

1187 Plate Center and Constants. 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14.7716 | 9.4710 | 02 | 49 | 30.98 | 20 | 13 | 25.3 |
| 25.4300 | 26.1742 | 02 | 55 | 45.35 | 22 | 29 | 43.1 |
| 34.0069 | 12.1555 | 03 | 00 | 41.45 | 20 | 34 | 36.3 |
| 74.2085 3 | 47.9297 3 | 08 | 45 | 57.78 3 | 63 | 17 | 44.7 |
| 24.7362 | 15.9331 | 02 | 55 | 19.26 | 21 | 05 | 54.9 |
| 22 | 18 | | − 01 | 24.82 | | +16 | 04.2 |
| −2.7362 | +2.0664 | | | | | | |
| 31s. | 4665 | | | | | | |

Plate Center { A 02 53 54.44 ; D 21 21 59.1

X-S

+32.8y +.6x +14933

+.7228 + 7386 = 14614 + 319 = 14924 + 9 = 14933
+.1345 + 12715 = 14060 + 858 = 14918 + 15 = 14933
−2481 + 17003 = 14514 + 399 = 14913 + 20 = 14933
23.2823 + 11641 + 546 + 14 = 23.0091

y-η

−31.5x +1.8y −6925

4.2623 + 4735 = 7358 − 450 = 6908 + 17 = 6925
−.5435 + 13087 = 7652 − 775 = 6877 + 47 = 6924
+.1862 + .6078 = 7440 − 1037 = 7403 + 22 = 6925
16.6450 + 8322 − 710 + 30 = 16.7161

Tables. a = +0.1 c = −0.1 a − c = +0.2 b + d = +0.3

−500.6 −501.8 +1.2 = −2.3

b − c −500.7 −501.7 −2.6

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11870 Plate Center and Constants. 4

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 14.7716 | 9.4710 | 02 | 49 | 30.98 | 20 | 13 | 25.3 |
| 25.4800 | 26.1742 | 12 | 53' | 45 35" | 22 | 29 | 43.1 |
| 34.0069 | 12.1555' | 13 | 00 | 41.45" | 20 | 14 | 36.3 |
| 74.2853 | 47.7997 | 3188 | 45' | 57.78 | 3163 | 17 | 44.7 |
| 24.7362 | 15.9336 | 02 | 55' | 19.26 | 21 | 05' | 54.9 |
| 22 | 18 | | - 01 | 24.82 | | +16 | 04.2 |
| - 2.7362 | +2.0664 | | | | | | |
| 31' | 4665' | | | | | | |

Plate Center { A 02 53 54.44 ; δ 21 01 59.1

X-S +32.8y +.6x-14933

+.7228 + 7386 = 14614 + 311 = 14424 + 9 = 14933
+.1345' + 12715' = 14060 + 858 = 14918 + 15 = 14933
-2481 + 17063 = 14514 + 399 = 14913 + 20 = 14933
3.2828 + 11642 + 546 + 14 = 23.0091'

y-η -31.3x +18y -6925'

+.2623 + 4735' = 7358 - 450 = 6908 + 17 = 6925'
-.5435' + 13087 = 7652 - 775' = 6877 + 47 = 6924
+.1862 + 6078 = 7940 - 1037 = 7903 + 22 = 6925'
6.6450 + 8322 - 710 + 30 = 16.7161

Tables. a: +0.1 c: -0.1 a-c: +0.2 b+d = +0.8
-500.6 -501.8 +1.2 = -2.3

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| $\xi$ | $\eta$ | $\Delta S$ | $-4.8S$ | $+.3\eta$ | $+6$ |
|---|---|---|---|---|---|
| $-7.95$ | $-8.82$ | $-42$ | $+38 = -4$ | $-2 = -6$ | |
| $+3.29$ | $+8.71$ | $+7$ | $-16 = -9$ | $+3 = -6$ | |
| $+12.25$ | $-6.09$ | $+55$ | $-59 = -4$ | $-2 = -6$ | |
| $m\ +1.00$ | $-1.28$ | | $-5$ | $-0$ | $= +1$ |

| $\Delta\eta$ | $-3.2\eta$ | $+.8S$ | $+8$ |
|---|---|---|---|
| $-30$ | $+28 = -2$ | $-6 = -8$ | |
| $+17$ | $-28 = -11$ | $+2 = -9$ | |
| $-29$ | $+11 = -18$ | $+10 = -8$ | |
| | $+4$ | $+1$ | $= +13$ |

Curv. $\alpha = +0.00$

$\delta = +0.6$

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1187 D

# Standard Coordinates

5

| | Cafe No. 421 mg 7.1 | | Cafe No 439 mg 7.4 | | Cafe No 457 mg 7.9 | |
|---|---|---|---|---|---|---|
| C | 02 48 | 36.51 | 02 54 | 50.06 | 02 59 | 46.60 |
| 2 | | 36.60 | | 50.06 | | 46.62 |
| E | | 36.49 | | 50.08 | | 46.65 |
| Mean | 02 48 | 36.53 | 02 54 | 50.07 | 02 59 | 46.62 |
| Prec | | +54.45 | | +55.28 | | 54.83 |
| α | 02 49 | 30.98 | 02 55 | 45.35 | 03 00 | 41.45 |
| A | 02 53 | 54.44 | 02 53 | 54.44 | 02 53 | 54.44 |
| α-A | −.04 | 23.46 ✓ | + 01 | 50.91 ✓ | + 06 | 47.01 ✓ |
| Sin " | | −263.44 ✓ | + | 110.91 ✓ | + | 406.95 ✓ |
| log " | 2.420688 ✓ | | 2.044997 ✓ | | 2.609534 ✓ | |
| log cos δ | 9.97236 ✓ | | 9.965563 ✓ | | 9.997137 ✓ | |
| log $S_0$ | 0.900028 ✓ | | 0.517784 ✓ | | 1.068815 ✓ | |
| $S_0$ | −7.9484 | | +3.2948 ✓ | | +12.2503 ✓ | |
| $S_1$ | − 0028 | | + 0007 | | +0.0055 | |
| S | 14.0488 ✓ | | 25.2955 ✓ | | 34.2558 ✓ | |
| X | 14.7716 ✓ | | 25.4300 ✓ | | 34.0064 ✓ | |
| X-S | +.7228 ✓ | | +.1345 ✓ | | −.2489 ✓ | |
| ζ | +20 09 | 27.7 | 22 25 | 52.09 | 20 30 | 49.7 |
| η | | 27.8 | | 51.34 | | 49.8 |
| ξ | | 28.3 | | 51.65 | | 49.5 |
| Mean | +20 09 | 27.9 | 22 25 | 51.69 | 20 30 | 49.7 |
| Prec | +03 | 58.3 | +03 | 51.41 | +03 | 46.6 |
| S | 20 13 | 26.2 | 22 29 | 43.10 ✓ | 20 34 | 36.3 ✓ |
| D | 21 21 | 59.1 ✓ | 21 21 | 59.1 ✓ | 21 21 | 59.1 ✓ |
| δ-D | −1 08 | 32.9 | +1 07 | 44.0 ✓ | −47 | 22.8 |
| tan " | | −4113.4 | | +4064.5 ✓ | | −2843.0 ✓ |
| log " | 3.614208 ✓ | | 3.609000 ✓ | | 3.453788 ✓ | |
| log $x_0$ | 0.945335 ✓ | | 0.940155 | | 0.784933 ✓ | |
| log $\tan\delta$ | 9.56633 ✓ | | 9.61711 ✓ | | 9.57455 ✓ | |
| log $\sec^2\delta$ | 1.80055 ✓ | | 1.03577 ✓ | | 1.17633 ✓ | |
| log $x_1$ | 8.42022 ✓ | | 7.70622 ✓ | | 8.80422 ✓ | |
| $x_0$ | −8.8176 ✓ | | +8.7126 ✓ | | −6.0944 ✓ | |
| $x_1$ | +0.0263 ✓ | | +.0051 ✓ | | +0.0637 ✓ | |
| $x_1$ | 9.2087 ✓ | | 26.7177 ✓ | | 11.4693 ✓ | |
| y | 9.4710 | | 26.1742 | | 12.1555 ✓ | |
| y-x | +.2623 | | −.5435 | | +.1862 | |

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11870 Standard Coordinates 5

| | Cape no. 421 mg 7.1 | | | Cape no 439 mg 7.4 | | | Cape no 457 mg 7.9 | | |
|---|---|---|---|---|---|---|---|---|---|
| C | 02 | 48 | 36.51 | 02 | 54 | 50.06 | 02 | 59 | 46.60 |
| 2 | | | 36.60 | | | 50.06 | | | 46.62 |
| 3 | | | 36.49 | | | 50.08 | | | 46.65 |
| Mean | 02 | 48 | 36.53 | 02 | 54 | 50.07 | 02 | 59 | 46.62 |
| Prec | | | +54.45 | | | +55.28 | | | 54.83 |
| X | 02 | 49 | 30.98 | 02 | 55 | 45.35 | 03 | 00 | 41.45 |
| A | 02 | 53 | 54.44 | 02 | 53 | 54.44 | 02 | 53 | 54.44 |
| X-A | | -04 | 23.46 | | +01 | 50.91 | | +06 | 47.01 |
| Sin " | | | -263.44 | | | 110.91 | | | 406.95 |
| log " | 2.420688 | | | 2.044497 | | | 2.609574 | | |
| log cos | 9.997236 | | | 9.996563 | | | 9.997137 | | |
| log $\delta_0$ | 0.900028 | | | 0.517784 | | | 1.088815 | | |
| $\delta_0$ | -7.94884 | | | +3.29488 | | | +12.25033 | | |
| $\delta$ | -.00288 | | | +.00007 | | | +0.00555 | | |
| $\delta$ | 140488 | | | 25.29555 | | | 34.25558 | | |
| x | 147716 | | | 25.43000 | | | 34.00664 | | |
| x-$\delta$ | +.17228 | | | +.13445 | | | -.24894 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| C | +20 | 09 | 27.7 | 22 | 25 | 52.09 | 20 | 30 | 49.7 |
| 1 | | | 27.8 | | | 51.34 | | | 49.8 |
| 2 | | | 28.3 | | | 51.65 | | | 49.5 |
| Mean | +20 | 09 | 27.9 | 22 | 25 | 51.69 | 20 | 30 | 49.7 |
| Prec | | +03 | 58.8 | | +13 | 51.41 | | +03 | 46.6 |
| S | 20 | 13 | 26.2 | 22 | 29 | 43.10 | 20 | 34 | 36.3 |
| D | 21 | 21 | 59.1 | 21 | 21 | 59.1 | 21 | 21 | 59.1 |
| $\delta$-D | -1 | 08 | 32.9 | +1 | 07 | 44.0 | -47 | | 22.8 |
| tan " | | | -4113.4 | | | +4064.6 | | | -2843.0 |
| log " | 3.614208 | | | 3.609100 | | | 3.453178 | | |
| log $x_0$ | 0.945835 | | | 0.940153 | | | 0.784933 | | |
| log $\tan\delta$ | 9.56633 | | | 9.61715 | | | 9.57455 | | |
| " $\delta_0$ | 1.80805 | | | 1.03557 | | | 1.17633 | | |
| log $x_1$ | 8.42302 | | | 7.70622 | | | 8.80432 | | |
| $x_0$ | -.881764 | | | +8.71126 | | | -6.09444 | | |
| $x_1$ | +0.02633 | | | +.00511 | | | +0.06377 | | |
| $x_1$ | 9.20877 | | | 26.71177 | | | 11.97693 | | |
| $\gamma$ | 9.47110 | | | 26.17442 | | | 12.15555 | | |
| x-$\gamma$ | +.26773 | | | -.54335 | | | +.18602 | | |

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1870 X — Moon Center — 6

| | X | $x - x_0$ | $(x-x_0)^2$ | $+ \eta - \eta_1)^2$ | $O - C$ |
|---|---|---|---|---|---|
| 1 | 23.2810 | - 0.0000 | + 3 | 0.0000 | 3.6100 | + 53 |
| 2 | 23.0000 | - 0.2810 | + 3 | 0.0788 | 3.6000 | - 47 |
| 3 | 22.0000 | - 1.2810 | + 2 | 1.6405 | 3.5963 | - 84 |
| 4 | 21.4966 | - 1.7844 | + 1 | 3.1837 | 3.5997 | - 50 |
| 5 | 21.3826 | - 1.8984 | + 0 | 3.6039 | 3.6039 | - 08 |
| 6 | 21.4167 | - 1.8643 | - 0 | 3.4756 | 3.6016 | - 31 |
| 7 | 22.0000 | - 1.2810 | - 2 | 1.6415 | 3.5990 | - 57 |
| 8 | 23.0000 | - 0.2810 | - 3 | 0.0788 | 3.6046 | - 11 |
| | | | | | 3.6047 | |

| | Y | $y - y_0$ | $(y-y_0)^2$ | |
|---|---|---|---|---|
| 1 | 14.7450 | - 1.9000 | - 0 | 3.6100 | 180° |
| 2 | 14.7685 | - 1.8765 | - 0 | 3.5212 | 189 |
| 3 | 15.2465 | - 1.3985 | - 0 | 1.9558 | 213 |
| 4 | 16.0000 | - 0.6450 | - 0 | 0.4160 | 223 |
| 5 | 16.6450 | - 0.0000 | - 0 | 0.0000 | 270 |
| 6 | 17.0000 | + 0.3550 | + 0 | 0.1260 | 281 |
| 7 | 18.0441 | + 1.3991 | + 0 | 1.9575 | 317 |
| 8 | 18.5227 | + 1.8777 | + 0 | 3.5258 | 352 |
| | | | | | Range 172° |

$x = 22$ $y = 15.2465$

18.0441

33.2906

$y_0$ 16.6453

$y$ min 14.7450

R 1.9003

Corr R 1.8987

Y min 21.3826

Moon Center $\{ x_0 \; 23.2810 \quad y_0 \; 16.6450$

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11870 Moon Center 6

| | x | x - x₀ | (x - x₀)² | + | y - y₀ | | o - c |
|---|---|---|---|---|---|---|---|
| 1 | 23.2810 | - 0.0000 | + 3 | 0.0000 | 3.6100 | + | 53 |
| 2 | 23.0000 | - 0.2810 | + 3 | 0.0788 | 3.6000 | = | 47 |
| 3 | 22.0000 | - 1.2810 | + 2 | 1.6405 | 3.5963 | - | 84 |
| 4 | 21.4966 | - 1.7844 | + 1 | 3.1837 | 3.5997 | = | 50 |
| 5 | 21.3826 | - 1.8984 | + 0 | 3.6039 | 3.6039 | + | 88 |
| 6 | 21.4167 | - 1.8643 | - 0 | 3.4756 | 3.6016 | - | 31 |
| 7 | 22.0000 | - 1.2810 | - 2 | 1.6415 | 3.5990 | - | 57 |
| 8 | 23.0000 | - 0.2811 | - 3 | 0.0788 | 3.6046 | + | 11 |
| | | | | | 3.6047 | | |

| | y | y - y₀ | (y - y₀)² | |
|---|---|---|---|---|
| 1 | 14.7450 | - 1.9000 | - 0 | 3.6100 | 180° |
| 2 | 14.7685 | - 1.8765 | - 0 | 3.5212 | 189 |
| 3 | 15.2465 | - 1.3985 | - 0 | 1.9558 | 213 |
| 4 | 16.0000 | - 0.6450 | - 0 | 0.4160 | 223 |
| 5 | 16.6450 | - 0.0000 | - 0 | 0.0000 | 270 |
| 6 | 17.0000 | + 0.3550 | + 0 | 0.1260 | 281 |
| 7 | 18.0441 | + 1.3991 | + 0 | 1.9575 | 317 |
| 8 | 18.5227 | + 1.8777 | + 0 | 3.5258 | 352 |
| | | | | | Range 172° |

x = 22 y = 15.2465
18.0441
33.2906
y₀ 16.6453

y min 14.7450
R 1.9003
Com R 1.8987

x min 21.3826

Moon Center { x₀ 23.2810
y₀ 16.6450

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# Normals

| | | |
|---|---|---|
| 1 + 0.00 | − 00.0 + 0.0 | − 136.5 + 36.1 |
| 2 + 0.53 | + 18.3 + 5.3 | + 52.6 |
| 3 + 1.80 | + 83.3 + 24.3 | + 90.8 |
| 4 + 1.14 | + 55.0 + 33.8 | + 19.8 |
| 5 + 0.00 | − 20.9 + 36.1 | + 0.00 |
| 6 − 0.65 | + 92.3 + 35.3 | − 4.2 |
| 7 − 1.79 | + 48.7 + 24.3 | − 53.0 |
| 8 − 0.33 | − 5.0 + 5.3 | + 33.9 |
| + 3.48 | + 2174 (64.4 | + 197.1 |
| − 2.97 | − 25.9 | − 193.7 |
| + 0.50 | + 191.5 | + 3.4 |
| | + 164.4 | − 41.6 |
| | 355.9 | − 38.2 |

27

| − a | − b | + Δc |
|---|---|---|
| + 0 | + 6 | − 21 |
| + 5 | + 6 | − 16 |
| + 22 | + 4 | − 1 |
| + 30 | + 2 | + 5 |
| + 32 | + 0 | + 5 |
| + 32 | − 1 | + 4 |
| + 22 | − 4 | − 9 |
| + 5 | − 6 | − 28 |

## Syr. Correction

( Δ R = − 0.1
+ 0.3
Sum Δ R = − 0.4 )

− 2 R = − 3.80 − 2 R cor = − 1.33 − 27

Δ b = + 0.16 + 3 Δ δ = + 0.1
Δ a = + 0.84 + 17 Δ α = + 0.03

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11870 Conditional Equations.

| | | | | O-C | | | O-C |
|---|---|---|---|---|---|---|---|
| 1 | −0.00 | −1.90 | = +9 | −19 | −00 | + 6 | +72 |
| 2 | −0.28 | −1.88 | = −28 | | − 5 | + 0 | −23 |
| 3 | −1.28 | −1.40 | = −65 | | −24 | + 0 | −41 |
| 4 | −1.78 | −0.64 | = −31 | | −34 | + 0 | + 3 |
| 5 | −1.90 | −0.00 | = +11 | | −36 | + 0 | +47 |
| 6 | −1.86 | +0.35 | = −12 | | −36 | − 0 | +24 |
| 7 | −1.28 | +1.40 | = −38 | | −24 | − 0 | −14 |
| 8 | −0.28 | +1.88 | = +18 | | − 5 | − 0 | +23 |
| | −8.66 | −2.19 | | | | | +169 −78 |
| | | | | | | | av. 31 |

13.70 +0.50 = +191.5

+0.50 +15.11 = +3.4

+0.50 + 0.02 = +6.99

+15.09 = −3.59

13.70 = +191.5 − 0.1 = +191.4

f = −.23

a = +13.9

Dec. Corr.

13.70 +0.50 = +355.9 −8.66

+0.50 +15.11 = −38.2 −2.19

+0.50 + 0.18 = +129.6 −0.31

+14.93 = −167.8 −1.88

f = −11.2 −0.12

13.70 = +355.9 +5.6 = +361.5

a = +26.4 −0.63

| | O-C | Corr |
|---|---|---|
| −00 | +21 = +21 | +42 +21 |
| − 7 | +21 = +14 | −61 −77 |
| −34 | +16 = −18 | −66 −67 |
| −47 | + 7 = −40 | −10 −5 |
| −50 | + 0 = −50 | +42 +47 |
| −49 | − 4 = −53 | +52 +26 |
| −34 | −16 = −50 | − 7 −16 |
| − 7 | −21 = −28 | +27 −1 |
| | | +133 −144 |

$\frac{f}{n}$ = .27

$\frac{\Sigma v}{2}$ = −1.4

$\frac{-1.4}{27}$ = −5.2

Δ R = −0.06

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1 1187.0 Conditional Equations. 7

| | | | O-C | | | | O-C |
|---|---|---|---|---|---|---|---|
| 1 | −0.00 | −1.90 | = +72 | −00.0 | + | 0 | +72 |
| 2 | −0.28 | −1.88 | = −28 | − 5 | + | 0 | −23 |
| 3 | −1.28 | −1.40 | = −65 | −24 | + | 0 | −41 |
| 4 | −1.78 | −0.64 | = −31 | −34 | + | 0 | + 3 |
| 5 | −1.90 | −0.00 | = +11 | −36 | + | 0 | +47 |
| 6 | −1.86 | +1.35 | = −12 | −36 | − | 0 | +24 |
| 7 | −1.28 | +1.40 | = −38 | −24 | − | 0 | −14 |
| 8 | −0.28 | +1.88 | = +18 | − 5 | − | 0 | +23 |
| | | | | | | | +169 −78 |
| | | | | | | | av. 31 |

13.70 +0.50 = +191.5

+0.50 +15.11 = + 3.4

+0.50 + 0.02 = + 6.99

+15.09 = − 3.59

13.70 = +191.5 − 0.1 = 191.4

b = −.23

a = +13.9

13.70 +0.50 = +3559

+0.50 +15.11 = −38.2

+0.50 + 0.17 = +1296

+14.93 = −1678

13.70 = +3559 + 5.6 = +3610

b = −11.2

a = +26.4

| | | | | O-C |
|---|---|---|---|---|
| − 00 | + 21 | = | +21 | +42 |
| − 7 | + 21 | = | +14 | −61 |
| − 34 | + 14 | = | −18 | −66 |
| − 47 | + 7 | = | −40 | −10 |
| − 50 | + 0 | = | −50 | +42 |
| − 49 | − 4 | = | −53 | +12 |
| − 34 | − 16 | = | −50 | − 7 |
| − 7 | − 21 | = | −28 | +27 |
| | | | | +133 −144 |
| | | | | av. 3 |

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11870 Moons Mean Position 8

$x_0$ 23.28810
+13
23.28823 ~

$y_0$ 16.64450
−6
16.64444 ~

From Plate Constants.

23.00091 ~
22
S +1.00091 ~
log S 0.00393 ~
log cos $\delta_0$ 9.96957 ~
8507 24 ~
log Sin(α−A) 1.52712 ~

16.71611 ~
18
−1.2839 ~
log tan δ 9.58877 ~
" S.² 0.00079 ~
7.0534 ~
log λ. 6.6500 ~
η. 0.00044 ~
$\eta_0$ −1.2843 ~
log $\eta_0$ 0.10867 ~
7.33115 ~
log tan δ−D 2.77752 n
−599.13
δ−D = − 09 59.1 ~

α−A +33.66 ~

A 02 53 54.44 ~

$\alpha_1$ 02 54 28.10 ~

Red +05.40 ~

α 02 54 33.50 ~

D 21 21 59.1 ~

$\delta_0$ 21 12 0.0 ~

Red +25.8 ~

δ 21 12 25.8 ~

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11870 Moon's Mean Position 8

$X_0$ 23 28 10
+ 13
23 28 23 -

$Y_0$ 16 64 50
− 6
16 64 44 -

From Plate Constants.

23.0041'
22
S + 1.0091"
log S 0.003931
log(cos $\delta_0$) 9.964577
8507 24"
log S sin(x−N) 1.527742

16.7161"
18
− 1.2839"

log tan $\delta$ 9.588930
.15 " 0.007917
7.05344"
log $\lambda$ 6.64700

x − A − 33.66"

A 02 53 54.44"

$\eta$ 0.00004"
$\eta_0$ − 1.28439"

$X_1$ 02 54 28 10" log $\eta_0$ 0.108677
7331.15"

Red +05.40" log(a sin 2) 2.777152 n
− 599.18

$\alpha_1$ 02 54 33 50" $\delta - \lambda$ = − 09 59.1

$\Phi$ 21 21 59.1

$\delta_0$ 21 12 00"

Red + 25.8"

$\delta$ 21 12 25.8"

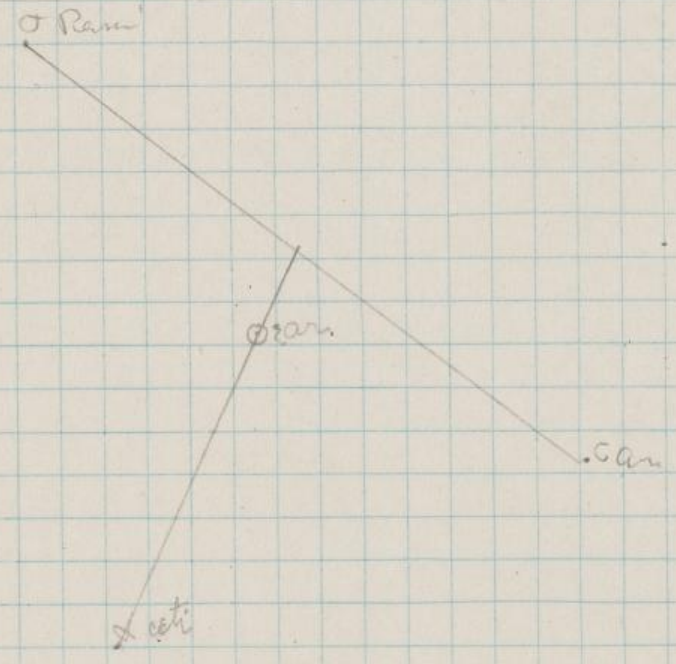
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ε Arietis

(1) 02 54 29.704
94.310
+ 5.394

21 0 44.00
18.17
+ 25.83




36
31
26
21
16
11
6
1

8 6 4 2 0 58 56 54 52 50 48 46 44 42 40 38

24

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1916phae.proj.2

1187 b

# Reduction to apparent Place

9

| | | | | | |
|---|---|---|---|---|---|
| H + α | 03 | 50.5 | 57° | 37.5′ | |
| H | 0 | 56.0 | | | |
| α | 02 | 54.5 | | | |
| G | 23 | 32.6 | | | |
| G + α | 26 | 27.1 | 36 | 46.5′ | |

| | |
|---|---|
| log cos G + α | 9.9036 |
| log g | 1.3951 |
| ∴ log sin G + α | 9.7772 |
| " tan δ₁ | 9.5887 |
| | 8.8239 |

| | |
|---|---|
| log g′ | 1.2987 |
| g | 9.5849 |
| g | +3.792 |
| g′ | +0.384 |
| h | 1.229 |
| Red. | +5.405 |

| | |
|---|---|
| δ₂ | 21° 12.0′ |
| log cos δ₀ | 9.9696 |
| log i | 0.3297 |
| log (1) | 0.2993 |
| log sin δ₀ | 9.5583 |
| " sin H + α₀ | 9.7289 |
| log h | 1.3087 |
| ∴ sin H + α₀ | 9.9266 |
| " sec δ₀ | 0.0384 |
| | 8.8239 |

| | |
|---|---|
| log h′ | 0.5959 |
| h | 0.0896 |
| g | +19.893 |
| h′ | +3.944 |
| i | +1.992 |
| Red. | +25.829 |

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1187 b

# Reduction to apparent Place



| | | | | |
|---|---|---|---|---|
| H + x | 03 | 50 5 | 57° | 37.5" |
| H | 0 | 56.0 | | |
| x | 02 | 54.5 | | |
| G | 23 | 32.6 | | |
| α + x | 26 | 27.1 | 36 | 46.5" |

| | |
|---|---|
| log cos C + x | 9.9036 |
| log q | 13951 |
| ∴ cos C + x | 9.7772 |
| ∴ tan δ₁ | 9.5887 |
| | 88239 |

| | |
|---|---|
| log q' | 1.2987 |
| q | 9.5849 |
| q | +3.792 |
| q' | +0.354 |
| h | 1.229 |
| Red. | +5.405 |

| | |
|---|---|
| δ₀ | 21° 12.0 |
| log cos δ₀ | 99696 |
| log i | 0.3297 |
| log (i) | 0.2993 |
| log cos δ₀ | 95583 |
| ∴ cos H + x | 97289 |
| log h | 1.3087 |
| ∴ sec H + x | 99266 |
| ∴ sec δ₀ | 0.0304 |
| | 88239 |

| | |
|---|---|
| log h' | 0.5959 |
| h | 0.0896 |
| q' | +19.893 |
| h' | +3.944 |
| i | +1.9923 |
| Red. | +25829 |

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11870 Lunar Parallax 10

| | | | |
|---|---|---|---|
| $\alpha'$ | 02 | 54 | 33.50 |
| $\theta$ | 05 | 03 | 03.9 |
| $\theta-\alpha'$ | 02 | 08 | 30.40 |
| = | +32 | 07 | 36.00 |
| $\parallel \alpha-\alpha'$ | + | 11 | 51.58 |
| $(\theta^2-\alpha')-\frac{1}{2}\alpha$ | 31 | 55 | 44.42 |

| | |
|---|---|
| | 9.995727 |
| log Cos $(\alpha-\alpha')$ | 0.000000 |
| Sec $(\theta-\alpha')-\frac{1}{2}\alpha$ | 0.007124 |
| log tan $\gamma$ | 0.002851 |

| | | | |
|---|---|---|---|
| $\gamma$ | 46 | 52 | 45.6 |
| $\delta'$ | 21 | 12 | 25.8 |
| $\gamma-\delta'$ | 25 | 40 | 19.8 |

| | |
|---|---|
| | 9.826401 |
| log Sin $\pi$ | 8.212411 |
| Sin $\gamma-\delta'$ | 9.636710 |
| Cosec $\gamma$ | 0.136733 |
| Sin $\delta-\delta'$ | 7.812255 |

| | | | |
|---|---|---|---|
| $\delta-\delta'$ | + | 22 | 18.7 |
| $\delta$ | 21 | 34 | 44.5 |
| Eph $\delta$ | 21 | 34 | 40.7 |
| O-C | + | | 3.8 |
| Curv. | | | +0.6 |
| 2nd ord. Reg. | | | +0.0 |
| Tur Corr | | | = +0.1 |
| $\delta$ | + 21 | 34 | 44.6 |
| O-C | | | + 3.9 |

| | | | |
|---|---|---|---|
| $\pi$ | | 56 | 04.0 |
| | | | 9.869130 |
| log Sin $\pi$ | | | 8.212411 |
| " Sin $\theta-\alpha'$ | | | 9.725574 |
| " Sec Eph $\delta$ | | | 0.003155 |
| " Sin $\alpha-\alpha'$ | | | 7.838830 |
| $\alpha-\alpha'$ | +23 | 43. | 17 |
| = | + 01 | 34. | 88 |

| | | | |
|---|---|---|---|
| $\alpha$ | 02 | 56 | 08.38 |
| Eph $\alpha$ | 02 | 56 | 07.54 |
| O-C | | | +0.84 |
| Curv. | | | +0.00 |
| Tur. Corr | | | +0.03 |
| $\alpha$ | 02 | 56 | 08.41 |
| O-C | | | +0.87 |

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11810 Lunar Parallax 10

| | | | |
|---|---|---|---|
| $\alpha$ | 02 | 54 | 33.58" |
| $\theta$ | 05 | 03 | 03.9" |
| $\theta - x'$ | 02 | 08 | 30.40" |
| = | +32 | 17 | 36.00" |
| $\frac{1}{2}x - x$ | + | 11 | 51.58" |
| $(\theta^2 - x')^{\frac{1}{2}} + \frac{1}{2}x - x$ | 31 | 55 | 44.42 |

| | |
|---|---|
| | 9.995727" |
| log Cos $\frac{1}{2}(\theta + x')$ | 0.000000" |
| Sec $(\theta - x')^{\frac{1}{2}}$ | 0.001124" |
| log tan $\gamma^2$ | 0.028511" |
| $\gamma$ | 46 52. 45.6" |

| | | | |
|---|---|---|---|
| $\delta'$ | 21 | 12 | 26.8" |
| $\gamma - \delta'$ | 25 | 40 | 119.8" |
| | 9.826411 | | |
| log Sin $\pi$ | 8.212441 | | |
| Sin $\gamma - \delta'$ | 9.636870" | | |
| Cosec $\gamma$ | 0.136733" | | |
| Sin $\delta - \delta'$ | 7.812055" | | |
| $\delta - \delta'$ | | 22 | 18.7" |
| $\delta$ | 21 | 34 | 44.5" |
| Eph $\delta$ | 21 | 34 | 40.7" |
| O-C | | + | 3.8" |
| Corr. | | | +0.6 |
| 2nd ord. eq. | | | +0.1 |
| Tue Corr | | = | +0.1 |
| $\delta$ | + 21 | 34 | 44.6 |
| O-C | | + | 3.9 |

| | | | |
|---|---|---|---|
| $\pi$ | 57 | 04.0" | |
| | 9.869130" | | |
| log Sin $\pi$ | 8.212441" | | |
| " Sin $\theta$ $x''$ | 9.725741" | | |
| " Sec Eph $\delta$ | 0.003155" | | |
| " Sin $x - x$ | 7.838833" | | |
| $x - x'$ | +23 | 43.17 | |
| = | +01 | 34.88 | |

| | | | |
|---|---|---|---|
| $\alpha$ | 02 | 57 | 08.33 |
| Eph $\alpha$ | 02 | 56 | 07.51 |
| O-C | | | +0.84 |
| Corr. | | | +0.00 |
| Tue Corr | | | +0.0" |
| $\alpha$ | 02 | 57 | 08.4 |
| O-C | | | +0.8 |

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1871 Star Measures 11

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 19782 | 17240 | | 1812 8 | 18770 | | |
| 14.5 | 14449 | 12579 | | 1036870 | 16518 | | |
| 9.8 | 49 | 79 | | 72 | 18 | | |
| | 82 | 40 | | 26 | 70 | | |
| | 145333 | 145339 | | 9.77556 | 9.77748 | | |
| 2 | 17192 | 17310 | | 18700 | 17040 | | |
| 55.2 | 15419 20 | 90867 | | 13797 | 11934 | | |
| 26.5 | 21 | 88 | | 97 | 36 | | |
| | 92 | 10 | | 00 | 40 | | |
| | 25.17772 | 25.17777 | | 26.49035 | 26.48955 | | |
| 3 | 16710 | 18594 | | 17230 | 17132 | | |
| 33.8 | 90786 | 16242 | | 12444 | 11905 | | |
| 2.6 | 74 | 42 | | 44 | 11 | | |
| | 10 | 94 | | 30 | 32 | | |
| | 33.76834 | 33.76648 | | 12.47786 | 12.47776 | | |

Moon Measures.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | [illegible] | | | 17240 | 17754 | | |
| 23.7 | [illegible] | | | 15054 57 | 99507 54 | | |
| 15.2 | [illegible] | | | 60 | 38 | | |
| | [illegible] | | | 40 | 60 | | |
| | [illegible] | | | 23.21883 | 23.21993 | | |
| 2 | | | | 16660 | 17380 | | |
| 23.0 | | | | 13280 | 10760 | | |
| 15.3 | | | | 80 | 60 | | |
| | | | | 60 | 80 | | |
| | | | | 15.33800 | 15.33800 | | |
| 3 | 17570 | 17892 | | | | | |
| 22.1 | 16400 98 | 90717 2 | | | | | |
| 16.0 | 96 | 73 | | | | | |
| | 90 | 98 | | | | | |
| | 22.11772 | 22.11774 | | | | | |

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11871. Star Measures

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 19782 | 17240 | | 18128 | 18770 | | |
| 4.5 | 14449 | 12579 | | 10368 | 70 | 16518 | |
| 9.8 | 49 | 79 | | 72 | | 18 | |
| | 82 | 40 | | 26 | | 70 | |
| | 145333 | 145339 | | 977556 | | 97748 | |
| 2 | 17192 | 17310 | | 18700 | | 17040 | |
| 5.2 | 15419 | 90867 | | 13747 | | 11934 | |
| 0.5 | 21 | 88 | | 97 | | 36 | |
| | 92 | 10 | | 00 | | 40 | |
| | 251772 | 251777 | | 264903 | | 264895 | |
| | 16710 | 18594 | | 17230 | | 17132 | |
| 18 | 90786 | 16243 | | 12444 | 31 | 11905 | 0.8 |
| 1.6 | 74 | 42 | | 44 | | 11 | |
| | 10 | 94 | | 30 | | 32 | |
| | 337634 | 337648 | | 124786 | | 124776 | |

Moon Measures.

| | | | |
|---|---|---|---|
| 17240 | | 17754 | |
| 15054 | 57 | 99570 | |
| 60 | | 56 | |
| 40 | | 60 | |
| 2321893 | | 2321898 | |
| 16660 | | 17280 | |
| 13280 | | 10760 | |
| 80 | | 60 | |
| 60 | | 80 | |
| 153380 | | 153380 | |

| | | | |
|---|---|---|---|
| 17570 | | 17892 | |
| 16400 | 98 | 90717 | 2 |
| 96 | | 73 | |
| 90 | | 98 | |
| 221172 | | 221174 | |

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Moon

12

| | | |
|---|---|---|
| | 18021 | 18200 |
| | 16190 | 10050 |
| | 90 | 50 |
| | 21 | 04 |
| | 16.18311 | 16.18446 |

| | | |
|---|---|---|
| | 17834 | 17822 |
| | 10218 | 15437 |
| | 08 | 37 |
| | 18 | 20 |
| | 21.76078 | 21.76117 |

| | | |
|---|---|---|
| | 17422 | 17812 |
| | 99888 | 15360 |
| | 88 | 50 |
| | 22 | 08 |
| | 21.75334 | 21.75544 |

| | | |
|---|---|---|
| | 17528 | 17790 |
| | 7839 | 17503 |
| | | 03 |
| | 28 | 90 |
| | 21.96889 | 21.97113 |

| | | |
|---|---|---|
| | 17370 | 16928 |
| | 8360 | 15938 |
| | 58 | 38 |
| | 68 | 28 |
| | 18.90110 | 18.90110 |

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Moon

12

E
-2
16.1

18021 18200
16190 10050
90 50
21 04
16.1831 16.1846

S 17834 17822
21.8 10218 13 15437
17 08 37
18 20
21.7607 21.7617

S 17422 17818
21.1 9888 80 15360 5-1
17.3 88 50
22 08
21.7534 21.7544

I 17528 17790
21 7839 44 17503
18. 03
28 90
21.9689 21.9713

M
S
R.A

17370 16928
8360 59 15938
58 38
68 28
18.9010 18.9010

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11871 Times etc 13

Date Dec 6 16

| | | | | | | |
|---|---|---|---|---|---|---|
| Exp. to Stars | 05 | 22 | ∠ | | 05 | 34 |
| " " Moon | 05 | 28 | 30.7 ∠ | | 05 | 28 30.9 ∠ |
| Clock fast | | 11 | 56.6 ∠ | | | |
| M. Sid. Time | 05 | 16 | 34.2 ∠ | + | 2h | 20m |
| M. Long. | 04 | 44 | 31.05 ∠ | | | |
| G. Sid. Time | 10 | 01 | 05.25 ∠ | | | |
| " " " M.N. | 16 | 59 | 45.11 ∠ | | | |
| Interval | 17 | 01 | 20.14 ∠ | | | |
| Reduction | | 02 | 47.32 ∠ | | | |
| G. M. T. | 16 | 58 | 32.82 ∠ | | 16h | 975-78 |

| From Naut. Alm. | | | | R.A. | | | Decl. | | |
|---|---|---|---|---|---|---|---|---|---|
| Moon | 16h | 02 | 54 | 27.68 ∠ | +21 | 28 | 43.9 ∠ | | |
| Motion for | | | | 2.256 ∠ | | | + 7.902 ∠ | | |
| " 58.547 | | 02 | | 9.72 ∠ | | 07 | 42.6 ∠ | | |
| Tabular Place | 02 | 56 | | 37.40 ∠ | +21 | 36 | 26.5 ∠ | | |

934" = 12.7

Moons age 12d

a = −502
+24
−478

| | | |
|---|---|---|
| Parallax | 56 | 03.73 ∠ |
| Semi-dia. | 15 | 18.1 ∠ |
| R | | 918.1 ∠ |
| Aug. | | 12.3 ∠ |
| Ort. 4.5 ∠ | | −0.7 ∠ |
| P | | 929.7 ∠ |
| R | | 1.99294 ∠ |
| (1+a) R | | − 953 ∠ |
| R | | 1.89976 ∠ |
| R 2 | | 3.60094 ∠ |

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11871 Lunes etc

Date Dec 6 '16

| | | | | | | |
|---|---|---|---|---|---|---|
| Exp't Stars | 05 | 22 | | 05 | 34 | |
| " Moon | 05 | 28 | 30.7 | 05 | 28 | 30.9 |
| Clock fast | | 11 | 56.6 | | | |
| 71 Syd Time | 05 | 16 | 34.2 | + 2h | 20 | |
| 71 Long | 04 | 44 | 31.05 | | | |
| 5 Sid Time | 10 | 01 | 05.25 | | | |
| " " M.N. | 16 | 59 | 45.11 | | | |
| Equation | 17 | 01 | 20.14 | | | |
| Reduction | | 12 | 47.32 | | | |
| to M.T | 16 | 58 | 32.82 | 16h | 975 | 78 |

| From Naut. Alm. | | | RA | | | Decl |
|---|---|---|---|---|---|---|
| Moon | 16h | 12 | 54 | 27.68 | 21 | 28 43.9 |
| Motion | | | | 2.21s | | + 7.02 |
| " 58.54.7 | | | 02 | 9.71 | | 07 42.6 |
| Tabular Place | | 02 | 56 | 37.40 | 21 | 36 26.5 |

Moons age 12d.

934' = 12.7

a!

a = − 502
+ 24
− 478

| | | |
|---|---|---|
| Parallax | 57 | 03.73 |
| Semi-diam | 15 | 18.1 |
| R | | 918.1 |
| Aug | | 123 |
| Ink 45° | | − 0.7 |
| R | | 9297 |
| R | | 1.99729 |
| (1+a) R | | − 953 |
| R | | 1.89776 |
| λ2 | | 3.60009 |

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| | | | |
|---|---|---|---|
| X | 14.5336 | 25.1774 | 33.7641 |
| S | 14.0488 | 25.2955 | 34.2558 |
| X-S | +.4848 | −.1181 | +.4917 |

| | | | |
|---|---|---|---|
| y | 9.7752 | 26.4899 | 12.4781 |
| η | 9.2087 | 26.7177 | 11.9693 |
| y-η | +.5665 | −.2278 | +.5088 |

X-S +4.1y +2X-12546

+4848 +7267 = 12115 +402 = 12517 +29 = 12546
−1181 +12589 = 11408 +1089 = 12497 +50 = 12547
−4917 +16882 = 11965 + 513 = 12478 +68 = 12546 ✓
23652 + 11826 +703 ✓ +47 = 23652

y-η −40.3X +.6y −9973

+5665 + 4888 10553 − 586 = 9967 + 6 = 9973
−.2278 +13250 10972 − 1015 = 9957 + 16 = 9973
+.5088 + 6239 = 11327 − 1361 = 9966 + 7 = 9973
17.1186 + 85.59 −953 ✓ +10 = 16.8829 ✓

Table a = −0.2 e = −0.3 a−e = +0.1 b+d = −1.6
− 502. − 500.6 − 1.4 − 0.8

6 − c −501.8 −500.3 +0.8

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11871 Plate Constants 

| | | | |
|---|---|---|---|
| X | 14.5336 | 25.1774 | 33.7641 |
| S | 14.1488 | 25.2955 | 34.2558 |
| X-S | +.4848 | -.1181 | +.4917 |

| | | | |
|---|---|---|---|
| y | 9.7752 | 26.4899 | 12.4781 |
| η | 9.2087 | 26.7177 | 11.9693 |
| y-η | +.5665 | -.2278 | +.5088 |

X-S +4.1y +2X-12546

+.4848 +.7267 = 1.2115 +.402 = 12.517 +29 = 12546
-.1181 +12.589 = 11.408 +1.084 = 12.497 +50 = 12547
-.4917 +16.882 = 11.965 +.513 = 12.478 +68 = 12546
23.6522 +1.1826 +.703 +47 = 23.6552

y-η -40.3X +.6y -9973

+.5665 +.4888 10.553 -.584 = 9.967 +6 = 9973
-.2278 +13.250 10.982 -1.015 = 9.967 +16 = 9973
-.5088 +6.239 = 11.327 -1.361 = 9.966 +7 = 9973
17.1186 +8.559 -9.53 +10 = 16.8828

Tables a = -0.2 b = -0.3 a-b = +0.1 b+d = -1.6
-.502 -.5006 -1.4 -0.8

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11871 Moon's Center 15

| | | X | X−X₀ | ΔX | (X−X₀)² | + | η−η₀ |² | O−C |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 23.65530 | −0.00000 | −3 | 0.0000 | | 3.6108 | + | 99 |
| 2 | | 23.00000 | −0.65530 | −3 | 0.4268 | | 3.5988 | − | 21 |
| 3 | | 22.11173 | −1.53357 | −2 | 2.3590 | | 3.6112 | + | 103 |
| 4 | | 22.00000 | −1.65530 | −1 | 2.7327 | | 3.6073 | + | 64 |
| 5 | | 21.76112 | −1.89418 | −0 | 3.5789 | | 3.5931 | − | 78 |
| 6 | X | 21.75539 | −1.89991 | −0 | 3.6066 | | 3.6066 | + | 43 |
| 7 | | 21.97001 | −1.68529 | +1 | 2.8318 | | 3.6080 | + | 71 |
| 8 | | 23.00000 | −0.65530 | +3 | 0.4260 | | 3.6015 | + | 6 |

Com R² 3.6009

| | | y | y−y₀ | Δy | | |
|---|---|---|---|---|---|---|
| 1 | X | 15.21888 | −1.90020 | 0 | 3.6108 | 180 |
| 2 | | 15.33380 | −1.78510 | 0 | 3.1720 | 200 |
| 3 | | 16.00000 | −1.11890 | 0 | 1.2522 | 234 |
| 4 | | 16.18388 | −0.93502 | 0 | 0.8746 | 248 |
| 5 | | 17.00000 | −0.11890 | 0 | 0.0142 | 266 |
| 6 | | 17.11200 | −0.00690 | 0 | 0.0000 | 270 |
| 7 | | 18.00000 | +0.88110 | 0 | 0.7762 | 298 |
| 8 | | 18.90010 | +1.78120 | 0 | 3.1755 | 340 160 |

Range

Approx Center

X = 23 y 15.33380
18.90010
34.23390
y₀ 17.11695

y min 15.21888
η R 1.90071
Com R 1.89976
X min 21.75539

Moon Center { X₀ 23.65530
y₀ 17.11890

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11871 Moon's Center 15

| | x | x − x₀ | Δx | (y − y₀)² | + (y − y₀)² | O − C |
|---|---|---|---|---|---|---|
| 1 | 23.65330 | − 0.00003 | 0.0000 | 3.61058 | + 99 | |
| 2 | 23.00000 | − 0.65330 | − 3 | 0.42648 | 3.59988 | − 21 |
| 3 | 22.11173 | − 1.53357 | − 2 | 2.35900 | 3.61112 | + 103 |
| 4 | 22.00000 | − 1.65330 | − 1 | 2.73327 | 3.60073 | + 64 |
| 5 | 21.76612 | − 1.89719 | − 0 | 3.57889 | 3.59931 | − 78 |
| 6 | 21.75339 | − 1.89991 | − 0 | 3.60666 | 3.60966 | + 43 |
| 7 | 21.97001 | − 1.68299 | + 1 | 2.83318 | 3.60080 | + 71 |
| 8 | 23.00000 | − 0.65330 | + 3 | 0.42660 | 3.60109 | + 6 |

Com R 360.09

| | y | y − y₀ | Δy | (x − x₀)² | O − C |
|---|---|---|---|---|---|
| 1 | 15.21888 | − 1.90029 | | 3.61058 | 180 |
| 2 | 15.33380 | − 1.78511 | | 3.17220 | 210 |
| 3 | 16.00000 | − 1.11891 | | 1.25322 | 234 |
| 4 | 16.18338 | − 0.93552 | | 0.87466 | 240 |
| 5 | 17.00000 | − 0.11890 | | 0.01422 | 266 |
| 6 | 17.11200 | 0.00000 | | 0.00000 | 270 |
| 7 | 18.00000 | + 0.88810 | | 0.77622 | 298 |
| 8 | 18.90010 | + 1.78821 | | 3.17555 | 340 |

160 Range

Approx Center

x = 23 y 15.33380
18.40010
34.23390
$y_0$ 17.11695

y min 15.21888
R 1.90029
Calc R 1.89976
x min 21.75339

Moon Center $x_0$ 23.65330
$y_0$ 17.11190

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Normals

| | | | |
|---|---|---|---|
| 1 | +0.00 | −00.0 | −188.0 |
| 2 | +1.15 | +13.6 | +37.4 |
| 3 | +1.71 | −157.3 | −115.8 |
| 4 | +1.53 | −105.8 | −59.4 |
| 5 | +0.23 | +147.6 | +9.3 |
| 6 | +0.01 | −81.8 | −0.0 |
| 7 | −1.47 | −101.9 | +62.4 |
| 8 | −1.16 | −4.0 | +104.9 |
| | +4.62 | +161.2 | +214.0 |
| | −2.63 | −4508 | −3632 |
| | +1.99 | −289.6 | −149.2 |

−28

| −a | −b | +Δc |
|---|---|---|
| +0 | +8 | −20 |
| +11 | +7 | −10 |
| +26 | +4 | +2 |
| +28 | +4 | +4 |
| +32 | +0 | +4 |
| +32 | +0 | +4 |
| +29 | −3 | −2 |
| +11 | −7 | −24 |

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11871 Conditional Equations. 16

| | | | | | | | | O−C | Corr |
|---|---|---|---|---|---|---|---|---|---|
| 1 | −0.00 | −1.90 | = +99 | + 00 | + 17 | +17 | | + 82 | +62 |
| 2 | −0.65 | −1.78 | = −21 | + 11 | + 16 | +27 | | − 48 | − 58 |
| 3 | −1.53 | −1.12 | = +103 | + 26 | + 10 | +36 | | + 67 | +69 |
| 4 | −1.65 | −0.93 | = + 64 | + 28 | + 8 | +36 | | + 28 | +32 |
| 5 | −1.89 | −0.12 | = − 78 | + 32 | + 1 | +33 | | − 111 | − 107 |
| 6 | −1.90 | −0.00 | = + 43 | + 32 | + 0 | +32 | | + 13 | +17 |
| 7 | −1.68 | +0.88 | = + 71 | + 29 | − 8 | +21 | | + 58 | +48 |
| 8 | −0.65 | +1.78 | = + 6 | + 11 | − 16 | − 5 | | + 11 | −13 |
| | −9.95 | −3.19 | | | | | +251 | −159 | |
| | | | | | | | ar 57 | | |

15.96 + 1.99 = −289.6 − 9.95

+ 1.99 + 12.87 = −149.2 − 3.19

+ 1.99 + 0.02 = − 36.1 − 1.24

+12.85 = −113.1 − 1.95 $t = -.88 - 0.15$

15.96 = −289.6 + 17.5 = −272.1 $\tau = -17.0 - 0.60$

$$C = \frac{\frac{\Sigma v}{n}}{\frac{p}{n}} = 2R\Delta R = 2R\,\text{corr.}$$

$\frac{p}{n} = .19$

$\frac{\Sigma v}{n} = +11.5$

$C = \frac{+11.5}{.19} = +60$

$\Delta R = +0.7$

Corr. +0.35

True $\Delta R$ +0.35

$2R = -3.98$ $\Delta = -2R\,\text{corr.} - 1.40$ −28

$\Delta t = +0.21$ (14) $\Delta\delta = +0.1$

$\Delta a = +0.84$ (17) $\Delta\alpha = +0.03$

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11871 Conditional Equations. 16

| | | | | | | | O − C |
|---|---|---|---|---|---|---|---|
| 1 | − 0.00 | − 1.90 | = +99 | + 00 | + 17 | +17 | + 82 |
| 2 | − 0.65 | − 1.18 | = − 21 | + 11 | + 16 | +27 | − 48 |
| 3 | − 1.53 | − 1.12 | = +103 | + 26 | + 10 | +36 | + 67 |
| 4 | − 1.65 | − 0.93 | = + 64 | + 28 | + 8 | +36 | + 28 |
| 5 | − 1.89 | − 0.12 | = − 78 | + 32 | + 1 | +33 | − 111 |
| 6 | − 1.90 | − 0.01 | = + 43 | + 32 | + 0 | +32 | + 13 |
| 7 | − 1.68 | + 1.88 | = + 71 | + 29 | − 8 | +21 | + 51 |
| 8 | − 0.65 | + 1.78 | = + 6 | + 11 | − 16 | − 5 | + 11 |
| | | | | | | +251 | − 159 |
| | | | | | | av 57 | |

15.96 + 1.99 = − 289.6

+ 1.99 + 12.87 = − 149.2

+ 1.99 + 002 = − 36.1

+ 12.85 = − 113.1 f = − 88

15.96 = − 289.6 + 117.5 = − 272.1 g = − 17.0

$\frac{p}{n}$ = .19

$\frac{\Sigma v}{n}$ = + 11.5

$\frac{+11.5}{.19}$ = +60

ΔR = + 0.7

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# Moon's Mean Position

$X_0$ 23.6530
− 8
23.6522 ✓

$Y_0$ 17.1190
− 4
17.1186 ✓

## From Plate Constants.

23.6552
22
$\xi$ +1.6552 ✓

16.8829
−18
−1.1171 ✓

log $S_0$ 0.2188 5 ✓
log Cos $\delta_0$ 9.9695 1 ✓
8.5072 4 ✓
log $\Sigma a(X-N)$ 1.7421 0

log tan $\delta$ 9.5887
log $S_0^2$ 0.7377
7.0534
log $n_1$ 7.0798

$X-A$ + 55.22 ✓

$n_1$ 0.0012
$n_0$ −1.1183

A 02 53 54.44 ✓

log $n_0$ 0.0485 6 n
7.3315 5
log $\Sigma a \delta D$ 2.7174 1 n

$\alpha_0$ 02 54 49.66 ✓
Red +05.40 ✓

$\alpha'$ 02 54 55.06 ✓

$\delta D$ −521.69 ✓
−08 41.7
D 21 21 59.1 ✓

$\delta_0$ 21 13 17.4 ✓

Red + 25.8

$\delta'$ 21 13 43.2

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Means Mean Position

$X_0$ 23.6530
− 8
23.6522

$Y_0$ 17.1190
− 4
17.1186

From Plate Constants.

23 65 52
−22
+1 65 52

168829
−18
−1.1171

log $S_0$ 0.2188 5
log cos $\delta_0$ 9.9645 1
8.5072 4
log $f_m(X-N)$ 1.7421 0

log tan $\delta$ 9.5887
log $S_0^2$ 0.4377
7.0534
log $n_1$ 7.0798

$X-A$ + 55.22

$n_1$ 0.0012
$n_0$ −1.1183

A 02 53 54.44

log $n_0$ 0.0485 6 $n$
7.3311 5
log tan $\delta \cdot E$ 2.7174 1 $n$

$\alpha_0$ 02 54 49.66
Red + 05.40
1
$\alpha'$ 02 54 55.06

$\delta E$ −521.69
−08 41.7
E 21 21 39.1

$\delta_0$ 21 13 17.4

Red + 25.8

$\delta'$ 21 13 43.2

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11871 Lunar Parallax. 18

| | | | |
|---|---|---|---|
| $\alpha'$ | 02 | 54 | 55.16 |
| $\theta$ | 05 | 16 | 34.20 |
| $\theta - \alpha'$ | +02 | 21 | 39.14 |
| = | +35 | 24 | 47.10 |
| $\frac{1}{2}(\alpha - \alpha')$ | + | 12 | 55.48 |
| $\frac{1}{2}(\alpha' - \alpha'')$ | +35 | 11 | 51.62 |

9.9572744
log cos $\frac{1}{2}(\alpha' - \alpha'')$ 0.0000014
Sec $(\theta - \alpha')$ 0.0879538
log tan $\gamma$ 0.044880

$\gamma$ 47 57 00.0

$\delta'$ 21 13 43.2

$\gamma - \delta'$ 26 43 16.8

9.826401
log sin $\pi$ 8.212377
Sin $\gamma - \delta'$ 9.652877
Cosec $\gamma$ 0.129271
Sin $\delta - \delta'$ 7.820915

$\delta - \delta'$ 22 45.6

$\delta$ 21 36 28.8

$\frac{1}{2}(\delta + \delta')$ 21 36 26.5

| | |
|---|---|
| O-C | +2.3 |
| Corr. | +0.6 |
| 2nd ord. eq. | +0.0 |
| Tur Corr | +0.1 |
| $\delta$ = | +21 36 28.9 |
| O-C | +2.4 |

| | | | |
|---|---|---|---|
| $\pi$ | 56 | 03.73 | |
| log sin $\pi$ | 8.212377 | | |
| " Sin $\theta - \alpha'$ | 9.763039 | | |
| " Sec $\frac{1}{2}(\alpha + \delta)$ | 0.031644 | | |
| | 9.869113 | | |
| Sin $(\alpha - \alpha')$ | 7.876117 | | |
| $(\alpha - \alpha')$ | +25 | 50.96 | |
| = | +01 | 43.39 | |

| | | | |
|---|---|---|---|
| $\alpha$ | 02 | 56 | 38.45 |
| $\frac{1}{2}(\alpha + \alpha')$ | 02 | 56 | 37.40 |
| O-C | | | +1.05 |
| Corr. | | | +0.00 |
| Tur Corr | | | +0.03 |
| $\alpha$ = | 02 | 56 | 38.48 |
| O-C | | | +1.08 |

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| | | | |
|---|---|---|---|
| $\alpha'$ | 02 | 54 | 55.16" |
| $\theta$ | 05 | 16 | 34.20" |
| $\theta - \alpha'$ | +02 | 21 | 39.04" |
| = | +35 | 24 | 47.10" |
| $\frac{1}{2}(\alpha - \alpha')$ | + | 12 | 55.48 |
| $\frac{1}{2}(\theta - \alpha') - "$ | +35 | 11 | 51.62 |

9.995727

log cos $\frac{1}{2}(\alpha - \alpha')$ 0.000000

Sec $(\theta - \alpha')$ " 008753"

log tan Y 0.044880

| | | | |
|---|---|---|---|
| Y | 47 | 57 | 00.0 |
| $\delta'$ | 21 | 13 | 43.2" |
| $Y - \delta'$ | 26 | 43 | 16.8 |

9.822640

log sin $\pi$ 821237"

Sin $Y - \delta'$ 9.652887

Cosec Y 012921"

Sin $\delta - \delta'$ 7.820911

| | | | |
|---|---|---|---|
| $\delta - \delta'$ | | 22 | 45.6 |
| $\delta$ | 21 | 36 | 28.8 |
| Syn $\delta$ | 21 | 36 | 26.5" |
| O - C | | | + 2.3 |
| Curv. | | | + 0.6" |
| 2nd Ord Wt | | | + 00 |
| Lin Corr | | | + 01 |
| $\delta$ = | +21 | 36 | 28.9 |
| O - C | | | + 2.4 |

| | | | |
|---|---|---|---|
| $\pi$ | 57 | 03.73" | |
| log Sin $\pi$ | | 8.21237" | |
| " Sin $\theta - \alpha'$ | | 9.763034 | |
| " Sec $\frac{1}{2}(\theta - \delta)$ | | 0.131144 | |
| Sin $\alpha - \alpha'$ | | 9.869131 | |
| | | 7.876117 | |
| $(\alpha - \alpha')$ | +25' | 50.96 | |
| = | + 01 | 33.76 | |
| = | + 01 | 43.3 | |

| | | | |
|---|---|---|---|
| $\alpha$ | 02 | 56 | 38.5" |
| Syn $\alpha$ | 02 | 56 | 37.46" |
| O - C | | | + 1.06" |
| Curv. | | | + 0.00 |
| Lin Corr | | | + 0.03 |
| $\alpha$ = | 02 | 56 | 38.48 |
| O - C | | | + 1.08 |

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# Star Measures



| | | | | |
|---|---|---|---|---|
| L | 18590 | 18370 | 18538 | 18214 |
| 17.8 | 10571 | 16396 97 | 18353 5-1 | 8399 |
| 19.0 | 71 | 98 | 49 | 99 |
| | 92 | 70 | 42 | 20 |
| | 12.80 21 | 12.80 27 | 19.0187 | 19.0179 |
| | 17917 | 18901 | 18072 | 18220 |
| 19 | 8912 10 | 17901 02 | 12140 | 14142 |
| 8.6 | 08 | 03 | 40 | 42 |
| | 17 | 01 | 72 | 24 |
| | 21.9807 | 21.9801 | 28.5932 | 28.5910 |
| | 16584 | 17789 | 17090 | 17641 |
| 8.6 | 11149 | 13222 | 15773 | 8956 |
| 11.1 | 49 | 22 | 73 | 56 |
| | 84 | 89 | 90 | 43 |
| | 33.5435 | 33.5433 | 11.1317 | 11.1313 |

# Moon Measures.

| | | | | |
|---|---|---|---|---|
| 84 | | | 19166 | 18410 |
| 14.9 | | | 9897 00 | 17680 |
| | | | 03 | 80 |
| | | | 72 | 12 |
| | | | 14,9271 | 14,9268 |
| | | | 18658 | 17828 |
| 153 | | | 15364 67 | 11132 |
| | | | 70 | 32 |
| | | | 62 | 30 |
| | | | 15,3291 | 15.3302 |
| | 16308 | 16392 | | |
| 225 | 11668 66 | 11838 39 | | |
| 16 | 64 | 41 | | |
| | 06 | 94 | | |
| | 22.4641 | 22.4645 | | |

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# Star Measures

| | | | | |
|---|---|---|---|---|
| - | 18590 | 18370 | 18538 | 18214 |
| 12.8 | 10571 | 16396 97 | 18353 5-1 | 18399 |
| 19.0 | 71 | 98 | 49 | 99 |
| | 92 | 70 | 42 | 20 |
| | 12.80 21 | 12.80 27 | 19.018 7 | 19.017 9 |

| | | | | |
|---|---|---|---|---|
| = | 17917 | 18901 | 18072 | 18221 |
| 21.9 | 9912 10 | 17901 02 | 12140 | 14142 |
| 28.6 | 08 | 03 | 40 | 42 |
| | 17 | 01 | 72 | 24 |
| | 21.900 7 | 21.900 1 | 28.593 2 | 28.591 0 |

| | | | | |
|---|---|---|---|---|
| . | 16584 | 17789 | 17090 | 17641 |
| 8.86 | 11149 | 13222 | 15773 | 89576 |
| 11.1 | 49 | 22 | 73 | 576 |
| | 84 | 81 | 90 | 43 |
| | 33.54 35- | 33.54 33 | 11131 7 | 16.131 3 |

# Moon Measures.

| | | | | |
|---|---|---|---|---|
| 24 | | | 19166 | 18410 |
| 14.9 | | | 9.8971 00 | 17650 |
| | | | 03 | 80 |
| | | | 72 | 12 |
| | | | 14.921 1 | 14.926 8 |

| | | | | |
|---|---|---|---|---|
| 3 | | | 18658 | 17828 |
| 23 | | | 15364 67 | 11132 |
| 15.3 | | | 70 | 32 |
| | | | 62 | 30 |
| | | | 15.329 1 | 15.330 2 |

| | | | | |
|---|---|---|---|---|
| 3 | 16308 | | 16392 | |
| 225 | 11668 66 | | 11038 34 | |
| 16 | 64 | | 24 0 | |
| | 06 | | 94 | |
| | 22464 1 | | 22460 5- | |

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4 1 6 3 2 8 1 6 3 6 8
22.3 1 3 4 6 6 6 7 9 2 3 2
16.8 6 8 3 2
2 4 6 8
22 2 8 6 0 22.2 8 6 4

5 1 6 3 3 0 1 6 3 6 4
22.3 1 3 3 7 8 9 3 3 2
17.0 7 8 3 0 3 1
3 0 6 4
22.29 5 2 22.29 6 7

6 1 6 3 5 7 1 6 2 3 1
22.8 9 2 0 8 1 3 3 8 9
18.0 0 8 8 9
5 7 3 3
22.7 1 4 9 22.7 1 5 6

7 1 7 6 7 2 1 6 4 3 4
23.0 1 4 8 5 3 9 2 3 3 35
18.2 5 3 3 6
7 4 3 2
18.28 1 9 1 8 2 8 0 3

8 1 6 1 7 6 1 6 8 0 1
24.1 9 2 5 1 49 1 3 7 4 0
18.7 4 7 3 8
8 0 0 1
18.6 9 3 0 18.6 9 3 8

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1890 Mars

4
223
16.8

16328 16368
13466 67 9232
68 32
24 68
22286.0 22.286 4

5
223
17.0

16330 16364
13378 9332
78 30
30 64
22.2952 22.2967

31

5
22.8
18.0

16357 16231
9218 13389
08 89
57 33
22.7149 22.7156

I
23.0
18.2

17672 16434
14853 9233
53 36
74 32
18.2819 18.2803

30

X
24.1
18.1

16176 16801
9251 1374 01
47 38
80 01
18.6930 18.6938

49

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11890 Times Etc. 

Date Dec. 7 '16.

| | | | | | |
|---|---|---|---|---|---|
| Expt Stars | 03 | 40 | | 03 | 52 |
| " " Moon | 03 | 45 | 58.6 | 45 | 58.9 |
| Clock fast | | 11 | 58.0 | | |
| | | | | $\theta = -0^s.12^m$ | |
| H. Sid Time | 03 | 34 | 0.75 v | | |
| " Greenw | 04 | 44 | 31.05 v | | |
| G.S.T. | 08 | 18 | 31.80 v | | |
| G.S.T. M.N | 17 | 03 | 41.67 | | |
| Interval | 15 | 14 | 50.13 v | | |
| Reduction | | 02 | 29.87 v | | |
| G.M.T. | 15 | 12 | 20.26 v | $15^h.20563$ | |

From Nautl. Alm.

| | | | RA | | Decl. |
|---|---|---|---|---|---|
| Moon | $15^h$ | 03.46 | 01.22 v | +24 00 | 06.1 v |
| Motion $1^m$ | | | 2.2653 v | | +5.14 v |
| | 12.33766 | | +27.95 v | +01 | 03.4 v |
| Tabular Place | 03 | 46 | 29.17 v | +24 01 | 09.5 v |

Mosis age 12.6

934" = 1.49

a = 502.7
+24.
-478.7

| | | |
|---|---|---|
| Parallax | 55 | 38.33 v |
| Semi-diam | 15 | 11.2 c |
| | | 911.2 v |
| Aug | | 14.2 v |
| Ind 4 | | - 0.6 v |
| R | | 9248 v |
| R | | 1.9824 c |
| (1+a)R | | - 949 v |
| R' | | 1.8875 v |
| R2 | | 3.5626 c |

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1890 Times Etc. 

Date Dec. 7 1/2

| | | | | | |
|---|---|---|---|---|---|
| Expt. Stars | 03 | 40 | | 03 | 52 |
| " " Moon | 03 | 45 | 58.6 | 45 | 58.9 |
| Clock fast | | 11 | 58.0 | | |
| 7 | | | | $\theta = -0^h 12^m$ | |
| 7h. Sid Time | 03 | 34 | 0.75 | | |
| " Long | 04 | 44 | 31.05 | | |
| h. S. T. | 08 | 18 | 31.80 | | |
| h.S.T. M.N | 17 | 03 | 41.67 | | |
| Interval | 15 | 14 | 50.13 | | |
| Reduction | | 02 | 29.91 | | |
| h. M.T | 15 | 12 | 20.26 | $15^h 20563$ | |

From Naut. Alm.

| | | | RA | | Decl. | |
|---|---|---|---|---|---|---|
| Moon | $15^h$ | 03 | 46 | 01.22 | +24 | 00 06.1 |
| Motion 1m | | | | 2.2653 | | +5.14 |
| " 12.33766 | | | | +27.95 | +01 | 03.4 |
| Tabular Place | 03 | 46 | | 29.17 | +24 | 01 09.5 |

Moons age 12.6

934 = 14.9

a = 5502.7
+24.
-478.7

| | |
|---|---|
| Parallax | 55 38.33 |
| Semi-diam | 15 11.2 |
| R | 911.2 |
| Long | 14.2 |
| Dr 4 | - 0.6 |
| R | 9248 |
| R | 19824 |
| (1+a)R | - 949 |
| R | 18875 |
| R2 | 35626 |

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11890 Plate Center a Constants. 24

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12,80224 | 19.01833 | | 03 | 39 | 48.39 | | 24 | 01 | 33.5 |
| 21.90044 | 28.59221 | | 03 | 45 | 15.71 | | 25 | 19 | 36.8 |
| 33.54434 | 11.13115 | | 03 | 52 | 0486 | | 22 | 55 | 56.6 |
| 3 16.82462 | 3 15.87419 | | 3 11 | 17 | 0.8963 | 3 | 72 | 17 | 06.9 |
| 32.74487 | 19.55806 | | 03 | 45 | 42.99 | | 24 | 05 | 42.3 |
| 32 | 18. | | | | −23.21 | | | −12 | 17.3 |
| −.74487 | −1.55806 | | 03 | 45 | 19.78 | | 23 | 53 | 25.0 |
| 31 | 4665 | | | | | | | | |

Plate Center { A = 03 45 19.78
Ⓓ 23 53 25.0

X − S + s·00X +65.74 +2.7X −13.46

| | | | | |
|---|---|---|---|---|
| +.5363 +6401 | = 11764 | + 1248 | = 13012 | + 34 = 13046 |
| +.0159 + 10950 | 11109 | + 1878 | = 12987 | + 59 = 13046 |
| −.4568 + 16772 | = 12212 | + 730 | = 12942 | + 103 = 13045 |
| 24.1741 + 12087 | | + 1104 | | + 65 = 34195 |

Y − η +s·00S. −66.Y +1.1S −7928

| | | | | |
|---|---|---|---|---|
| −.0765 + 95·09 | = 8744 | − 845 | = 7899 | + 21 = 7920 |
| −.4963 + 14296 | = 9333 | − 1444 | = 7889 | + 31 = 7920 |
| −.4584 + 55·66 | = 10020 | − 2211 | = 7909 | + 12 = 7921 |
| 16.8051 + 8402 | | − 15·95 | | + 18 = 16956 |

Tables a = +0.5 c = +0.5 a − c = 0 b + d = 0
− 502.7 − 501.1 = −1.6 +0.3

b − c −503.2 −501.6 +0.3

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# Plate Center Constants. 24.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.80 24 | 19.0183 | | 03 | 39 | 48.39 | | 24 | 01 | 33.5 |
| 21.90 04 | 28.5921 | | 03 | 45 | 15.71 | | 25 | 19 | 36.8 |
| 33.5434 | 11.1315 | | 03 | 52 | 0486 | | 22 | 55 | 56.4 |
| 16.824 62 | 3\|5.8 7 4 1 9 | | 3\|11 | 17 | 0896 | 3 | 72 | 17 | 069 |
| 22.7487 | 19.5806 | | 03 | 45 | 4999 | | 24 | 05 | 42.3 |
| 22 | 18 | | | | -2321 | | | -12 | 17.3 |
| -.7487 | -1.5806 | | 03 | 45 | 1978 | | 23 | 53 | 250 |
| 31° | 466.5' | | | | | | | | |

Plate Center { A. 03 45 19.78
E 23 53 25.0

-5 + 5·00x +65.7y +2.7x -13.46

+.5863 +6401 = 11764 + 1248 = 13012 + 34 = 13146
+.0159 +1045 = 11109 + 1878 = 12987 + 59 = 13046
-.4568 +16772 = 12212 + 730 = 12942 + 103 = 13045
24.1741 +12087 +1114 +65 = 24195

-η +5·00ξ. -66x +1.1ξ -7920

-0765 +9509 - 8744 -845 - 7899 + 21 = 7920
-4963 +14296 - 9333 -1444 = 7889 + 31 = 7920
+4554 +5566 = 10020 -2211 = 7909 + 12 = 7921
16.8151 +8402 -1595 +18 = 16.6956

Tables a: +0.5 c: +0.5 a - c = 0 b + d = 0
-502.7 -501.1 = -1.6 +0.3

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| S | η | ΔS | −3.3 S | + 9 η | −10 |
|---|---|---|---|---|---|
| −9.73 | +1.05 | −23 | +32 | = +9 | +1 = +10 |
| −0.11 | +11.09 | − 0 | + 0 | = 0 | +10 = +10 |
| +11.99 | −7.89 | +56 | −40 | = +16 | −6 = +10 |
| η+2.19 | −1.30 | | − 7 | | −1 = −18 |

| Δη | −3.5 η | +.5 S | +7 |
|---|---|---|---|
| + 2 | − 4 | = −2 | − 5 = −7 |
| +32 | −39 | = −7 | − 0 = −7 |
| −38 | +26 | = −12 | + 6 = −6 |
| | + 4 | | + 1 = +12 |

Corr α = − 0.06
∴ δ = + 0.6

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1898 Standard Coordinates 25

| | Cafe No. 534 mg 5.4 | | | Cafe No. 559 mg 5.3 | | | Cafe No. 572 mg 6 | | |
|---|---|---|---|---|---|---|---|---|---|
| C | 03 | 38 | 51.4 N | 03 | 44 | 18.12 | 03 | 51 | 07.99 |
| 4 | 03 | 38 | 51.47 | | | 18.10 | | | 07.99 |
| 8 | | | 51.43 | | | 18.13 | | | 07.99 |
| Mean | 03 | 38 | 51.44 | 03 | 44 | 18.12 | 03 | 51 | 07.99 |
| Prec | | | +56.95 | | | +57.59 | | | +56.87 |
| α | 03 | 39 | 48.39 | 03 | 45 | 15.71 | 03 | 52 | 04.86 |
| A | 03 | 45 | 19.78 | 03 | 45 | 19.78 | 03 | 45 | 19.78 |
| α-A | | -05 | 31.39 | | | -04.07 | | +06 | 45.08 |
| log-A | | -331.36 | | | | -04.07 | | +405.02 | |
| log " " | 2.52030m | | | 0.60959m | | | 2.607748 | | |
| log cos δ | 9.960644 | | | 9.95-611 | | | 9.964424 | | |
| log S₀ | 0.988181n | | | 9.072944n | | | 1.078896 | | |
| S₁ | -9.7315 | | | -0.11555 | | | +11.9939 | | |
| S₂ | - | 24 | | | 0 | | | +55 | |
| S | 12.26611 | | | 21.88455 | | | 33.99994 | | |
| X | 12.80224 | | | 21.90004 | | | 33.54434 | | |
| X-S | +5363 | | | +0159 | | | -4560 | | |
| C | 23 | 58 | 29.7 | 25 | 16 | 39.6 | 22 | 53 | 06.5 |
| 4 | | | 29.8 | | | 39.9 | | | 06.8 |
| 8 | | | 29.0 | | | 39.9 | | | 06.1 |
| Mean | 23 | 58 | 29.5 | 25 | 16 | 39.8 | 22 | 53 | 06.5 |
| Prec | | +03 | 04.0 | | +02 | 57.0 | | +02 | 50.1 |
| S | 24 | 01 | 33.5 | 25 | 19 | 36.8 | 22 | 55 | 56.6 |
| Θ | 23 | 53 | 25.0 | 23 | 53 | 25.0 | 23 | 53 | 25.0 |
| S-Θ | | +08 | 08.5 | +1 | 26 | 11.8 | - | 57 | 28.4 |
| log " | | +488.5 | | | +5172.8 | | | -3448.7 | |
| log " | 2.68686 | | | 3.71372 | | | 3.537655n | | |
| log n₀ | 0.002001 | | | 1.04487 | | | 0.868800n | | |
| log S | 9.649100 | | | 9.675113 | | | 9.626430 | | |
| " S₂ | 1.97636 | | | 8.14588 | | | 2.15792 | | |
| log n₁ | 8.67789 | | | 4.87444 | | | 8.83790 | | |
| n₀ | +1.04711 | | | +11.0884 | | | -7.3927 | | |
| n₁ | +0.04477 | | | | 0 | | +.0688 | | |
| n | 19.09488 | | | 29.06884 | | | 10.67761 | | |
| y | 19.01883 | | | 28.59211 | | | 11.13315 | | |
| y-η | -.07655 | | | -.4963 | | | +.4554 | | |

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1890 Standard Coordinates 25

| | Cafe No. 534 mg 5.4 | | | Cafe No. 537 mg 5.3 | | | Cafe No. 572 mg ? | | |
|---|---|---|---|---|---|---|---|---|---|
| | C | 03 | 38 | 51.41 | 03 44 | 18.12 | 03 51 | 07.29 | |
| | 4 | 03 | 38 | 51.47 | | 18.10 | | 07.99 | |
| | 8 | | | 51.43 | | 18.13 | | 07.99 | |
| Mean | | 03 | 38 | 51.44 | 03 44 | 18.12 | 03 51 | 07.99 | |
| Prec | | | | +56.95 | | +57.59 | | -56.57 | |
| α | | 03 | 39 | 48.39 | 03 45 | 15.71 | 03 52 | 04.86 | |
| A | | 03 | 45 | 19.78 | 03 45 | 19.78 | 03 45 | 19.. | |
| X-A | | | -05 | 31.39 | | -04.07 | | +06 45.08 | |
| Σ(X-A) | | | -331.36 | | | -24.07 | | +405.02 | |
| log " | | 2.52030n | | | 0.66959n | | 2.60748 | | |
| log cos δ | | 9.99664 | | | 9.99511 | | 9.99424 | | |
| log S. | | 0.48818n | | | 9.07294n | | 1.07896 | | |
| S. | | -9.7315 | | | -0.11555 | | +11.99939 | | |
| S. | | - | 24 | | | 0 | | +55 | |
| S | | 12.26610 | | | 21.88845 | | 33.99944 | | |
| X | | 12.80234 | | | 21.90004 | | 33.54334 | | |
| X-S | | +53623 | | | +01559 | | -4560 | | |
| | C | 23 | 58 | 29.7 | 25 16 | 39.6 | 22 53 | 06.5 | |
| | 4 | | | 29.8 | | 39.9 | | 06.8 | |
| | 8 | | | 29.0 | | 39.9 | | 06.1 | |
| Mean | | 23 | 58 | 29.5 | 25 16 | 39.8 | 22 53 | 06.5 | |
| Prec | | | +03 | 04.0 | | +02 | 57.0 | +02 | 50.7 |
| S | | 24 | 01 | 33.5 | 25 18 | 36.8 | 22 55 | 56.6 | |
| E | | 23 | 53 | 25.0 | 23 53 | 25.0 | 23 53 | 25.0 | |
| S-E | | | +08 | 08.5 | +1 26 | 11.8 | - 57 | 28.4 | |
| tan " | | | +4 | 58.5 | +51728 | | = 3448.7 | | |
| log " | | 2.68686 | | | 3.71372 | | 3.53765n | | |
| log n. | | 0.02001 | | | 1.04487 | | 0.86660n | | |
| log tan S | | 9.64910 | | | 9.67513 | | 9.62643 | | |
| log S.² | | 1.97636 | | | 8.14588 | | 3.15792 | | |
| log h. | | 8.67889 | | | 4.87444 | | 2.88371 | | |
| n. | | +1.04711 | | | +11.08884 | | -7.3927 | | |
| n. | | +0.04777 | | | 0 | | +.0688 | | |
| n | | 19.09+8 | | | 29.08834 | | 10.6761 | | |
| y | | 19.0183 | | | 28.59421 | | 11.1315 | | |
| y-x | | -.0765 | | | -.49413 | | +.4554 | | |

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1890 Moons Center - 26

| | | Δx | | δ − c |
|---|---|---|---|---|
| 1 | 24.0000 − 0.17400 | 0.0303 | 3.5579 | − 47 |
| 2 | 23.0000 − 1.17400 | 1.3783 | 3.5554 | − 72 |
| 3 | 22.4643 − 1.7097 | 2.9231 | 3.5711 | + 85 |
| 4 x | 22.2862 − 1.8878 | 3.5636 | 3.5638 | + 12 |
| 5 | 22.2959 − 1.8781 | 3.5273 | 3.5653 | + 27 |
| 6 | 22.7152 − 1.4588 | 2.1281 | 3.5561 | − 65 |
| 7 | 23.0000 − 1.17400 | 1.3783 | 3.5575 | − 51 |
| 8 | 24.17400 − 0.00000 | 0.0000 | 3.5649 | + 23 |
| | | | 3.5626 | |

| | | | | |
|---|---|---|---|---|
| 1 | 14.9269 − 1.8781 | − 1 3.5276 | 185 | |
| 2 | 15.3296 − 1.4754 | − 1 2.1791 | 218 | |
| 3 | 16.0000 − 0.8050 | − 0 0.6480 | 245 | |
| 4 | 16.80500 − 0.0000 | − 0 0.0000 | 270 | |
| 5 | 17.0000 + 0.1950 | + 0 0.0380 | 276 | |
| 6 | 18.0000 + 1.1950 | + 0 1.4280 | 309 | |
| 7 | 18.2811 + 1.4761 | + 1 2.1792 | 321 v | |
| 8 y | 18.6930 + 1.8880 | + 1 3.5649 | 360 v | |
| | | | Range | 175 |

X = 23 y = 15.3296
18.2811
33.6107
$y_0$ 16.8053

$y_{max}$ 18.6934

R 1.8881

Corr R 1.8875

$x_m$ 22.2862

Moons Center $\begin{cases} x_0 & 24.17400 \\ y_0 & 16.80500 \end{cases}$

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11890 Moons Center - 

| | | Δx | | t-c | |
|---|---|---|---|---|---|
| 1 | 24.0000 | -0.17400 | 0.0303 | 3.5579 | - 47 |
| 2 | 23.0000 | -1.1740 | 7.3788 | 3.5554 | - 72 |
| 3 | 22.4643 | -1.7097 | 2.9231 | 3.5711 | + 85 |
| 4 x | 22.2862 | -1.8878 | 3.5635 | 3.5638 | + 12 |
| 5 | 22.2959 | -1.8781 | 3.5273 | 3.5653 | + 27 |
| 6 | 22.7152 | -1.4588 | 2.1281 | 3.5561 | - 65 |
| 7 | 23.0000 | -1.1740 | 1.3783 | 3.5575 | - 51 |
| 8 | 24.1740 | -0.0000 | 1.0000 | 3.5649 | + 23 |
| | | | | 3.5626 | |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 14.9269 | -1.8781 | -1 | 3.5276 | 185 |
| 2 | 15.3296 | -1.4754 | -1 | 2.1771 | 218 |
| 3 | 16.0000 | -0.8050 | -0 | 0.6480 | 244 |
| 4 | 16.8050 | -0.0000 | -0 | 0.0000 | 270 |
| 5 | 17.0000 | +0.1950 | +0 | 0.0380 | 276 |
| 6 | 18.0000 | +1.1950 | +0 | 1.4280 | 309 |
| 7 | 18.2811 | +1.4761 | +1 | 2.1792 | 321 |
| 8 | 18.6934 | +1.8881 | +1 | 3.5649 | 360 |
| | | | | | Range 175 |

X- 23 y- 15.3296
18.2811
3.3607
$y_0$ 16.8053

y max 18.6934

R 1.8881
Corr R 1.8875
x max 22.2862

Moons Center $x_0$ 24.1740
$y_0$ 16.8050

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Normals

| | | | |
|---|---|---|---|
| 1 | +0.32 | + 8.0 | + 88.8 |
| 2 | +1.72 | + 84.1 | +105.9 |
| 3 | +1.37 | −145.2 | − 68.0 |
| 4 | +0.00 | − 22.7 | − 00.0 |
| 5 | −0.36 | − 51.0 | + 5.1 |
| 6 | −1.74 | + 95.0 | = 77.4 |
| 7 | −1.73 | + 59.6 | = 75.3 |
| 8 | −0.00 | − 000 | + 43.5 |
| | +3.41 | +246.7 | +243.3 |
| | −3.83 | −2189 | −220.9 |
| | −0.42 | + 27.8 | + 22.4 |

| − a | − b | + Δc |
|---|---|---|
| + 2 | − 1 | −23 |
| + 18 | − 1 | − 7 |
| + 26 | − 0 | + 2 |
| + 28 | − 0 | + 4 |
| + 28 | + 0 | + 4 |
| + 22 | + 0 | − 2 |
| + 18 | + 1 | − 5 |
| + 0 | + 1 | −23 |

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1893 Conditional Equations 27

| | | | | | | O−C | Corr |
|---|---|---|---|---|---|---|---|
| 1 | −0.17 | −1.89 | = −47 | −0 | −3 | = −3 | −44 | −67″ |
| 2 | −1.17 | −1.47 | = −72 | −2 | −3 | = −5 | −67 | −74″ |
| 3 | −1.71 | −0.80 | = +85 | −3 | −1 | = −4 | +89 | +91″ |
| 4 | −1.89 | −0.00 | = +12 | −4 | −0 | = −4 | +16 | +20.″ |
| 5 | −1.89 | +0.19 | = +27 | −4 | +0 | = −4 | +31 | +35″ |
| 6 | −1.46 | +1.19 | = −65 | −3 | +2 | = −1 | −64 | −66″ |
| 7 | −1.17 | +1.48 | = −51 | −2 | +3 | = +1 | −52 | −57″ |
| 8 | −0.00 | +1.89 | = +23 | −0 | +3 | = +3 | +20 | −3″ |
| | −9.46 | +0.59 | | | | | +156 | −227 |
| | | | | | | | or 48 | |

$14.93 - 0.42 = +27.8 \cdot -9.46$

$-0.42 + 13.56 = +22.4 + 0.59$

$+0.42 - 0.01 = +0.78 - 0.27$

$+13.55 = +23.18 + 0.32$ $\quad f = +1.71 + 0.02$

$14.93 = +27.8 + 0.12 = +28.52$ $\quad g = +1.91 - 0.63$

$\frac{\phi}{n} = 0.29$

$\frac{\Sigma mr}{n} = -9$

$\Delta R = -0.1$

Corr $= +0.2$

True $\Delta R = -0.3$

$-2R = -396$ $\quad \Delta = -2R\,\text{Corr} = -1.19$ $-24$

$\Delta b = -0.02$ $\quad \Delta \delta = -0.0$

$\Delta a = +0.75$ $\quad \Delta \alpha = +0.03$

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11890 Conditional Equations 2.

| | | | | O - C |
|---|---|---|---|---|
| 1 | -0.17 -1.89 = -47 | -0 -3 = -3 | | -44 |
| 2 | -1.17 -1.47 = -72 | -2 -3 = -5 | | -67 |
| 3 | -1.71 -0.80 = +85 | -3 -1 = -4 | | +89 |
| 4 | -1.89 -0.00 = +12 | -4 -0 = -4 | | +16 |
| 5 | -1.89 +0.19 = +27 | -4 +0 = -4 | | +31 |
| 6 | -1.46 +1.19 = -65 | -3 +2 = -1 | | -64 |
| 7 | -1.17 +1.48 = -51 | -2 +3 = +1 | | -52 |
| 8 | -0.00 +1.89 = +23 | -0 +3 = +3 | | +20 |
| | | | | +156 -227 |
| | | | | av 28 |

1493 -042 = +27.8

-0.42 +13.58 = +22.4

+042 - 0.01 = +0.78

+13.55 = +23.18 a = +1.71

1493 = +27.8 + 0.12 = +28.52 a = +1.91

$\frac{\phi}{n}$ = 029

$\frac{\Sigma w}{n}$ = -9

ΔR = -01

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$\gamma_0$ 24.1740
+1
24.1741 ✓

$\delta_0$ 16.805-0 ✓
+1
16.805-1 ✓

Lyon Plate Constants.

24.1951
22.
$S_1$ +2.1951 ✓

16.6956
18.
−1.3044 ✓

log $S_1$ 0.341455 ✓
log cos $\delta$ 9.96167 ✓
8.50724 ✓
log sin(α−A) 1.87254 ✓

log tan $\delta$ 9.6428 ✓
log $S_0^2$ 0.6829 ✓
7.0534 ✓
log $n_1$ 7.3791 ✓

(α−A) 74.57 ✓
= +01 14.57

$n_1$ 0.0024 ✓
$n_0$ −1.3068 ✓

A 03 45 19.78 ✓

log $n_0$ 0.11621 ✓
7.33115
log tan(δ−D) 2.78506 ✓

$\alpha_0$ 03 46 34.35 ✓

Red +5.75 ✓

δ−D −609.62 ✓
−10 09.6 ✓
D 23 53 25.0 ✓

$\alpha_1$ 03 46 40.10 ✓

$\delta_0$ 23 43 15.4 ✓

Red +20.7 ✓

δ' 23 43 36.1 ✓

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$Y_0$ 24.1740
+1
24.1741

$\eta_0$ 16.80S0
+1
16.80S-1

From Plate Constants.

24.195-1
22
S. +2.195-1

14.695-6
18
-1.3044

log S. 0.341455
log cos i 9.996167
8S-0724
log Sin i-N 1.872534

tg i 9.6428
log S.² 0.6829
7.0534
log n. 7.3791

$\chi - A_1$ 74.5-9

= +01 14.57

n. 0.00024
$n_0$ -1.3065

+ 03 45 19.78

log $n_0$ 0.11621-n
7.33115
log tg(i-x) 2.185064-n

$\chi_0$ 03 46 34.35

Red + 5.75

S.ε -609.62
-10 09.6
ε 23 53 25.2

$\chi_1$ 03 46 40.10

$\delta_0$ 23 43 15.4

Red +20.7

δ' 23 43 36.1

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1. 3 42 35.019
29.281
+5.738

2 3 48 56.957
50.870
+6087

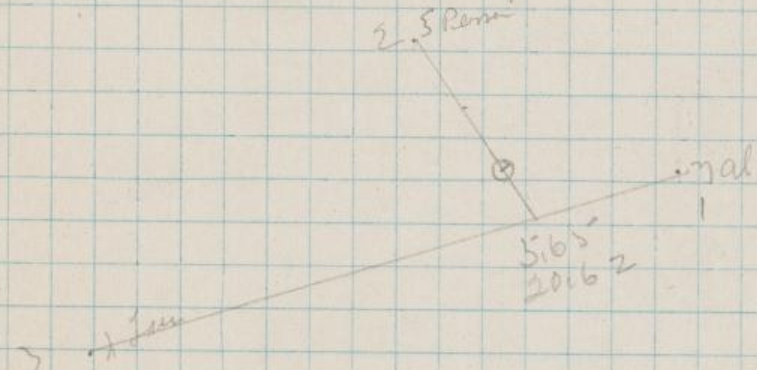
3 3 56 06.889
01.481
+5.408

23 51 07.66
50 46.45
+21.21
15 54 2.37

31 38 27.59
38 06.39
+21.20

12 15 32.71
13.87
+18.84

5.738
5.408
.330




38
33
28
23
18
13
8
3

58 52 54 52 50 48 46 44 42 41 38 36 34 32

3a

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1916phae.proj.2

1898

## Reduction to apparent Place



| | | | | | |
|---|---|---|---|---|---|
| H + α | 04 | 39.0 | 69 | 45 | |
| H | 0 | 52.4 | | | $\delta_0$ 23 43.3 |
| χ | 03 | 46.6' | | | |
| G | 23 | 33.2 | | | log sin $\delta_1$ 9.9617 |
| G + χ | 21 | 19 8 | 49 | 57 | log i 0.3003 |
| | | | | | log (i) 0.2620 |

log cos G + χ 9.8085
log g 1.3964
log sin G + χ 9.8839
log tan δ 9.6428
8.8234

log g' 1.2049
g' 9.7470

log sin $\delta_0$ 9.6045
Cos H + χ 9.5392
log $h_2$ 1.3090
log $\Delta_2$ H + χ 9.9723
Sec $\delta_0$ 0.0383
8.8239

log $h_1$ 0.4527
$h_1$ 0.1435

g +3.802
g' +0.558
$h_2$ +1.391
Red +5.751

g' +16.030
$h_2$ + 2.836
i + 1.829
Red +20.695

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1890

## Reduction to apparent Place



| | | | | | |
|---|---|---|---|---|---|
| H + x | 04 | 39.0 | 69 | 45 | |
| H | 0 | 52.4 | | | |
| x | 03 | 46.6 | | | |
| G | 23 | 33.2 | | | |
| Q + x | 21 | 19 | 8 | 49 | 57 |

$\delta_1$ 23° + 3.3

log cos G+x 9 8085
log g 1 3964
log sin G+x 9 8839
log tan δ 9 6428
8.8234

log g' 1.2049
log g 9.7470

g +3.802
g +0 55.8
h +1.391
Red +5.751

log cos $\delta_1$ 9.9617
log i 0.3003
log (i) 0.2620

log sin $\delta_1$ 9.6045
Cog H+x 9 5392
log h 1.3090
log sin H+x 9.9723
Sec $\delta_1$ 0 0383
8.8239

log h' 0.4527
log h 0.1435

g' +16.030
h' + 2836
i +1.829
Red +20.695

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1890 Lunar Parallax. 30

| | | | |
|---|---|---|---|
| $\alpha'$ | 03 | 46 | 40.10 v |
| $\theta$ | 03 | 34 | 00.75 v |
| $\theta - \alpha'$ | − | 12 | 39.35 v |
| | = −03 | 09 | 50.25 v |
| $\frac{1}{2}(\alpha - \alpha')$ | − | 01 | 14.63 v |
| $\frac{1}{2}(\theta - \alpha - \frac{1}{2}(\alpha + \alpha')$ | 03 | 08 | 35.62 v |

9.95727 v

log cos $\frac{1}{2}(\alpha - \alpha')$ 0.000000 v

cd $(\theta - \alpha') - \frac{1}{2}(\alpha - \alpha')$ 0.000065 v

log tan $\chi$ 9.95792 v

$\chi$ 42 13 43.2 v

$\delta'$ 23 43 36.1 v

$\chi - \delta'$ 18 30 07.1 v

9.82647 v

log sin $\pi$ 8.20908 v

Sin $\chi - \delta'$ 9.50152 v

Cosec $\chi$ 0.17257 v

Sin $(\delta - \delta')$ 7.70957 v

$\delta - \delta'$ + 17 36.8 v

$\delta$ 24 01 12.9

Eph $\delta$ +24 01 09.5 v

O − C + 3.4 v

curv +0.6

2nd ord ref. +0.8

2nd Corr 0.0

$\delta$ +24 01 12.9

O − C = +3.4

$\pi$ 55 38.33

9.86913 v

log sin $\pi$ 8.20908 v

" Sin $\theta - \alpha'$ 8.74197 v

" Sec $\delta'$ 0.03934

log sin $\alpha - \alpha'$ 6.85952

$\alpha - \alpha'$ − 2' 29".26

= −9.95

$\alpha$ 03 46 30.15 v

Eph $\alpha$ 03 46 29.17 v

O − C + 0.98 v

curv. − 0.06

2nd Corr +0.03

$\alpha$ = 03 46 30.18

O − C + 1.01

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1890 Lunar Parallax. 30

| | | | |
|---|---|---|---|
| x' | 13 | 46 | 40.10 |
| θ | 13 | 34 | 00.75 |
| θ − x' | − | 12 | 39.35 |
| z | −0.8 | 09 | 50.25 |
| x − x' | − | −01 | 14.63 |
| ½(θ − x') − 0.8 | | 08 | 35.62 |

log sin ½(x − x') 9.95727
log cos ½(x + x') 0.000000
log z 1.001065
log sin y 9.957792

y 42 13 43.2

δ' 23 43 36.1

x − δ' 18 30 07.1
9.824781
log cos π 8.209408
log sin (x − δ') 9.501552
log sin x 0.172857
log sin (δ − δ') 7.709457

δ − δ' 17 36.8

δ +24 01 12.9

δ' +24 01 09.5

O − C +3.4
Corr. +0.6
2nd ord. eff. +0.8

2nd Corr. 0.0

δ +24 01 12.9

O − C +3.4

π 55" 38.33
9.864134
log sin π 8.269408
log sin (x − x') 7.419714
Sec δ' 0.039344
log sin (x − x') 6.854452

λ − λ' = 2' 29.26
= −9.95

x 13 46 30.15
x' 13 46 29.17
O − C +0.98
Corr. −0.06
2nd Corr. +0.03
x 13 46 30.18
O − C +1.01

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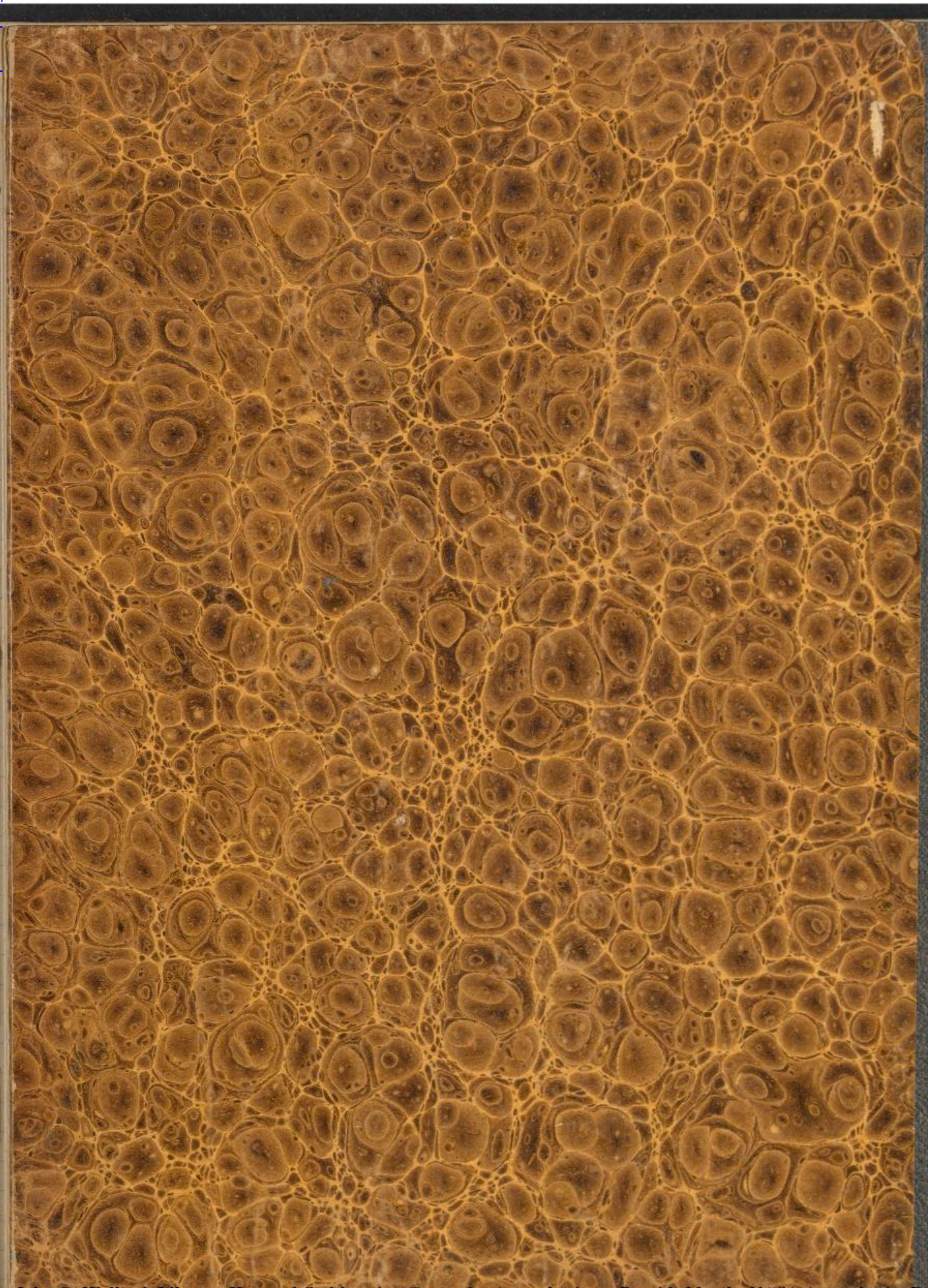
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