

KG

11366

WOLF

CLXVI

166



11636	Nov. 11, '16	1
11708	" 18 '16	11
11709	" " "	21

11636

Dwr

Star Measures

Tycho

1

1	17222	18458	17610	17104
11.2	1541315	1028481	163.30	837072
13.1	17	78	30	74
	30	64	14	10
	<u>11.1808</u>	<u>11.1818</u>	<u>13.1280</u>	<u>13.1264</u>

2	17105	17886	16582	16656
27.9	834846	1666563	1092832	1230914
76	44	61	36	19
	11	94	88	66
	<u>27.8764</u>	<u>27.8776</u>	<u>7.5654</u>	<u>7.5652</u>

3	18172	17653	16908	18350
34.6	1298689	12862	830293	1697069
23.4	92	5860	02	68
	80	63	16	60
	<u>34.5188</u>	<u>34.5202</u>	<u>238614</u>	<u>238616</u>

Mean Measures

1	19740	15727
26.0	1324705	12218
14.7	47	18
	80	27
	<u>14.6493</u>	<u>14.6491</u>

2	17442	16508
26.4	1397316	1002021
50	19	22
	38	04
	<u>26.3524</u>	<u>26.3516</u>

3	17530	16438
26.7	1013637	13823
16.0	38	23
	28	34
	<u>26.7392</u>	<u>26.7386</u>

11636

2

Star Measures

Tycho

L 17222 18458
 11.2 1541315 1028481
 13.1 17 78
 30 64
11.1808 11.1818

17610 17104
 16330 837072
 30 74
 14 10
131280 131264

2 17105 17886
 27.4 834846 1666563
 7.6 44 61
 11 94
278764 27.8776

16582 16656
 1042832 1230914
 36 19
 88 66
7.5654 7.5652

3 18172 17653
 34.6 1398689 12862
 23.4 92 5860
 90 63
345188 345202

16908 18350
 8302 1697069
 02 68
 16 60
238414 238616

Mean Measures

L
 26.0
 147

14740 13727
 1324715 12218
 47 18
 40 27
14.6493 14.6491

2 17442 16508
 26.4 1391316 1002021
 15.0 19 22
 88 04
263524 263516

3 17530 16438
 26.7 1013637 13823
 16.0 38 23
 28 34
26.7392 26.7386

11636

Moon Measures

2

4	16205	16418
26.8	874651	13866
16.2	56	66
	05	14
	<u>26.7454</u>	<u>26.7449</u>

5	16579	16362
26.5	1123634	11720,5
17.0	32	10
	77	58
	<u>26.5344</u>	<u>26.5355</u>

6
26
17.6

17062	18912
1074745	1525045
43	4045
62	14
<u>17.6317</u>	<u>17.6332</u>

7
25
18.0

18501	17514
1838683	761821
80	24
01	12
<u>18.0118</u>	<u>18.0109</u>

8
24.9
18.0

17852	16094
1771513	6220
11	20
52	90
<u>18.0139</u>	<u>18.0130</u>

11636

Moon Measures.

2

4	16205	16418
26.8	874651	13866
16.2	56	66
	05	14
	<u>26.7454</u>	<u>26.7448</u>

5	16579	16362
26.5	1123634	11720,5
17.0	32	10
	77	58
	<u>26.5344</u>	<u>26.5355</u>

6
26
17.6

17062	18912
1074745	1525041
43	40
62	14
<u>17.6317</u>	<u>17.6332</u>

7
25
18.0

18501	17514
1838653	761821
80	24
01	12
<u>18.0118</u>	<u>18.0109</u>

8
249
18.0

17852	16094
1770513	6220
41	20
52	90
<u>18.0139</u>	<u>18.0130</u>

11636

Times etc

Date Nov. 11/16

Exp. 2 Stars

" " Moon

Clock fast

02 17

02 22

11.

46.4 ✓

16.0 ✓

02 29

02 22 46.6 ✓

H. Sid. Time

02

11

30.5 ✓

" " " "

04

44

31.05 ✓

B = - 2^h 47^m

G. Sid. Time

06

56

01.55 ✓

" " " M.N.

15

21

11.18 ✓

Interval

15

34

50.37 ✓

Reduction

0.2

33.15

15.5381.2 ✓

Q. M.T.

15

32

17.22 ✓

15.5312

True Horiz. Altitude

R.A.

Decl.

Moon 15^h

04

58

03.03 ✓ +25

39

48.0 ✓

Motion 1^m

+ 2.2918 ✓

+ 1.037 ✓

" 32.287 ✓

01

13.99 ✓

+ 33.5 ✓

Tabular Place.

04

59

17.02 ✓ +25

40

21.5 ✓

934 = 12.5

Moon's age 16^d

Parallax

55

16.4 ✓

Semi-diam

15

0.53 ✓

R

905.3 ✓

ang

11.8 ✓

Dist 4

- 0.6 ✓

R

916.5 ✓

R

1.9646 ✓

(1+a) R

- 945 ✓

R

1.8701 ✓

R²

3.4973 ✓

a = -505.1

+24

-481.1

11636

Times etc

Date Nov 11.16

Exp to Stars

" " Moon

Clock fast

H Sid Time

" " "

G Sid Time

" " " MN

Interval

Reduction

Q M T

02 17

02 22 46.4

11 16.0

02 11 30.5

04 44 31.05

06 51 01.55

15 21 11.18

15 34 50.37

12 33.15

15 32 17.22

02 29

02 22 46.6

02 22 47

15 53.842

15 53.842

From Naut. Almanac

Moon 15^hMars 1^m

" 32.2871

Tabular Place

RA

04 58

01 59

04 59

13.13 +25

+22.918

13.99

17.02 +25

Decl

3.9 48.0

+1.137

+33.5

40 21.5

934 = 12.5

a = -505.1

+24

-48.11

Mean age 16^d

Parallax

Semi-diam

R

Ang

Semi 4

R

R

(1+4)R

R

R.2

55 16.4

15 05.3

9 05.3

11.8

-0.6

9 16.5

1.9646

-945

1.8701

3.4973

11636

Plate Center + Constants.

4

11.1813	13.12.72	04	53	0.83	24	55	19.0
27.8770	7.5653	05	02	59.40	24	09	18.5
34.5195	23.8615	05	07	9.49	26	21	24.6
373.5778	344.5540	315	03	9.72	3175	26	2.1
24.5259	14.8513	05	01	3.24	25	08	40.7
22.	18.	-01		18.30		+24	28.9
-2.5259	+3.1487						
315	466.5						

Plate Center

$$A = 04 \quad 59 \quad 44.94$$

$$B = +25 \quad 33 \quad 09.6$$

$$+5.1x - 16330$$

$$+76.5y$$

$$\begin{aligned}
 X-S + 500X &+ 9678 + 5591 = 15269 + 1004 = 16273 + 57 = 16330 \\
 + 1672 + 13939 &= 15611 + 579 = 16190 + 141 = 16331 \\
 - 2929 + 17259 &= 14330 + 1825 = 16155 + 175 = 16330 \\
 24.8736 + 12437 &+ 12352 + 127 = 24.6205
 \end{aligned}$$

$$\begin{aligned}
 y - \eta + 500y &- 79.3x + 6.4y - 4979 \\
 - 8782 + 6564 &= 5782 - 887 = 4895 + 84 = 4979 \\
 + 3358 + 3783 &= 7141 - 2210 = 4931 + 48 = 4979 \\
 - 4367 + 11931 &= 7564 - 2737 = 4827 + 152 = 4979 \\
 16.1432 + 8072 &- 1972 + 103 = 16.2656
 \end{aligned}$$

$$\begin{aligned}
 \text{Labels: } a &= -1.4 \quad e = -0.9 \quad a - e = -0.5 \quad b + d = +1.7 \\
 &- 505.1 \quad - 506.4 \quad = +1.3 \quad = +2.8
 \end{aligned}$$

$$b - e = -503.4 \quad -505.5 \quad +1.1$$

11636

Plate Center - Constants.

4

11.1813	13.1272	04 53	0.83	24 55	19.0
27.8770	7.5653	05 02	59.40	24 09	18.5
34.5195	23.8615	05 07	9.49	26 21	24.6
373.5778	3144.5540	31.5 43	97.2	3175	26 2.1
24.5259	14.8513	05 01	3.24	25 08	40.7
22	18	- 01	18.30	+ 24	28.9
-2.5259	+3.1487				
315	466.5				

Plate Center

$$A = 04 \quad 59 \quad 4494$$

$$B = +25 \quad 33 \quad 09.6$$

$$+5.1X - 1633$$

$$+76.5Y$$

$$+9678 + 5591 = 15269 + 1004 = 16273 + 57 = 16330$$

$$+1672 + 13939 = 15611 + 579 = 16190 + 141 = 16331$$

$$-2929 + 17259 = 14330 + 1825 = 16155 + 175 = 16330$$

$$248736 + 12437 = 261173 + 1235 = 262408 + 127 = 262535$$

$$y - \gamma + 5004$$

$$-79.5X$$

$$+6.4y - 4979$$

$$-0782 + 6564 = 5782 - 887 = 4895 + 84 = 4979$$

$$+3358 + 3783 = 7141 - 2210 = 4931 + 49 = 4980$$

$$-4367 + 11931 = 7564 - 2737 = 4827 + 152 = 4979$$

$$16.143R + 8072 = 24215 - 1972 = 22243 + 103 = 22346$$

Labels:

$$a = -1.4$$

$$e = -0.9$$

$$a - e = -0.5$$

$$t + d = +1.7$$

$$-505.1$$

$$-506.4$$

$$+1.3$$

$$+2.8$$

ξ	η	ΔS	$-4S$	-7η	-5
-11.78	-4.87	-45	+47 = +2	+3 = +5	
+5.71	-10.79	+21	-23 = -2	+7 = +5	
+12.81	+6.21	+61	-57 = +4	-4 = +6	
$m+2.62$	-1.73		-10	+1 =	<u>-14</u>

$\Delta \eta$	-4η	-33	-2
-20	+19 = -1	+3 = +2	
-39	+43 = +4	-2 = +2	
+31	-25 = +6	-4 = +2	
	+7	-1	= +4

Corr. $x = -0.05$
 $\delta = +0.2$

11636

Standard Coordinates:

5

Cape No.	717 mg 56	Cape No. 737 mg 55	Cape No. 745 mg 618
C	04 52 02.13	05 02 50.99	05 06 10.05
q	02.16	0.96	10.06
E	02.14	0.95	10.99
Mem	04 52 02.14	05 02 0.97	05 06 10.03
Prec	+58.69	+58.43	+59.46
α	04 53 0.83	05 02 59.40	05 07 9.49
Δ	04 59 44.94	04 59 44.94	04 59 44.94
$\alpha - \Delta$	-06 44.11	+03 14.46	+07 24.55
sin "	-404.05	+194.45	+444.48
log "	2.60643 ^m	2.28881 ^v	2.64785 ^v
log cos	9.95755 ^v	9.96020	9.95233 ^v
log S.	1.07122 ^m	0.75645	1.10742
S.	-11.7819 ^v	+5.7076 ^v	+12.8062 ^v
S.	.0046 ^v	+0022	+0062
S	10.2135 ^v	27.7098 ^v	34.8124
X	11.1813 ^v	27.8770	34.5195 ^v
X-S	+9.678 ^v	+1.1672 ^v	-2.2929 ^v
C	+24 53 45.77	24 07 58.5	26 20 10.5
q	45.98	59.3	10.9
E	45.60	58.8	10.3
Mem	+24 53 45.8	24 07 58.9	26 20 10.6
Prec	+01 33.2	+01 19.6	+01 14.0
δ	24 55 19.0	24 09 18.5	26 21 24.6
Φ	25 33 09.6	25 33 09.6	25 33 09.6
$\delta - \Phi$	-37 50.6	-1 23 51.1	+48 15.0
tan "	-2270.7	-5032.1	+2895.2
log "	3.35616 ^m	3.70175 ^m	3.46168 ^v
log no	0.68731 ^m	1.03290	0.79283
log tan δ	9.66712 ^v	9.65174 ^v	9.69501 ^v
log S.	2.14244	1.51290	2.21484
log n.	8.8629	8.2180	8.9682
m ₀	-4.8675 ^v	-10.7870 ^v	+6.2063 ^v
m ₁	+0.0729	+0.0165	+0.0919
m	13.2054	7.2295	24.2982
y	13.1272	7.5653	23.8615 ^v
y ₀	-0782	1.2258	42.67

11636

Standard Coordinates

5

Cape No.	717 mg 56	Cape No 737 mg 55	Cape No 745 mg 6.8
C	04 52 02.13	05 02 50.99	05 06 10.05
q	02.16	0.96	10.06
E	02.14	0.95	10.99
Mean	04 52 02.14	05 02 0.97	05 06 10.03
Prec	+58.69	+58.43	+59.46
α	04 53 0.83	05 02 59.40	05 07 9.49
A	04 59 44.94	04 59 44.94	04 59 44.94
$\alpha - A$	-06 44.11	+03 14.46	+07 24.55
Sm "	-414.05	+194.45	+444.85
log "	2.60643	2.28881	2.64785
log S	9.95755	9.96020	9.95233
log S ₁	1.07122	0.75645	1.10742

S ₁	-11.7819	+5.7056	+12.8062
S ₂	-0046	+0022	+0062
S ₃	10.2125	29.7198	34.8124
Y	11.1813	27.8770	34.5195
X-S	+9.678	+1.672	-29.29

C	+24 53 45.77	24 07 58.5	26 20 17.5
q	45.98	59.3	10.9
E	45.60	58.8	10.3
Mean	+24 53 45.8	24 07 58.9	26 20 10.6
Prec	+01 33.2	+01 19.6	+01 14.0
δ	24 55 19.0	24 09 18.5	26 21 24.6
δ	25 33 09.6	25 33 09.6	25 33 09.6
$\delta - \delta$	-37 50.6	-1 23 51.1	+48 15.0
tan "	-2270.7	-5032.1	+2895.2
log "	3.35616	3.70175	3.46168
log no	0.68731	1.03290	0.79283
log tan δ	9.66742	9.65174	9.69504
log S ₂	2.14244	1.51296	2.21484
log n ₁	8.8629	8.2180	8.9632
n ₀	-48675	-107870	+62063
n ₁	+0.1729	+0.0165	+0.0929
n	13.2854	7.2295	24.2982
y	13.1272	7.5653	23.8615
log "	-0.788	+2.258	-4.367

11636

Main Center

6

	X	$X - X_0$	ΔX		$O - C$
1	26.0000	+1.1260	+3	1.2686	-65
2	26.3520	+1.4780	+2	2.1851	-126
3	26.7389	+1.8649	+0	3.4778	+1
4	26.7452	+1.8712	+0	3.5014	+41
5	26.5350	+1.6610	-1	2.7586	+9
6	26.0000	+1.1260	-2	1.2674	-23
7	25.0000	+0.1260	-3	0.0158	+199
8	24.8740	+0.0000	-3	0.0000	+119
				3.4973	

	Y	$Y - Y_0$	ΔY	
1	14.6492	+1.4908	+1	2.2222
2	15.0000	-1.1400	+0	1.2996
3	16.0000	-0.1400	+0	0.0196
4	16.1396	-0.0000	+0	0.0000
5	17.0000	+0.8600	-0	0.7396
6	17.6325	+1.4925	-0	2.2276
7	18.0114	+1.8714	-1	3.5014
8	18.0134	+1.8734	-1	3.5092

Range 1430

Approx. Center

$$X = 26 \quad Y = 14.6492$$

$$17.6325$$

$$3.22817$$

$$Y_0 \quad 16.1409$$

$$Y_{max} \quad 18.0134$$

$$R \quad 1.8725$$

$$Com R \quad 1.8701$$

$$X_{max} \quad 26.7452$$

Main Center

$$X_0 \quad 24.8740$$

$$Y_0 \quad 16.1400$$

11636

Mass Center

6

	X	X - X ₀	ΔX			0 - C
1	26.0000	+1.1260	+3	1.2686	3.4908	-65
2	26.3520	+1.4780	+2	2.1851	3.4847	-126
3	26.7389	+1.8649	+0	3.4778	3.4974	+1
4	26.7452	+1.8712	+0	3.5014	3.5014	+41
5	26.5350	+1.6610	-1	2.7586	3.4982	+9
6	26.0000	+1.1260	-2	1.2674	3.4950	-23
7	25.0000	+0.1260	-3	0.0158	3.5172	+199
8	24.8740	+0.0000	-3	0.0000	3.5092	+119
					3.4973	

	y	y - y ₀	Δy	
1	14.6492	-1.4908	+1	2.2222
2	15.0000	-1.1400	+0	1.2996
3	16.0000	-0.1400	+0	0.0196
4	16.1396	-0.0000	+0	0.0000
5	17.0000	+0.8600	-0	0.7396
6	17.6325	+1.4925	-0	2.2276
7	18.0114	+1.8714	-1	3.5014
8	18.0134	+1.8734	-1	3.5092

143⁰
128⁰
94⁰
90⁰
63
37
3
0

Range 143⁰

Approx Center

X = 26 y = 14.6492
17.6325
3.22812
y₀ 16.1409
y max 18.0134
R 1.8725
Com R 1.8701
X max 26.7452

Mode Center

X₀ 24.8740
y₀ 16.1400

Normals

1	- 1.68
2	- 1.69
3	- 0.62
4	- 0.00
5	+ 1.42
6	+ 1.68
7	+ 0.24
8	+ 0.00
	+ 3.34
	- 3.99
	- 0.65

- 73.3
- 186.8
+ 1.8
+ 76.5
+ 14.9
- 26.0
+ 25.8
+ 00.0
+ 119.0
- 286.1
- 167.1

+ 97.8
+ 143.5
- 0.1
- 00
+ 77.2
- 34.3
+ 373.0
+ 222.5
+ 913.2
- 34.4
+ 878.8

- a	- b	+ DC
+ 11	- 4	- 8 ✓
+ 15	- 3	- 3 ✓
+ 19	- 0	+ 4 ✓
+ 19	- 0	+ 4 ✓
+ 17	+ 2	+ 4 ✓
+ 11	+ 4	+ 0 ✓
+ 1	+ 6	- 8 ✓
+ 0	+ 6	- 9 ✓

11636

Conditional Equations

							0 - e	7 corr
1	+1.13	-1.49	= -65	-9	-96	= -105	+40	+32
2	+1.48	-1.14	= -126	-13	-73	= -86	-40	-43
3	+1.86	-0.14	= +1	-16	-9	= -25	+26	+30
4	+1.87	-0.00	= +41	-16	-0	= -16	+57	+61
5	+1.66	+0.86	= +9	-14	+52	= +38	-29	-25
6	+1.13	+1.49	= -23	-9	+96	= +87	-110	-110
7	+0.13	+1.87	= +199	-1	+120	= +119	+80	-72
8	+0.00	+1.87	= +119	-0	+120	= +119	+0	-9
	+9.26	+2.40					+203	-179
	14.47	-0.65	= -167.1	+9.26			Ar 48	

$$-0.65 + 13.52 = +878.8 + 2.40$$

$$+0.65 - 0.03 = -7.5 + 0.60$$

$$13.5 = +871.3 + 3.00$$

$$b = +64.5 + 0.22$$

$$14.47 = -167.1 + 41.9 = -125.2$$

$$a = -8.6 + 0.65$$

$$\frac{p}{n} = 12$$

$$\frac{\sum v}{n} = +3$$

$$\frac{+3}{12} = +25$$

$$AR = +0.3$$

$$\text{Corr} + 0.2$$

$$\text{Linear} AR = +0.1$$

$$-2R = -3.74 \quad A = -2R \text{ con} = -0.74 \quad : -115$$

$$Ab = -0.16 \quad (-3) \quad A\beta = -0.1$$

$$Aa = -0.48 \quad (-10) \quad A\alpha = -0.02$$

11636

Conditional Equations:

7

1	+1.13	-1.49	= -65	-	9	-96	= -105	+	40
2	+1.48	-1.14	= -126	-	13	-73	= -86	-	40
3	+1.86	-0.14	= +1	-	16	-9	= -25	+	26
4	+1.87	-0.00	= +41	-	16	-0	= -16	+	57
5	+1.66	+0.86	= +9	-	14	+52	= +38	-	29
6	+1.13	+1.49	= -23	-	9	+96	= +87	-	110
7	+0.13	+1.87	= +199	-	1	+120	= +119	+	80
8	+0.00	+1.87	= +119	-	0	+120	= +119	+	0
								+	203 - 179

Ar 48

$$1447 - 0.65 = -167.1$$

$$-0.65 + 13.52 = +878.8$$

$$+0.65 - 0.03 = -7.5$$

$$13.5 = +871.3$$

$$b = +645$$

$$1447 = -167.1 + 41.9 = -125.2$$

$$a = -8.6$$

$$\frac{p}{n} = 12$$

$$\frac{3v}{n} = +3$$

$$\frac{+3}{12} = +25$$

$$AR = +03$$

11636

Moon's Mean Position.

8

$$\begin{array}{r} X \quad 24.8740 \checkmark \\ \quad - 4 \\ \hline 24.8736 \checkmark \end{array}$$

$$\begin{array}{r} 16.1400 \checkmark \\ \quad + 32 \\ \hline 16.1432 \checkmark \end{array}$$

From Plate Constants

$$\begin{array}{r} 24.6205 \\ 22 \\ \hline S \quad +2.6205 \checkmark \end{array}$$

$$\begin{array}{r} 16.2656 \checkmark \\ 18 \\ \hline -1.7344 \checkmark \end{array}$$

$$\begin{array}{r} \log S \quad 0.41838 \checkmark \\ \log \cos \delta_0 \quad 9.95611 \checkmark \\ \log \sin \delta_0 \quad 8.50724 \\ \log \sin \delta - A \quad 1.95503 \\ \alpha - A \quad 90.16 \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 9.6749 \checkmark \\ \log S_0 \quad 0.8368 \checkmark \\ \log \eta_1 \quad 7.0534 \\ \log \eta_2 \quad 7.5651 \end{array}$$

$$\begin{array}{r} +01 \quad 30.16 \checkmark \\ A \quad 04 \quad 59 \quad 44.94 \checkmark \end{array}$$

$$\begin{array}{r} \eta_1 \quad +0.0037 \checkmark \\ \eta_2 \quad -1.7381 \checkmark \end{array}$$

$$\alpha_0 \quad 05 \quad 01 \quad 15.10 \checkmark$$

$$\begin{array}{r} \log \eta_1 \quad 0.24008 \checkmark \\ \log \eta_2 \quad 7.33115 \checkmark \end{array}$$

$$\text{Red} \quad + 5.54 \checkmark$$

$$\log \tan \delta - \delta \quad 2.90893 \checkmark$$

$$\alpha \quad 05 \quad 01 \quad 20.64 \checkmark$$

$$\begin{array}{r} S - \delta \quad -810.8 \checkmark \\ \quad - 13 \quad 30.8 \checkmark \end{array}$$

$$\delta + 25 \quad 33 \quad 09.6 \checkmark$$

$$\delta_0 + 25 \quad 19 \quad 38.8 \checkmark$$

$$\text{Red} \quad + 10.6 \checkmark$$

$$S \quad 25 \quad 19 \quad 49.4 \checkmark$$

11636

Mean Mean Position

8

$$\begin{array}{r} X \quad 248740 \\ \quad \quad = 4 \\ \hline 248736 \end{array}$$

$$\begin{array}{r} 161404 \\ \quad \quad + 32 \\ \hline 161432 \end{array}$$

From Plate Constants

$$24.6205$$

$$22$$

$$S \quad +2.6215$$

$$16.2656$$

$$18$$

$$-1.7344$$

$$\log S \quad 0.41838$$

$$\log \cos \delta_0 \quad 9.95611$$

$$\log \sin \delta_0 \quad 8.50724$$

$$\log \sin (\delta - \delta_0) \quad 1.95503$$

$$\lambda - A \quad 90.16$$

$$+01 \quad 30.16$$

$$A \quad 04 \quad 59 \quad 4494$$

$$\alpha_0 \quad 05 \quad 01 \quad 15.10$$

$$\text{Red} \quad + \quad 5.54$$

$$\alpha' \quad 05 \quad 01 \quad 20.64$$

$$\log \tan \delta \quad 9.6749$$

$$\log S_0^2 \quad 0.8368$$

$$7.0534$$

$$\log \lambda_1 \quad 7.5651$$

$$\eta_1 \quad +0.0037$$

$$\eta_0 \quad -4.7381$$

$$\log \eta_1 \quad 0.24008$$

$$7.33115$$

$$\log \tan \delta - \delta_0 \quad 2.90893$$

$$S - \delta \quad -8.108$$

$$-13 \quad 30.8$$

$$E + 25 \quad 33 \quad 09.6$$

$$19 \quad 38.8$$

$$S_0 + 25 \quad 19 \quad 38.8$$

$$\text{Red} \quad 10 + 10.6$$

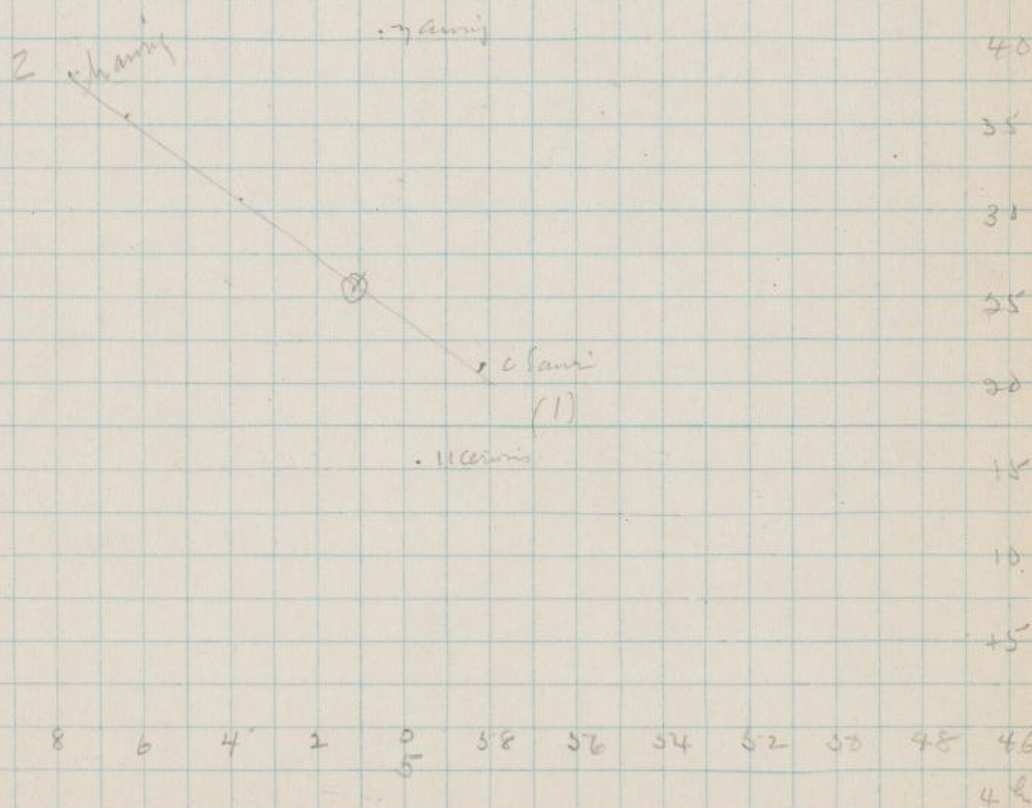
$$S' \quad 25 \quad 19 \quad 49.4$$

$$\begin{array}{r}
 1 \quad 04 \quad 58 \quad 09.799 \\
 \quad \quad \quad 04.422 \\
 \hline
 \quad \quad \quad + 5.377
 \end{array}$$

$$\begin{array}{r}
 21 \quad 28 \quad 26.82 \\
 \quad \quad \quad 15.14 \\
 \hline
 \quad \quad \quad + 11.68
 \end{array}$$

$$\begin{array}{r}
 (2) \quad 05 \quad 07 \quad 46.806 \\
 \quad \quad \quad 40.639 \\
 \hline
 \quad \quad \quad + 6.167
 \end{array}$$

$$\begin{array}{r}
 38 \quad 23 \quad 17.55 \\
 \quad \quad \quad 10.05 \\
 \hline
 \quad \quad \quad + 7.50
 \end{array}$$



11636.

Reduction to Apparent Place 9

$$H + \alpha_0 \quad 07 \quad 33.8$$

$$H \quad 02 \quad 32.5$$

$$\alpha_0 \quad 05 \quad 01.3$$

$$\alpha \quad 23 \quad 25.6$$

$$\alpha + \alpha_0 \quad 28 \quad 26.9$$

$$113^\circ 27'$$

$$66^\circ 43.5'$$

$$\delta_0 + 25 \quad 19.6$$

$$\log \cos \delta_0 \quad 9.9561$$

$$\log i \quad 0.7237$$

$$p(i) \quad 0.6804$$

$$\log \sin \delta_0 \quad 9.6312$$

$$\cos H + \alpha_0 \quad 9.5998$$

$$\log h \quad 1.2960$$

$$\sin(H + \alpha_0) \quad 9.9626$$

$$\sec \delta_0 \quad 0.0439$$

$$8.8239$$

$$\log \cos \quad 9.5975$$

$$q \quad 1.3668$$

$$\sin(\alpha + \alpha_0) \quad 9.9631$$

$$\tan \delta_0 \quad 9.6751$$

$$8.8239$$

$$\log g' \quad 0.9643$$

$$q' \quad 9.8289$$

$$\log h' \quad 0.5270$$

$$h' \quad 0.1264$$

$$2 \quad + 3.532$$

$$q \quad + 0.674$$

$$L \quad + 1.338$$

$$\text{Red} \quad + 5.544$$

$$g' \quad + 9.211$$

$$L' \quad - 3.365$$

$$l \quad + 4.791$$

$$\text{Red} \quad + 10.637$$

11636

Reduction to Apparent Place 9

$$H + x_0 \quad 07 \quad 338$$

$$H \quad 02 \quad 32.5$$

$$x_0 \quad 05 \quad 01.3$$

$$C_1 \quad 23 \quad 25.5$$

$$Q + x_0 \quad 28 \quad 26.8$$

$$113^\circ 27'$$

$$66^\circ 43.5'$$

$$\delta_0 + 25 \quad 19.6$$

$$\log \cos \delta_0 \quad 9.9561$$

$$\log i \quad 0.7237$$

$$p(ii) \quad 0.6804$$

$$\log \cos \quad 9.5975$$

$$q \quad 1.3668$$

$$\sin (Q+x) \quad 9.9631$$

$$\tan \delta_0 \quad 9.6751$$

$$8.8239$$

$$\log g' \quad 0.9648$$

$$g \quad 9.8288$$

$$z \quad +3.532$$

$$g \quad +0.674$$

$$l \quad +1.338$$

$$\text{Red} \quad +5.544$$

$$\log \sin \delta_0 \quad 9.6312$$

$$\cos H + x_0 \quad 9.8998$$

$$\log h \quad 1.2960$$

$$\sin (H+x_0) \quad 9.9624$$

$$\sec \delta_0 \quad 0.0439$$

$$8.8239$$

$$\log h' \quad 0.5270$$

$$h \quad 0.1264$$

$$g' \quad +9.216$$

$$h' \quad -3.385$$

$$i \quad +4.791$$

$$\text{Red} \quad +16.627$$

11636

Lunar Parallax.

10

$$\begin{array}{rcll}
 \alpha' & 05 & 01 & 20.64 \checkmark \\
 \theta & 02 & 11 & 30.50 \checkmark \\
 \theta - \alpha' & -02 & 49 & 50.14 \checkmark \\
 = & -42 & 27 & 32.10 \checkmark \\
 \frac{1}{2}(\alpha - \alpha') & - & 15 & 18.85 \checkmark \\
 (\theta - \alpha') - \frac{1}{2}(\alpha - \alpha') & -42 & 12 & 13.25 \checkmark
 \end{array}$$

$$\begin{array}{rcll}
 & 9.95727 & & \\
 \log \cos \frac{1}{2}(\alpha - \alpha') & 000000 & & \\
 \sec \theta - \alpha' - \frac{1}{2}(\alpha - \alpha') & 0.13032 & & \checkmark \\
 \log \tan \gamma & 0.08759 & & \checkmark
 \end{array}$$

$$\gamma + 50 \quad 44 \quad 20.8 \checkmark$$

$$\delta' + 25 \quad 19 \quad -49.4 \checkmark$$

$$\gamma - \delta' + 25 \quad 24 \quad 31.4$$

$$\begin{array}{rcll}
 & 9.82640 & & \\
 \log \sin \Pi & 8.20622 & & \checkmark \\
 \sin \gamma - \delta' & 9.63253 & & \checkmark \\
 \operatorname{cosec} \gamma & 0.11111 & & \checkmark \\
 \sin(\delta - \delta') & 7.77626 & & \checkmark
 \end{array}$$

$$\delta - \delta' + 20 \quad 32.2 \checkmark$$

$$\delta + 25 \quad 40 \quad 21.6 \checkmark$$

$$\gamma - \delta + 25 \quad 40 \quad 21.5 \checkmark$$

$$\begin{array}{rcll}
 O-C & & +0.1 & \\
 \text{Curr.} & & +0.2 & \\
 2^{\text{nd}} \text{ ord. ref.} & & 0.0 &
 \end{array}$$

$$\text{Lun. Corr.} \quad - \quad 0.1$$

$$\delta + 25 \quad 40 \quad 21.5$$

$$O-C \quad 0.0$$

$$\Pi \quad 55 \quad 16.4 \checkmark$$

$$\begin{array}{rcll}
 & 9.86913 & & \\
 \log \sin \Pi & 8.20622 & & \checkmark \\
 \log \sin(\theta - \alpha') & 9.82933 & & \checkmark \\
 \log \sec \delta' & 0.04514 & & \checkmark \\
 \sin(\alpha - \alpha') & 7.94984 & & \checkmark
 \end{array}$$

$$\alpha - \alpha' \quad -30 \quad 37.70$$

$$= -02 \quad 02.51 \checkmark$$

$$\alpha \quad 04 \quad 59 \quad 18.13 \checkmark$$

$$\gamma - \alpha \quad 04 \quad 59 \quad 17.02 \checkmark$$

$$\begin{array}{rcll}
 O-C & & +1.11 & \\
 \text{Curr.} & & -0.05 &
 \end{array}$$

$$\text{Lun. Corr.} \quad - \quad 0.02$$

$$\alpha - \quad 04 \quad 59 \quad 18.11$$

$$O-C \quad + \quad 1.09$$

17636

Lunar Parallax.

10

$$\begin{aligned}
 \alpha' & \\
 \theta & 02 \quad 11 \quad 30.5' \\
 \theta - \alpha' & \\
 = & -42' \quad 27 \quad 32.10' \\
 \frac{1}{2}(\alpha - \alpha') & - \quad 15 \quad 18.85' \\
 \frac{1}{2}(\alpha - \alpha') - \frac{1}{2}(\theta - \alpha') & -42 \quad 12 \quad 13.25'
 \end{aligned}$$

$$\begin{aligned}
 & 9.95727 \\
 \log \cos \frac{1}{2}(\alpha - \alpha') & 0.00000 \\
 \cos \frac{1}{2}(\alpha - \alpha') - \frac{1}{2}(\theta - \alpha') & 0.13032 \\
 \log \tan \frac{1}{2} & 0.08759
 \end{aligned}$$

$$Y = 50 \quad 44 \quad 20.8'$$

 δ'

$$Y - \delta' = 25 \quad 24 \quad 31.4$$

$$\begin{aligned}
 & 9.82640 \\
 \log \sin \Pi & 8.20622 \\
 \sin Y - \delta' & 9.63253 \\
 \cos \Pi & 0.11111 \\
 \sin(\delta - \delta') & 7.77626
 \end{aligned}$$

$$\delta - \delta' = 20' \quad 32.2'$$

$$\delta + 25' \quad 40 \quad 21.6'$$

$$\sin \delta + 25' \quad 40 \quad 21.5'$$

$$\begin{aligned}
 O-C & + 0.1 \\
 \text{Corr.} & + 0.2 \\
 2^{\text{nd}} \text{ ord. corr.} & 0.0
 \end{aligned}$$

$$\text{Err. Corr.} = 0.1$$

$$\delta + 25' \quad 40 \quad 21.5'$$

$$O-C = 0.0$$

$$\Pi = 53 \quad 16.4'$$

$$\begin{aligned}
 & 9.86913 \\
 \log \sin \Pi & 8.21622 \\
 \sin(\theta - \alpha') & 9.82935 \\
 \sec \delta & 0.04514 \\
 \sin(\alpha - \alpha') & 7.94984
 \end{aligned}$$

$$\alpha - \alpha' = 30 \quad 37.70'$$

$$= -02 \quad 02.51'$$

$$\alpha = 04 \quad 59 \quad 18.1'$$

$$\sin \alpha = 04 \quad 59 \quad 17.02'$$

$$\begin{aligned}
 O-C & + 1.1 \\
 \text{Corr.} & - 0.05
 \end{aligned}$$

$$\text{Err. Corr.} = 0.02$$

$$\alpha = 04 \quad 59 \quad 18.11'$$

$$O-C = + 1.09$$

11708

11

Star Measures.

1 18638 17430
 11.0 1812016 7970
 11.5 12 6065
 38 30
11.0522 11.0535

18272 18806
 1334244 1373059
 46 30
 72 06
11.4928 11.4924

2 17908 17612
 26.4 1449997 11021
 31.6 95 21
 08 12
26.3411 26.3409

17389 18214
 11836 1375057
 36 52
 89 8214
305553 30.5537

3 18071 18150
 31.9 8230 1799593
 3.9 30 91
 69 50
319839 31.9843

18545 17356
 887573 1704237
 71 32
 47 56
39674 3.9681

4 18874 16888
 17.4 1459496 1117980
 9.4 98 8180
 72 90
17.4277 17.4291

18530 18151
 1473638 1193328
 41 23
 32 53
93793 9.3776

Mean

1 18870 17332
 22.4 12430 13774
 14.7 30 74
 70 32
14.6440 14.6442

2 18695 17653
 23. 10760 15573
 14.8 6201 73
 4.7993 55
14.7934 14.7920

11708

11

Star Measures.

1 18638 17430
 11.0 1812016 7970
 11.5 12 6065
 38 30
11.0522 11.0535

18272 18808
 1334244 13738
 46 80
 72 06
114928 114924

2 17908 17612
 26.4 1449997 11021
 31.6 95 21
 08 12
26.3411 26.3409

17389 18214
 11836 13750
 36 52
 89 8214
305553 30.5537

3 18071 18150
 1.9 8230 1799593
 3.9 30 91
 69 50
319839 31.9843

18545 17356
 887573 17042
 71 32
 47 56
39674 3.9681

4 18874 16888
 7.4 1459496 1117980
 9.4 98 81
 72 90
17.4277 17.4291

18530 18151
 1473638 1193328
 40 23
 32 53
93793 9.3776

Moon

1
 22.4
 14.7

18870 17332
 1243067 13774
 80 74
 70 32
14.6440 14.6442

2
 23
 14.8

18695 17083
 1076001 15573
 6201 73
 14.7993 55
14.7934 14.7920

11708

12

3	1.7215	1.6242
23.3	135.82	98.8583
15.0	82	81
	15	42
	<u>23.8633</u>	<u>23.3641</u>

4
24
59

17660	17390
19430	351560607
40	08
60	92
<u>15.8225</u>	<u>15.8215</u>

5	1.7519	1.7470
24.0	16908	809094
16.0	08	9-8
	17	66
	<u>24.8611</u>	<u>24.0628</u>

6	1.8512	1.7470
24.1	17182	879798
16.5	82	99
	10	70
	<u>24.1330</u>	<u>24.1328</u>

7	1.8144	1.7790
24.0	1618082	9748
17.1	84	48
	44	90
	<u>17.1962</u>	<u>17.1958</u>

8	1.6573	1.7330
23.4	12760	1113233
18.0	60	34
	75	30
	<u>23.3814</u>	<u>23.3803</u>

11708

12

2 17215 16242
 23.3 13882 988583
 15.0 82 8183
 15 42
238633 238641

24.0
15.9

17660 17390
 19430 35 15606
 40 08
 60 92
158225 158215

24.0 17519 17470
 16.0 16908 809094
 08 98
 17 62
240611 240628

24.0 18512 17470
 16.5 17182 879792
 82 99
 10 70
241330 241328

24.0
17.1

18144 17796
 16280 82 9748
 84 48
 44 90
171962 171958

23.4 16573 17330
 18.0 12760 1113233
 60 34
 75 30
233814 233803

11708

Times etc.

13

Date Nov. 18 '16

Exp to Stars	09	34		09	46
" Moon	09	40	10.8	09	40 11.0
Clock fast		11	29.0		

H. Sid Time	09	28	41.9 ^v		
H. Long	04	44	31.05 ^v	$\phi = -1^{\circ} 25''$	
S. Sid Time	14	13	12.95 ^v		
" " M.N.	15	48	47.08 ^v		
Interval	22	24	25.87 ^v		
Reduction		03	40.25 ^v		
G.M.T.	22	20	45.62 ^v	22.3460 ^v	

From Naut. Alman.

R A

Decl.

Mean 22 ^h	10	52	25.47 ^v	+ 02	49	18.1 ^v
Motion 1 ^m			1.8426			- 13.231 ^v
" 20.7603			38.25 ^v		- 04	34.7 ^v
Tabular Place	10	53	03.72 ^v	+ 02	44	43.4 ^v

Moon's ap 23^d

934" = 11.3

$$\begin{array}{r} a = -502.4 \\ +24. \\ \hline -478.4 \end{array}$$

Parallax	55	09.4 ^v
Semi-diam	15	03.4 ^v
R		903.4
aug		+10.6 ^v
Dist		-0.8 ^v
R		713.2 ^v
R		1.9575 ^v
(1+a) R		-936 ^v
R		1.8639 ^v
R2		3.4741 ^v

11708

Times etc.

13

Date Nov. 18 '16

Exp to Star	09	34		09	46
" Moon	09	40	10.8	09	40 11.0
Clock fast		11	29.0		

H Sid June	09	28	41.9		
H Young	04	44	30.05		
S Sid June	14	13	12.95		
" " " M.N.	15	48	47.08		
Internal	22	24	25.87		
Reduction		13	40.25		
S. M.T.	22	20	45.62	22.3460	

From Naut. Alman.

R A

Ecl.

Moon 22.11.52	25.47	+12	49	18.1
Motion 1"	1.8426			-13.231
" 20.7603	38.25		-04	34.7
Tabular Place	03.72	+02	44	43.4

Moon ap 23^d

934" = 11.3

a = -502.4

+24

-478.4

Parallax	55	09.4
Semi-diam	15	03.4
R		903.4
ang		+10.6
Dist		-0.8
R		713.2
R		1.9575
(1+a) R		-936
R		1.8639
R 2		3.4741

ξ	η	ΔS	-5.73	$+0.9\eta$	-10
-11.55	-6.72	-50	$+66 = +16$	-6	$+10$
$+4.47$	$+13.33$	$+23$	$-25 = -2$	$+12$	$+10$
$+10.44$	-14.59	$+81$	$-59 = +22$	-13	$+9$
$\eta + 0.21$	-1.43	-1		-1	-12
		$\Delta\eta$	-5.83	$+1.6S$	$+8$
		-30	$+39 = +9$	-18	-9
		$+62$	$-77 = -15$	$+7$	-8
		-11.0	$+85 = -25$	$+17$	-8
			$+8.3$	-0	$+16$

$$\text{Corr. } \alpha = -0.04$$

$$\delta = +0.8$$

11718

Plate Center + Constants.

14

11.0528	11.4926	10	47	54.78	01	28	17.0
26.3410	30.5545	10	56	13.41	04	04	07.4
31.9841	3.9677	10	59	18.64	10	27	06.2
369.3779	71460148	332	43	26.83	31.05	59	30.6
23.1260	15.3383	10	54	28.94	01	59	50.2
22	18		-	34.90		+20	46.7
-1.7260	+2.6617	10	53	54.04			
31 ^s	466.5						
-34.90	1241.68						

Plate Center { A 10 53 54.04
B 02 20 31.9

$$\begin{array}{rclcl}
 X-S & +500X & -1.692 & +24X & -11403 \\
 +6045 & +5526 = 11571 & -194 & -11377 & +26 = 11403 \\
 -1315 & +13171 = 11856 & -516 & -11340 & +63 = 11403 \\
 -4599 & +15892 = 11393 & -67 & -11326 & +77 = 11403 \\
 22.2678 & +11134 & -279 & +53 & = 22.2183
 \end{array}$$

$$\begin{array}{rclcl}
 y-n & +13.6X & +5.34 & -8049 \\
 +.2092 & +5746 = 7838 & +150 & = 7988 & +61 = 8049 \\
 -.7749 & +15277 = 7528 & +358 & = 7886 & +162 = 8048 \\
 +5609 & +1984 = 7593 & +435 & = 8028 & +21 = 8049 \\
 16.5068 & +8253 & +303 & +87 & = 16.5662
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Tables } a = -0.9 & l = -3.5 & a-l = +2.6 & b+d = +2.0 \\
 -502.4 & = -505.3 & = +2.9 & = +3.6
 \end{array}$$

$$\begin{array}{rclcl}
 b-c & -501.3 & -501.8 & & +1.6
 \end{array}$$

11718

Plate Center - Cometary.

14

11.0528	11.4926	10 47	54.78	01 28	17.0
26.3410	30.5545	10 56	13.41	04 04	07.4
31.9841	3.9677	10 59	18.64	10 27	06.2
3693779	31460148	3132 43	26.83	3105 59	31.6
231260	153389	10 54	28.94	01 59	50.2
22	18	-	34.90	+20	46.7
-1.1260	+2.6617	10 53	54.04		
31 ^s	466.5				
-34.90	1241.68				

Plate Center { A 10 53 54.04
B 02 20 31.9

$$\begin{aligned}
 X-S &+ 500X & -1695 & + 2.4X - 11403 \\
 +6045 & +5526 = 11571 & -194 & -11377 + 26 = 11403 \\
 -1315 & +13171 = 11856 & -516 & -11340 + 63 = 11403 \\
 -4599 & +15892 = 11393 & -67 & -11326 + 77 = 11403 \\
 22.2678 & +11134 & -279 & +53 = 22.2183
 \end{aligned}$$

$$\begin{aligned}
 Y-T &+ 13.6X & +5.3Y - 8049 \\
 +2092 & +5746 & 7838 +150 = 7988 +61 = 8049 \\
 -7749 & +15277 = 7528 & +358 = 7886 +162 = 8048 \\
 +5609 & +1984 = 7593 & +435 = 8028 +21 = 8049 \\
 16.5068 & +8253 & +303 & +87 = 16.5662
 \end{aligned}$$

$$\begin{aligned}
 \text{Tables } a &= -0.9 & l &= -3.5 & a-l &= +2.6 & b+d &= +2.0 \\
 & -502.4 & & -505.3 & & +2.9 & & +3.6
 \end{aligned}$$

484
 10 50 33.74
 + 33.75
 33.71
 10 50 33.73
 + 49.37
 Prec
 10 51 23.10
 S
 A
 S-A

C 01 16 12.6
 12.8
 12.7
 01 16 12.7
 Prec
 - 05 06.2
 S 01 11 06.5
 S
 S-A

11708

Standard Coordinates

15

Cape No.	1479	mag	6.3	Cape No.	1495	mag	5.1	Cape No.	1500	mag	6.1
C	10	470	05.44	10	55	23.82		10	58	29.51	
q			05.46			23.86				29.57	
ε			05.43			23.79				29.54	
Mean	10	47	05.44	10	55	23.82		10	58	29.54	
Prec			+49.34			+49.59				+49.10	
α	10	47	54.78	10	56	13.41		10	59	18.64	
A	10	53	54.04	10	53	54.04		10	53	54.04	
α-A		-05	59.26		+02	19.37			+05	24.60	
Sin "			-359.22			+139.37				+324.57	
log "	2.5	553.6	✓	2.14	417	✓		2.5	1130	✓	
cos δ	9.99	986		9.99	891			9.99	999		
log S	1.0	6246	n	0.65	032			1.0	1853		
S ₀	-11.5	467	✓	+4.4	701	✓		+10.4	360	✓	
S ₁	-	0050		+0024				+0080			
S ₂	10.4	483		26.4	725			32.4	440		
Y	11.0	528		26.3	410			31.9	841		
X-S	+6.0	45		-1.3	15			-4.5	99		

C	+01	33	223	+04	09	15.8	0	32	15.4
q			21.7			16.3	0		15.7
ε			21.4			15.7			15.1
Mean	01	33	21.8	04	09	15.9	0	32	15.4
Prec	-	05	04.8	-	05	08.5	-	05	09.2
δ	01	28	17.0	04	04	07.4	0	27	06.2
Δ	02	20	31.9	02	20	31.9	02	20	31.9
S-Δ	-	52	14.9	+1	43	35.5	-01	53	25.7
tan "			-3135.1			+6217.4			-6808.2
log "	3.49	625	n	3.79	361		3.83	303	n
" n ₀	0.82	740	n	1.12	476		1.16	418	n
log tan δ	8.40	97	✓	8.85	21	✓	7.89	67	
" S ₀ ²	2.12	49		1.30	06		2.03	71	
" n ₁	7.58	80		7.20	61		6.98	72	
n ₀	-6.7	20.5		+13.3	278		-14.5	941	
n ₁	+0.0	03.9		+0.0	016		+0.0	009	
n	11.2	834		31.3	294		3.4	068	
q	11.4	926		30.5	545		3.9	677	

11708

Standard Coordinates

15

Cafe No. 1479 mg 6.3	Cafe No. 1495 mg 5.1	Cafe No. 1500 mg 6.1
C 10 470 05.44	10 55 23.82	10 58 29.51
q . 05.46	23.86	29.57
E . 05.43	23.79	29.54
mean 10 47 05.44	10 55 23.82	10 58 29.54
unc + 49.34	+ 49.59	+ 49.10
α 10 47 54.78	10 56 13.41	10 59 18.64
A 10 53 54.04	10 53 54.04	10 53 54.04
X-A - 05 59.26	+ 02 19.37	+ 05 24.60
sin - 359.22	+ 139.37	+ 324.57
log " 2.55536 ⁿ	2.14417	2.51130
cos 9.99986	9.99891	9.99999
log 1.06246 ⁿ	0.65032	1.01853

S ₀ -11.5467	+ 4.4701	+ 10.4360
S ₁ - 0050	+ .0024	+ .0080
S ₂ 10.4483	26.4725	32.4440
Y 11.0528	26.3410	31.9841
X-S + 6045	- 1315	- 4599

C + 01 33 22.3	+ 04 09 15.8	0 32 15.4
q 21.7	16.3	0 15.7
E 21.4	15.7	15.1
mean 01 33 21.8	04 09 15.9	0 32 15.4
prec - 05 04.8	- 05 08.5	- 05 09.2
δ 01 28 17.0	04 04 07.4	0 27 06.2
θ 02 20 31.9	02 20 31.9	02 20 31.9
S-E - 52 14.9	+ 43 35.5	- 04 53 20.7
tan - 3135.1	+ 6219.4	- 6808.2
log " 3.49625 ⁿ	3.79361	3.83303 ⁿ
" ₁₀ 0.82740 ⁿ	1.12476	1.16418 ⁿ
log tan δ 8.4097	8.8521	7.8967
" ₁₀ ² 2.1249	1.3006	2.1371
" ₁₀ 7.5880	7.2061	6.9872

γ_0 - 6.7205	+ 13.3278	- 14.5941
γ_1 + 0.0039	+ .0016	+ .0009
γ_2 1.2834	31.3294	33.4068
γ_3 11.4926	30.5545	39.677

11705

Mosaic Center

16.

-DX

1	22.2670	+0.0000	+3	0.0000	3.4790	+49
2	23.0000	+0.7330	+3	0.5878	3.4848	+106
3	23.3637	+1.0967	+3	1.2034	3.4814	+73
4	24.0000	+1.7330	+1	3.0036	3.4759	+18
5	24.0619	+1.7949	+1	3.2220	3.4812	+71
6	24.1329	+1.8659	+0	3.4816	3.4816	+75
7	24.0000	+1.7330	-1	3.0029	3.4750	+9
8	23.3808	+1.1138	-3	1.2399	3.4639	-102
					3.4741	

DY

1	14.6441	-1.8649	-3	3.4790	180° ✓
2	14.7927	-1.7163	-3	2.9469	157° ✓
3	15.0000	-1.5090	-3	2.2780	144°
4	15.8220	-0.6870	-1	0.4723	112
5	16.0000	-0.5090	-1	0.2592	107
6	16.5090	-0.0000	-0	0.0000	90
7	17.1960	+0.6870	+1	0.4721	68 ✓
8	18.0000	+1.4910	+3	2.2240	37
					Range 143

approx. Center

$$X = 24 \quad Y = 15.8220$$

$$17.1960$$

$$330.180$$

$$Y_0 = 16.5090$$

$$Y_{\min} = 14.6400$$

$$R = 1.8690$$

$$\text{Com } R = 1.8640$$

$$X_{\max} = 24.1329$$

$$\text{Plate Center} \left\{ \begin{array}{l} X_0 = 22.2670 \\ Y_0 = 16.5090 \end{array} \right.$$

10706

Mosaic Center

16.

AT

1	22 26 80	+0.0000	+3	0.0000	3.4790	+49
2	23.0000	+0.7330	+3	0.5878	3.4847	+106
3	23.3637	+1.0967	+3	1.2034	3.4814	+73
4	24.0000	+1.7330	+1	3.0036	3.4759	+13
5	24.0619	+1.7949	+1	3.2220	3.4812	+71
6	24.1329	+1.8659	+0	3.4816	3.4816	+75
7	24.0000	+1.7331	-1	3.0029	3.4790	+9
8	23.3808	+1.1138	-3	1.2399	3.4639	-102
					3.4741	

Dx

1	14.6444	-1.8649	-3	3.4790	1500
2	14.7927	-1.7163	-3	2.9469	1570
3	15.0000	-1.5090	-3	2.2780	1440
4	15.8220	-0.6870	-1	0.4723	112
5	16.0000	-0.5090	-1	0.2592	107
6	16.5090	-0.0000	-0	0.0000	90
7	17.1980	+0.6870	+1	0.4721	68
8	18.0000	+1.4910	+3	2.2240	37

Range 143

approx. Center

$x = 24$ $y = 15.8220$
 17.1980
 33.0480
 $y_0 = 16.5090$

$y_{min} = 14.6400$
 $R = 1.8690$
 $Com R = 1.8640$
 $x_{max} = 24.1329$

Plate Center { $x_0 = 22.2670$
 $y_0 = 16.5090$

Normals

1 - 0.08	+ 0.0.0	- 9 1.3
2 - 1.24	+ 77.3	- 18 1.1
3 - 1.65	+ 80.3	- 110.0
4 - 1.19	+ 31.8	- 12.4
5 - 0.92	+ 127.0	- 36.2
6 - 0	+ 139.0	- 0.0
7 + 1.19	+ 15.6	+ 6.2
8 + 1.65	- 113.0	- 152.0
+ 2.84	+ 471.0	+ 6.2
- 500	- 113.0	- 583.0
- 2.16	+ 358.0	- 576.8

- a	- b	- 39
+ 0	+ 17	+ 22
+ 17	+ 15	- 7
+ 26	+ 13	0
+ 41	+ 6	+ 8
+ 43	+ 5	+ 9
+ 45	+ 0	+ 6
+ 41	- 6	- 4
+ 27	- 13	- 25

11708

Conditional Equations

O-C $\leftarrow 17_{\text{con}}$

1	+ 0.00	+ 1.86	=	+ 49	+ 0.00	+ 98	=	+ 198	- 49	- 71
2	+ 0.73	- 1.81	=	+ 106	+ 11	+ 90	=	+ 101	+ 5	- 2
3	+ 1.10	- 1.51	=	+ 73	+ 17	+ 80	=	+ 97	- 24	- 24
4	+ 1.73	- 0.69	=	+ 18	+ 2.7	+ 36	=	+ 63	- 45	- 37
5	+ 1.79	- 0.51	=	+ 71	+ 2.9	+ 27	=	+ 56	+ 15	+ 24
6	+ 1.86	- 0.00	=	+ 75	+ 2.9	+ 0	=	+ 29	+ 46	+ 52
7	+ 1.73	+ 0.69	=	+ 4	+ 2.7	- 36	=	- 9	+ 18	+ 14
8	+ 1.11	+ 1.44	=	- 102	+ 1.7	- 79	=	- 62	- 48	- 65
9	+ 10.05	- 4.10							+ 84	- 158

$$15.69 - 2.16 = +358.0 + 10.05 \quad \text{Corr } 3.0$$

$$-2.16 + 12.13 = -576.8 - 4.10$$

$$+2.16 - 0.3 = +49.2 + 1.38$$

$$+11.83 = -527.6 - 2.72 \quad b = -44.6 - 123$$

$$15.69 = -96.5 + 358.0 + 261.5 \quad a = +16.6 + 0.61$$

$$\frac{P}{m} = .13$$

$$\frac{\sum v}{m} = -9.3$$

$$\frac{-9.3}{.13} = -71$$

$$\Delta R = -0.9$$

$$\text{Corr.} = +0.5$$

$$\text{True } \Delta R = -1.4$$

$$-2R = -3.92 \quad \Delta = -2R \text{ con} = -1.96 \quad \Delta C = 0 - 39$$

$$\Delta t = +0.45 + 9 \Delta \delta = +0.2$$

11708

Conditional Equations

O-C 17

1	+0.00	+1.86	=	+49	+0.00	+98	=	+49	-47
2	+1.73	-1.71	=	+102	+11	+90	=	+101	+5
3	+1.10	-1.51	=	+73	+17	+80	=	+97	-24
4	+1.73	-0.69	=	+18	+2.7	+36	=	+63	-45
5	+1.79	-0.51	=	+71	+29	+27	=	+56	+15
6	+1.86	-0.00	=	+75	+29	+0	=	+29	+46
7	+1.73	+0.69	=	+4	+27	-36	=	-9	+18
8	+1.11	+1.49	=	-102	+17	-79	=	-62	-48
9								+24	-158

$$15.69 - 2.16 = +358.0$$

Cur 30

$$-2.16 + 12.13 = -576.8$$

$$+2.16 + 0.3 = +49.2$$

$$+11.83 = -527.6$$

$$b = -44.6$$

$$15.69 = -96.81 + 358 = +261.5$$

$$a = +16.6$$

$$\frac{P}{n} = .13$$

$$\frac{\Sigma v}{n} = -9.3$$

$$\frac{-9.3}{.13} = -71$$

$$\Delta R = -0.9$$

11708

Moon Mean Position

18

$$\begin{array}{r} X_0 \quad 22.2670 \\ \quad \quad + 8 \\ \hline 22.2678 \end{array}$$

$$\begin{array}{r} Y_0 \quad 16.5090 \\ \quad \quad - 22 \\ \hline 16.5068 \end{array}$$

From Plate Constants

$$\begin{array}{r} X \quad 22.2183^{\vee} \\ \quad \quad 22 \\ \hline S \quad +.2183 \end{array}$$

$$\begin{array}{r} Y \quad 16.5662^{\vee} \\ \quad \quad 18 \\ \hline \end{array}$$

$$m_1 + m_0 - 1.4338^{\vee}$$

$$\begin{array}{l} \log S \quad 9.33905^{\vee} \\ \log \cos \delta_0 \quad 9.99969^{\vee} \\ \quad \quad 8.50724^{\vee} \\ \log \sin \delta \quad 0.83212^{\vee} \end{array}$$

$$\begin{array}{l} 7.0534 \\ \log \tan \delta \quad 8.5745^{\vee} \\ \log S^2 \quad 8.6781^{\vee} \\ \log m_1 \quad 4.3060 \end{array}$$

$$a - \mu \quad +06.79^{\vee}$$

$$m_1 \quad 0.0000$$

$$m_0 - 1.4338$$

$$A \quad 10 \quad 53 \quad 54.04^{\vee}$$

$$\log m_0 \quad 0.15649^m$$

$$m_0 \quad 10 \quad 54 \quad 0.83^{\vee}$$

$$7.33115^{\vee}$$

$$\text{Red} \quad +3.29^{\vee}$$

$$\log \tan \delta - \mu \quad 2.82534^m$$

$$\delta - \delta_0 - 668.9^{\vee}$$

$$\alpha' \quad 10 \quad 54 \quad 4.12^{\vee}$$

$$-11 \quad 0.8.9$$

$$\delta \quad 0.2 \quad 20 \quad 31.9$$

$$\delta_0 + 0.2 \quad 09 \quad 23.0$$

$$\text{Red} \quad - \quad 17.8$$

$$\delta' + 0.2 \quad 09 \quad 05.2$$

11708

Moon Mean Position

18

$$\begin{array}{r} X_0 \quad 22.2670 \\ + R \\ \hline 22.2678 \end{array}$$

$$\begin{array}{r} Y_0 \quad 16.5090 \\ - 22 \\ \hline 16.5068 \end{array}$$

From Plate Constants

$$\begin{array}{r} X \quad 22.2183 \\ 22 \\ \hline J \quad 4.2183 \end{array}$$

$$\begin{array}{r} Y \quad 16.5662 \\ 18 \\ \hline J \quad -1.4338 \end{array}$$

$$\begin{array}{l} \log S \quad 9.33905 \\ \log \cos \delta \quad 9.99968 \\ \log \sin \delta \quad 8.50724 \\ \log \sin \delta \quad 0.83212 \end{array}$$

$$\begin{array}{l} \log \tan \delta \quad 8.5745 \\ \log S_0 \quad 8.6781 \\ \log n \quad 7.3060 \end{array}$$

$$\lambda - \mu \quad +06.79'$$

$$\begin{array}{l} \mu_1 \quad 0.0000 \\ \mu_0 \quad -1.4338 \end{array}$$

$$A \quad 10 \quad 53 \quad 54.04'$$

$$\log n_0 \quad 0.15649$$

$$D_0 \quad 10 \quad 54 \quad 0.83'$$

$$7.33115$$

$$\log \tan \delta - \mu \quad 2.82534$$

$$Red \quad +3.29$$

$$\delta - \epsilon \quad 668.9$$

$$X' \quad 10 \quad 54 \quad 4.12$$

$$-17 \quad 08.9$$

$$R \quad 0.2 \quad 20 \quad 31.9$$

$$S_0 \quad 02 \quad 09 \quad 23.0$$

$$Red \quad - \quad 17.8$$

$$J' \quad +02 \quad 09 \quad 05.2$$

$$\begin{array}{r}
 1. \quad 10 \quad 44 \quad 54.089 \\
 \underline{50.638} \\
 + 3.459
 \end{array}$$

$$\begin{array}{r}
 +10 \quad 59 \quad 03.89 \\
 \underline{23.67} \\
 - 19.78
 \end{array}$$

$$\begin{array}{r}
 2. \quad 10 \quad 45 \quad 31.845 \\
 \underline{28.732} \\
 + 3.113
 \end{array}$$

$$\begin{array}{r}
 -15 \quad 45 \quad 23.73 \\
 \underline{12.88} \\
 - 10.85
 \end{array}$$

$$\begin{array}{r}
 3. \quad 10 \quad 56 \quad 16.685 \\
 \underline{13.381} \\
 + 3.304
 \end{array}$$

$$\begin{array}{r}
 +4 \quad 03 \quad 49.48 \\
 \underline{04 \quad 07.38} \\
 - 17.90
 \end{array}$$

$$\begin{array}{r}
 0.304 \\
 3.113 \\
 \hline
 .191
 \end{array}$$

54 Semi

28

22

17

12

+7

+2

-3

-8

-13

-18

x Semi

d Semi

+ 3.58
16.90

d Semi

2
V. Hyd

4 6 4 2 0 58 56 54 52 50 48 46 44 42 10 L

11788

Reduction to Apparent Place 19

$$H + \alpha' \quad 12 \quad 57.8$$

$$1940 \quad 27''$$

$$H \quad 02 \quad 03.8''$$

$$\delta_0 + \alpha' \quad 09.4$$

$$\alpha_0 \quad 10 \quad 54.0$$

$$G \quad 23 \quad 20.4''$$

$$G + \alpha' \quad 34 \quad 20.4 \quad 155 \quad 06$$

$$\log \cos \delta_0$$

$$9.9997''$$

$$\log 1$$

$$0.6492''$$

$$\log (1)$$

$$0.6489''$$

$$\log \sin \delta_0$$

$$8.5755''$$

$$\cos H + \alpha_0$$

$$9.9860''$$

$$\log h$$

$$1.3006''$$

$$\sin H + \alpha_0$$

$$9.3971''$$

$$\sec \delta_0$$

$$0.0003''$$

$$8.8239''$$

$$\log g' \quad 1.3332''$$

$$'' \quad g \quad 8.3996''$$

$$2 \quad +3.602''$$

$$g \quad +0.025''$$

$$h \quad -0.333''$$

$$\text{Red} \quad +3.294''$$

$$\log g'$$

$$9.8621''$$

$$h$$

$$9.5219''$$

$$g' - 21.540''$$

$$h' - 0.728''$$

$$i \quad +4.456''$$

$$\text{Red} \quad -17.812''$$

11708

H + x 12 57.8

H 02 03.8

x 10 54.0

G 23 26.4

G + x 34 20.4

log cos C + x 9.9578

log g 1.3756

log G + x 9.6243

tan δ_0 8.5758

8.8239

log g' 1.3332

g 8.3994

+ 3.602

- 0.025

+ 0.333

Red + 3.294

Reduction to Apparent Place 19

1940 27"

 $\delta_0 + 0.2$ 99.4log cos δ_0 9.9997

log 1 0.6472

log 11 0.6489

log sin δ_0 8.5758

cos H + x 9.9860

log h 1.3006

sin H + x 9.3971

sec δ_0 0.0003

8.8239

log h' 9.8621

h 9.5219

g' - 21.540

h' - 0.728

+ 4.456

Red - 17.812

11708

Lunar Parallax.

20

$$\begin{array}{rcl}
 \alpha' & 10 & 54 \quad 04.12 \checkmark \\
 \theta & 09 & 28 \quad 41.90 \checkmark \\
 \alpha - \alpha' & -1 & 25 \quad 22.22 \checkmark \\
 = & -21 & 20 \quad 33.30 \checkmark \\
 1/2(\alpha - \alpha') & -10 & 10 \quad 26.03 \checkmark \\
 \theta - \alpha' - 1/2(\alpha - \alpha') & 21 & 13 \quad 07.27 \checkmark
 \end{array}$$

$$\begin{array}{rcl}
 & & 9.95727 \checkmark \\
 \log \cos 1/2(\alpha - \alpha') & & 0.00000 \checkmark \\
 \sec(\theta - \alpha' - 1/2(\alpha - \alpha')) & & 0.03048 \checkmark \\
 \log \tan \gamma & & 9.98775 \checkmark
 \end{array}$$

$$\gamma \quad 44 \quad 11 \quad 31.2 \checkmark$$

$$\delta' \quad 02 \quad 09 \quad 05.2$$

$$\gamma - \delta' \quad 42 \quad 02 \quad 26.0$$

$$\begin{array}{rcl}
 & & 9.82640 \\
 \log \sin \pi & & 8.20530 \checkmark \\
 \sin \gamma - \delta' & & 9.82585 \checkmark \\
 \operatorname{cosec} \gamma & & 0.15672 \checkmark \\
 \sin(\theta - \delta') & & 8.01427 \checkmark
 \end{array}$$

$$\theta - \delta' \quad +35 \quad 31.6 \checkmark$$

$$\delta \quad 02 \quad 44 \quad 36.8$$

$$\text{Eph } \delta \quad 02 \quad 44 \quad 43.4 \checkmark$$

$$O-C \quad - \quad 6.6 \checkmark$$

$$\begin{array}{rcl}
 \text{curr.} & + & 0.8 \\
 \text{2nd ord. ref.} & + & 0.0
 \end{array}$$

$$\text{Lun. Cor.} \quad - \quad + \quad 0.2$$

$$\delta - \quad + \quad 02 \quad 44 \quad 37.0$$

$$O-C = \quad - \quad 06.4$$

$$\pi \quad 55 \quad 09.4 \checkmark$$

$$9.86413$$

$$\log \sin \pi \quad 8.20530 \checkmark$$

$$\sin(\theta - \alpha') \quad 9.56104 \checkmark$$

$$\sec \delta' \quad 0.00050 \checkmark$$

$$\sin(\alpha - \alpha') \quad 7.63597 \checkmark$$

$$\alpha - \alpha' \quad - \quad 14 \quad 52.06 \checkmark$$

$$- \quad - \quad 59.47 \checkmark$$

$$\alpha' \quad 10 \quad 53 \quad 04.65 \checkmark$$

$$\text{Eph } \alpha \quad 10 \quad 53 \quad 03.72 \checkmark$$

$$O-C \quad + \quad 0.93 \checkmark$$

$$\text{curr.} \quad - \quad 0.04$$

$$\text{Lun. Cor.} \quad - \quad 0.04$$

$$\alpha - \quad 10 \quad 53 \quad 04.61$$

$$O-C = \quad + \quad 0.89$$

Lunar Parallax.

20

α' 10 54 04.12 ✓
 θ .04 28 41.90 ✓
 $\theta - \alpha'$ -1 20 22.22
 $=$ -21 20 33.30
 $\frac{1}{2}(\alpha - \alpha')$ - 17 26 03
 $\theta - \delta'$ - 21 13 07.27

9.95727
 $\log \cos \frac{1}{2}(\alpha - \alpha')$ 0 0 0 0 0
 $\sec \frac{1}{2}(\alpha - \alpha')$ 0 0 3 0 4 8
 $\log \tan \frac{1}{2} \gamma$ 9.98175
 γ 44 11 31.2

δ' 02 09 05.2
 $\gamma - \delta'$ 42 02 26.0

9.82640
 $\log \sin \Pi$ 8.20530 ✓
 $\sin \gamma - \delta'$ 9.82585 ✓
 $\cos \gamma$ 0.15672
 $\sin \delta - \delta'$ 8.01427 ✓

$\delta - \delta'$ 35 31.6 ✓

δ 02 44 36.8

$\text{eph } \delta$ 02 44 43.4 ✓

$\delta - \epsilon$ - 6.6 ✓
 curr + 0.8
 2nd ord. up + 0.0
 2nd corr + 0.2

$\delta -$ + 02 44 37.0

$\delta - \epsilon -$ - 06.4

Π 55 09.4 ✓

9.86913

$\log \sin \Pi$ 8.20530 ✓
 $\sin \theta - \alpha'$ 9.56104 ✓
 $\sec \delta$ 0 0 0 0 50
 $\sin(\alpha - \alpha')$ 7.63597 ✓

$\alpha - \alpha' -$ 14 52.06

- 59.47 ✓

α' 10 53 04.65

$\text{eph } \alpha$ 10 53 03.72 ✓

$\alpha - \epsilon$ + 0.93
 curr - 0.04

2nd corr - 0.04

$\alpha -$ 10 53 04.61

$\alpha - \epsilon -$ + 0.89

11709

21

Star Measures.

+ 16718

11.1 15698

11.5 98

20

11.1020

11.1040

2 16018

26.4 1220607

80.6 08

18

26.3811

18392

1221615

14

92

26.3823

16070"

1126059

58

70

11.4811

18676

1319997

45

76

31.5479

17000

1179900

01

00

11.4800

18006

1346267

72

00

30.5465

3 16649

32.0 1627377

3.9 81

45

32.0372

18421

880001

02

21

32.0380

16160

648885

82

60

3.9675

18780

1844034

38

80

3.9659

Moon

1 18439

6.228 1570607

14.3 08

37

2731

18439

1570607

08

37

14.2731

16048

878990

91

48

14.2742

2 18439

23 1570607

14.3 08

37

2731

18978

1616263

64

72

14.2814

16312

913334

35

12

14.2822

3 18439

24 1570607

14.3 08

37

2731

18568

1143739

41

62

14.7124

16467

13580

80

61

14.7115

11709

21

Star Measures.

L 16718

1.1 15698

1.5 98

20

111020

= 16018

1.4 1220607

1.6 08

1.8

263811

16528

7568

68

28

111040

18392

12216.5

14

92

263828

16649

2.0 1627377

1.9 81

45

320372

18820

880001

02

21

320380

16070"

1126059

5859

70

114811

18676

1319997

45

76

315479

179846

117990

01

00

114800

18006

134626

726

00

315465

16160

648825

82

60

39675

18780

1844034

3834

80

39659

Moon

L 12437

228 157067

143 08

37

2731

18439

1570607

08

37

142731

16048

878990

91

48

142742

18978

1616263

64

72

142814

16312

913334

35

12

142822

18568

1143739

41

62

147124

16467

13580

80

61

147115

1
4
34
15
5
24
16
6
24
16
7
24
17
8
24
17

11709

Moon

22

4	16980	16738
243	1422827	950805-
15	26	02
	80	38
	<u>24.2753</u>	<u>24.2767</u>

5	16512	16742
246	9901	1334243
16	01	44
	12	38
	<u>24.6611</u>	<u>24.6603</u>

6	16522	16740
247	983432	1341216
162	30	20
	18	36
	<u>24.6687</u>	<u>24.6676</u>

7	16518	16739
244	1195253	1128687
17.8	54	88
	14	32
	<u>24.4563</u>	<u>24.4552</u>

8	17238	16228
24	1157075	1190603
17.5	80	00
	34	22
	<u>17.5661</u>	<u>17.5678</u>

1
4
24
125
24
166
24
167
24
178
24
17

11709

Moon

4	16980	16738
24.3	1422827	950805-
15	26	02
	80	38
	<u>24.2753</u>	<u>24.2767</u>

5	16512	16742
246	9901	13342
16	01	44
	12	38
	<u>24.6611</u>	<u>24.6613</u>

6	16522	16740
247	983432	1341216
16.2	30	20
	18	36
	<u>24.6687</u>	<u>24.6676</u>

7	16518	16739
24.4	1195253	1128687
17.0	54	88
	14	32
	<u>24.4563</u>	<u>24.4552</u>

8	17238	16228
24	1157275-	11906
17.5	80	00
	34	22
	<u>17.5661</u>	<u>17.5678</u>

11709

Times etc

23

Date Nov. 18

Exp. & Stars	09	48		10.	00
" " Moon	09	53	40.6 ^v	09	53 40.8
Clock fast		11	29.0		

H. Sid. Time	09	42	11.7 ^v	$\odot - 1^h 11^m$
H. Long	04	44	31.05 ^v	
L. Sid. Time	14	26	42.75 ^v	
L. Sid. Time M.H.	15	48	47.08 ^v	
Interval	22	37	55.67 ^v	
Reduction		03	42.46	
G. M. T.	22	34	13.21 ^v	22 ^h 57 ^m 03 ^s 4

From Naut. Alman.		RA	Decl
Moon 22 ^h	10	52 25.47 ^v + 02	49 18.1 ^v
Motion 1 ^m		1.8426 ^v	- 13.233 ^v
" 34 ^m 22017		01 03.05 ^v	- 07 32.8 ^v
Tabular Place	10	53 28.52 ^v 02	41 45.3 ^v

Moon's Age 23^d

934" = 11.5

$$\begin{aligned} a &= 502.6 \\ &+ 24 \\ &- 478.6 \end{aligned}$$

Parallax	55	09.68 ^v
Semi diam	15	03.5 ^v
P		903.5 ^v
Aug.		10.8 ^v
Dist 55'		- 0.9 ^v
P		913.4 ^v
P		1.9580 ^v
P + a/P		- 937 ^v
P		1.8643 ^v
P 2		3.4756 ^v

11709

Junes etc

23

Date Mon. 18

Exp & Stars	09	48		10	06	
" " Moon	09	53	40.6	09	53	40.8
Clock fast		11	29.0			

H. Sid June	09	42	11.7
H. Long	14	44	31.05
S. Sid June	14	26	42.75
S. Sid June M	15	48	47.08
Interval	22	37	55.67
Reduction		03	42.46
S. M.T.	22	34	13.21

E - - 1^h 11^m22^h 57^m 13.4

From Naut. Alman.

		RA.	Decl
Moon 22 ^h	10	52 25.47 +0.2	49 18.1
Moon 1 ^h		0 1.8426	-13.233
" 34 ^h 22017		01 13.05	-07 32.8
Fabular Place	10	53 28.52 0.2	41 45.3

Moon's Age 23^d

934" = 11.5

$$\begin{array}{r} 2 = 502.6 \\ + 24 \\ - 478.6 \end{array}$$

Parallax	55	09.68
Semi diam	15	03.5
R		903.5
Aug		10.8
Dur 55		- 0.9
R		913.4
R		1.9580
(1+4) R		- 937
R		1.8643
R 2		3.4756

11709

Plate Constants.

24

X	11.1030	26.3817	32.0376
S	10.4483	26.4725	32.4440
X-S	+65.47	-0.908	-4064

y	11.4806	30.5472	3.9667
n	11.2834	31.3294	3.4068
y-n	+1972	-7822	+5599

X-S	+500X	-11.88	+2.6X	-11991
+6547	+5551	= 12098	-135	= 11963
+8908	+13191	= 12283	-360	= 11923
+4064	+16019	= 11955	47	= 11908
22.8021	+11401	-1902	+59	= 22.7300

y-n	+500y	+8.6X	+6.7X	-7884
+1972	+5740	= 7712	+95	= 7807
+7822	+15274	= 7452	+227	= 7679
+5599	+1983	= 7582	+275	= 7857
16.1380	+8069	+1962	+108	= 16.1869

Tables	a = -0.9	c = -36	a - c = +2.7	b + d = +1.7
	-502.6	-5067	= +4.1	+3.2
	c - a	-503.1		+1.5

11709

Plate Constants.

24

X	11.1030	26.3817	32.0376
3	10.4483	26.4725	32.4440
X-S	+6547	-0.908	-4064

y	11.4806	30.5472	-3.9667
y	11.2834	31.3294	3.4068
y-n	+1972	+7823	+5599

X-S	+500X	-11.85	+2.6X	-11991
+6547	+5551 = 12198	-135 = 11963	+29 = 11992	
-1918	+13192 = 12283	-300 = 11923	+68 = 11991	
-4164	+16119 = 11955	47 = 11908	+83 = 11991	
22.8021	+11401	-190	+59 = 22.7300	

y-n	+500Y	+8.5Y	+6.7Y	-7884
+1972	+5740 = 7712	+95 = 7807	+77 = 7884	
+7822	+15274 = 7452	+227 = 7679	+205 = 7884	
+5599	+1983 = 7582	+275 = 7857	+26 = 7883	
16.1380	+8069	+196	+108 = 16.1569	

Tables	a = -0.9	c = -36	a - c = +2.7	b + d = +1.7
	-502.6	-506.7	= +4.1	+3.2

11709

Moon Center

25

	x	$x - x_0$	$(x - x_0)^2$	$(y - y_0)^2$	$y - y_0$	
1	22.8030	+0.0000	+3	0.0000	3.4809	+ 53
2	23.0000	+0.1970	+3	0.0389	3.4892	+ 136
3	24.0000	+1.1970	+3	1.4335	3.4707	- 49
4	24.2760	+1.4730	+2	2.1703	3.4681	- 75
5	24.6607	+1.8577	+0	3.4511	3.4704	- 52
6	24.6682	+1.8652	+0	3.4793	3.4793	+ 37
7	24.4557	+1.6527	-1	2.7310	3.4725	- 31
8	24.0000	+1.1970	-3	1.4321	3.4724	- 32
					3.4756	

y

1	14.2736	-1.8654	-3	3.4809	180° ✓
2	14.2818	-1.8572	-3	3.4503	174°
3	14.7120	-1.4270	-3	2.0372	140°
4	15.0000	-1.1390	-2	1.2978	128°
5	16.0000	-0.1390	-0	0.0193	94
6	16.1390	-0.0000	-0	0.0000	90
7	17.0000	+0.8610	+1	0.7415	63 ✓
8	17.5670	+1.4280	+3	2.0403	48 ✓

Range 140°

$$x = 24 \quad y = 14.7120$$

$$17.5670$$

$$322790$$

$$y_0 = 16.1395$$

$$y_{\min} = 14.2736$$

$$R = 1.8658$$

$$\text{Com } R = 1.8643$$

$$x_{\max} = 24.6682$$

$$\text{Moon Center} \begin{cases} x_0 = 22.8030 \\ y_0 = 16.1390 \end{cases}$$

11709

Moon's Center.

25

	x	$x - x_0$	$x - x_0/2$	$+(x - x_0)^2$	$0 - C$	
1	22.8030	+0.0000	+3	0.0000	3.4819	+ 53
2	23.0000	+0.1990	+3	0.0389	3.4892	+ 136
3	24.0000	+1.1970	+3	1.4335	3.4707	- 49
4	24.2760	+1.4731	+2	2.1703	3.4681	- 75
5	24.6667	+1.8577	+0	3.4511	3.4704	- 52
6	24.6682	+1.8652	+0	3.4793	3.4743	+ 37
7	24.4557	+1.6527	-1	2.7310	3.4725	- 31
8	24.0000	+1.1971	-3	1.4321	3.4724	- 32
					3.4758	

4

1	14.2736	-1.8654	-3	3.4809	1800
2	14.2818	-1.8572	-3	3.4503	1740
3	14.7120	-1.4270	-3	2.1372	1400
4	15.0000	-1.1391	-2	1.2978	1280
5	16.0000	-0.1391	-0	0.0193	94
6	16.1390	-0.0000	-0	0.0000	90
7	17.0000	+0.8618	+1	0.7415	63
8	17.5670	+1.4280	+3	2.0403	40

Range 1400

$$x = 24 \quad y = 14.7120$$

$$17.5670$$

$$322190$$

$$y_0 = 16.1395$$

$$y_{min} = 14.2736$$

$$R = 1.8658$$

$$C_{min} R = 1.8643$$

$$x_{max} = 24.6682$$

$$\text{Moon Center} \left\{ \begin{array}{l} x_0 = 22.8030 \\ y_0 = 16.1390 \end{array} \right.$$

Normals.

1 - 0.00	+ 00	- 93.5
2 - 0.37	+ 27.2	- 256.3
3 - 1.72	- 58.8	+ 70.1
4 - 1.68	- 110.0	+ 85.4
5 - 0.26	- 96.7	+ 7.3
6 - 0.00	+ 69.0	- 0.0
7 + 1.42	- 51.0	- 26.6
8 + 1.72	- 38.3	- 45.8
+ 314	+ 96.2	+ 162.8
- 4.03	- 354.8	- 422.2
- 0.89	- 258.6	- 259.4

- 47

- a	- b	+ AC
+ 0	+ 24	- 23
+ 6	+ 24	- 17
+ 36	+ 19	+ 6
+ 44	+ 15	+ 12
+ 51	+ 1	+ 5
+ 51	+ 0	+ 4
+ 49	- 11	- 9
+ 36	- 19	- 30

11709

- Conditional Equations

1	+0.00	-1.86 = +53	-0.0	+39	+39	+14	-9
2	+0.20	-1.86 = +136	-4	+3.9	+35	+101	+84
3	+1.20	-1.43 = -49	-23	+30	+7	-56	-50
4	+1.47	-1.14 = -75	-28	+24	-4	-71	-5.9
5	+1.86	-0.14 = -52	-34	+3	-31	-21	-16
6	+1.86	-0.00 = +37	-34	+0	-34	+71	+75
7	+1.65	+0.86 = -31	-31	-18	-49	-18	-27
8	+1.20	+1.43 = -32	-23	-30	-53	+21	-9
	+9.44	-4.14			+207	-166	

av. 47

$$14.74 - 0.89 = -258.6 + 9.44$$

$$-0.89 + 13.07 = -259.4 - 4.14$$

$$+0.89 - 0.05 = -15.77 + 0.57$$

$$+13.02 = -275.17 - 3.57$$

$$t = -21.1 - 0.27$$

$$14.74 = -258.6 - 18.7 = -277.3$$

$$a = -18.8 + 0.64$$

$$\frac{p}{n} = +.11$$

$$\frac{\sum r}{n} = +5$$

$$\frac{+5}{.11} = +44$$

$$\Delta R = +0.5$$

$$\text{corr.} + 0.6$$

$$\text{true } \Delta R = 0.1$$

$$-2R = -3.92 \quad A = -2R_{\text{corr}} - 2.35 = -47.25$$

$$At = +0.64 \quad As = +0.3$$

$$Aa = -1.58 \quad Ax = -0.05$$

1709

Conditional Equations

26

1	+ 0.00	- 1.86 = +53	- 000 + 39	+ 39	+ 14
2	+ 0.20	- 1.86 = +136	- 04 + 39	+ 35	+ 101
3	+ 1.20	- 1.43 = - 49	- 28 + 30	+ 7	- 56
4	+ 1.47	- 1.14 = - 75	- 28 + 24	- 4	- 71
5	+ 1.86	- 0.14 = - 52	- 34 + 3	- 31	- 21
6	+ 1.86	- 0.00 = +37	- 34 + 0	- 34	+ 71
7	+ 1.85	+ 0.86 = - 31	- 31 - 18	- 49	- 18
8	+ 1.20	+ 1.43 = - 32	- 23 - 30	- 53	+ 21
					+ 207 - 166
					av. 47

$$14.74 - 1.89 = -258.6$$

$$-0.89 + 13.07 = -259.4$$

$$+1.89 - 0.05 = -15.77$$

$$+13.12 = -275.17$$

$$b = -21.1$$

$$14.74 = -258.6 - 18.7 = -277.3$$

$$a = -18.8$$

$$\frac{p}{m} = +.11$$

$$\frac{\Sigma x}{n} = +5$$

$$\frac{+5}{.11} = +44$$

$$\Delta R = +0.5$$

11709

Moon's Mean Position

27

$$\begin{array}{r} X_0 \quad 22.8030 \checkmark \\ \quad \quad - 9 \\ \hline 22.8021 \checkmark \end{array}$$

$$\begin{array}{r} 40 \quad 16.1390 \checkmark \\ \quad \quad - 10 \\ \hline 16.1380 \checkmark \end{array}$$

From Plate Constants.

$$\begin{array}{r} \Sigma \quad 22.7300 \\ \quad 22 \\ \hline + .7300 \end{array}$$

$$\begin{array}{r} 16.1869 \\ \quad 1.8 \\ \hline - 1.8131 \end{array}$$

$$\begin{array}{r} \log S_0 \quad 9.86332 \checkmark \\ \log \cos \delta_0 \quad 9.99971 \checkmark \\ \quad \quad 8.50724 \checkmark \\ \log \sin \alpha - A \quad 1.35637 \checkmark \end{array}$$

$$\begin{array}{r} \log \tan \delta \quad 8.5643 \checkmark \\ + S_0 \quad 9.7266 \checkmark \\ \quad \quad 7.0534 \\ \log n' \quad 5.3443 \checkmark \end{array}$$

$$\alpha - A \quad + 22.72 \checkmark$$

$$n_1 \quad 0.0000$$

$$n_0 \quad 1.8131$$

$$A \quad 10 \quad 53 \quad 54.04$$

$$\log n_0 \quad 0.25842 \checkmark$$

$$\alpha_0 \quad 10 \quad 54 \quad 16.76 \checkmark$$

$$\log \tan \delta - \delta' \quad 2.92727 \checkmark$$

$$\text{Red.} \quad + 3.29 \checkmark$$

$$\delta - \delta' \quad - 845.8 \checkmark$$

$$- 14 \quad 05.8 \checkmark$$

$$q' \quad 10 \quad 54 \quad 20.05 \checkmark$$

$$\delta \quad 02 \quad 20 \quad 31.9 \checkmark$$

$$\delta_0 \quad 02 \quad 06 \quad 26.1 \checkmark$$

$$\text{Red} \quad - 17.8 \checkmark$$

$$\delta' \quad 02 \quad 06 \quad 08.3 \checkmark$$

$$\text{Corr.} \quad + 0.0$$

18709

Mean Mean Position

27

$$\begin{array}{r} X_0 \quad 22.8030 \\ \quad \quad - 9 \\ \hline 22.8021 \end{array}$$

$$\begin{array}{r} 40 \quad 16.1390 \\ \quad \quad - 10 \\ \hline 16.1380 \end{array}$$

From Plate Constants.

$$\begin{array}{r} \Sigma \quad 22.7300 \\ \quad \quad 22 \\ \hline + 7300 \end{array}$$

$$\begin{array}{r} 16.1869 \\ \quad \quad 18 \\ \hline - 1.8131 \end{array}$$

$$\begin{array}{r} \lg S_0 \quad 9.86332 \\ \lg \cos \delta_0 \quad 9.99971 \\ \quad \quad 8.51724 \\ \lg S_0 \sin \alpha - \mu \quad 1.35637 \end{array}$$

$$\begin{array}{r} \lg \tan \delta \quad 8.5643 \\ \lg \sin \delta \quad 9.7266 \\ \quad \quad 7.0534 \\ \lg \mu \quad 5.3443 \end{array}$$

$$\alpha - \mu \quad + 22.72$$

$$\mu \quad 0.0000$$

$$A \quad 10 \quad 53 \quad 54.04$$

$$\mu_0 \quad 1.8131$$

$$\lg \mu_0 \quad 0.25842$$

$$\alpha_0 \quad 10 \quad 54 \quad 16.76$$

$$7.33115$$

$$\lg \tan \delta - \alpha \quad 2.92727$$

$$\text{Red.} \quad + 3.29$$

$$S - \alpha \quad - 845.8$$

$$- 14 \quad 05.8$$

$$A' \quad 10 \quad 54 \quad 20.05$$

$$R \quad 02 \quad 20 \quad 31.9$$

$$S_0 \quad 002 \quad 06 \quad 26.1$$

$$\text{Red} \quad - 17.8$$

$$S' \quad 02 \quad 06 \quad 08.3$$

$$\text{Cur} \quad - 0$$

11709

Lunar Parallax

29

$$\alpha \quad 10 \quad 54 \quad 20.05^\circ$$

$$\theta \quad 09 \quad 42 \quad 11.7^\circ$$

$$\theta - \alpha' = -01 \quad 12 \quad 08.35^\circ$$

$$= -18 \quad 02 \quad 05.25^\circ$$

$$\frac{1}{2}(\alpha - \alpha') = -06 \quad 19.45^\circ$$

$$\frac{1}{2}(\alpha - \alpha') - \frac{1}{2}(\theta - \theta') = -17 \quad 55 \quad 45.80^\circ$$

$$9.95727^\circ$$

$$\log \cos \frac{1}{2}(\alpha - \alpha') = 9.99999^\circ$$

$$\sec \frac{1}{2}(\alpha - \alpha') = 0.02162^\circ$$

$$\log \tan \gamma = 9.97888^\circ$$

$$\gamma \quad 43 \quad 36 \quad 26.4^\circ$$

$$\delta' \quad 02 \quad 06 \quad 08.3^\circ$$

$$\chi - \delta' \quad 41 \quad 30 \quad 18.1^\circ$$

$$9.82640^\circ$$

$$\log \sin \pi = 8.20537^\circ$$

$$\sin(\chi - \delta') = 9.82130^\circ$$

$$\csc \chi = 0.16133^\circ$$

$$\sin \delta - \delta' = 8.01440^\circ$$

$$\delta - \delta' \quad +35 \quad 32.2^\circ$$

$$\delta \quad 02 \quad 41 \quad 40.5^\circ$$

$$\rho \delta \quad 02 \quad 41 \quad 45.3^\circ$$

$$O-C \quad - \quad 4.8$$

$$\text{curr.} \quad +0.8$$

$$2 \text{nd ord. ref.} \quad +0.0$$

$$\text{Lun. Corr} \quad +0.3$$

$$\delta = +02 \quad 41 \quad 40.8$$

$$O-C \quad -4.5$$

$$\pi \quad 55 \quad 89.68^\circ$$

$$9.86913$$

$$\log \sin \pi = 8.20537$$

$$\sin(\theta - \alpha') = 9.49079^\circ$$

$$\sec \frac{1}{2}(\theta - \theta') = 0.0048^\circ$$

$$\sin(\alpha - \alpha') = 7.56577^\circ$$

$$(\alpha - \alpha') = 12' \quad 38.91^\circ$$

$$= -50.60^\circ$$

$$\alpha \quad 10 \quad 53 \quad 29.45^\circ$$

$$\rho \alpha \quad 1.0 \quad 53 \quad 28.52^\circ$$

$$O-C \quad +0.93^\circ$$

$$\text{curr.} \quad -0.04$$

$$\text{Lun. Corr} \quad -0.05$$

$$\alpha = 10 \quad 53 \quad 29.40$$

$$O-C \quad +0.88$$

11709

Lunar Parallax

29

$$\begin{array}{rcl}
 \alpha & 10 & 54 \quad 20.05 \\
 \theta & 09 & 42 \quad 11.7 \\
 \theta - \alpha' & -01 & 12 \quad 08.35 \\
 = & -18 & 02 \quad 15.25 \\
 \frac{1}{2}(\alpha - \alpha') & & -06 \quad 19.45 \\
 \frac{1}{2}(\alpha - \alpha') - \frac{1}{2}(\theta - \theta') & 19 & 55 \quad 45.80
 \end{array}$$

$$\begin{array}{rcl}
 \log \cos \frac{1}{2}(\alpha - \alpha') & 9.95727 \\
 \log \sin \frac{1}{2}(\theta - \theta') & 9.99999 \\
 \log \tan \frac{1}{2}(\alpha - \alpha') & 9.97888
 \end{array}$$

$$Y \quad 43 \quad 36 \quad 26.4$$

$$\delta' \quad 02 \quad 06 \quad 08.3$$

$$X - \delta' \quad 41 \quad 30 \quad 18.7$$

$$\begin{array}{rcl}
 \log \sin \Pi & 9.82640 \\
 \log \sin \Pi & 8.20537 \\
 \sin(\theta - \delta') & 9.82130 \\
 \cos \alpha & 0.16133 \\
 \sin \delta - \delta' & 8.01440
 \end{array}$$

$$\delta - \delta' \quad + 35 \quad 32.2$$

$$\delta \quad 02 \quad 41 \quad 40.5$$

$$\text{Eph } \delta \quad 02 \quad 41 \quad 45.3$$

$$O-C \quad - \quad 4.8$$

$$\text{curr} \quad + 0.8$$

$$\text{2nd ord. ref.} \quad + 0.0$$

$$\text{Inv. Corr.} \quad + 0.3$$

$$\delta \quad + 02 \quad 41 \quad 40.8$$

$$O-C \quad - 4.5$$

$$\Pi \quad 55 \quad 59.68$$

$$9.86913$$

$$\log \sin \Pi \quad 8.20537$$

$$\sin(\theta - \alpha') \quad 9.49079$$

$$\text{sec } \phi \quad 01.0045$$

$$\sin(X - \Pi) \quad 7.56577$$

$$(X - \Pi) \quad -12 \quad 38.96$$

$$= \quad - \quad 50.60$$

$$\alpha \quad 10 \quad 53 \quad 29.45$$

$$\text{Eph } \alpha \quad 10 \quad 53 \quad 29.52$$

$$O-C \quad + 0.93$$

$$\text{curr} \quad - 0.04$$

$$\text{Inv. Corr.} \quad - 0.05$$

$$\alpha \quad 10 \quad 53 \quad 29.40$$

$$O-C \quad + 0.88$$

