

KG
11366
v.1061

NATIONAL



Plate Date Page

14448 Dec. 22 '17 1

14449 " " " 11

14454 " 26 " 21

NATIONAL



14448

Star Measures

1

L	1.6266	1.8650	1.8628	1.6372
13.1	1.5144	9780	9526	1.5476
26.9	44	80	26	76
	66	50	28	72
	<u>13.1122</u>	<u>13.1130</u>	<u>26.9100</u>	<u>26.9104</u>

2	1.6626	1.6082	1.6474	1.8720
22.8	7984	1.4728	1.1192	1.3998
55	88	28	92	98
	26	82	74	20
	<u>22.8640</u>	<u>22.8646</u>	<u>5.5282</u>	<u>5.5278</u>

3	1.6260	1.6032	1.6834	1.6330
26.3	1.287880	9416	1.395458	9200
27.3	82	16	62	00
	60	32	34	30
	<u>26.3380</u>	<u>26.3384</u>	<u>27.2876</u>	<u>27.2870</u>

Moon

L		1.7190	1.7240
19.1		1.5942	8980
16.1		42	80
		90	40
		<u>16.1248</u>	<u>16.1240</u>

2		1.7606	1.8280
19.		1.5240	1.0640
16.2		40	40
		06	80
		<u>16.2366</u>	<u>16.2360</u>

3	1.8520	1.6884
18	834044	7060
17.	48	60
	20	84
	<u>18.0176</u>	<u>18.0176</u>

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Star Measures

1

L	16266	18650	18628	16372
131	15144	9780	9526	15476
26.9	44	80	26	76
	66	80	28	72
	<u>13.1122</u>	<u>13.1130</u>	<u>26.9102</u>	<u>26.9104</u>

2	16626	16082	16474	18720
22.8	798486	14728	11192	13998
5.5	88	28	92	98
	26	82	74	20
	<u>22.8640</u>	<u>22.8646</u>	<u>5.5282</u>	<u>5.5278</u>

2	16260	16032	16834	16030
263	1287880	9416	1395458	4200
27.3	82	16	62	00
	60	32	24	30
	<u>26.3380</u>	<u>26.3384</u>	<u>27.2876</u>	<u>27.2870</u>

Moon

L		17190	17240
9.1		15942	8980
16.1		42	80
		90	40
		<u>16.1248</u>	<u>16.1240</u>

2		17606	18280
19.		15240	10640
6.2		40	40
		06	80
		<u>16.2366</u>	<u>16.2360</u>

2	18520	16884
18	834044	7060
17	48	60
	20	84
	<u>18.0176</u>	<u>18.0176</u>

1917.2
20

5
17
18
6
17
1
7
17
18
8
19
1
18
19

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Moon Measures

2

4
18
17.

18844	16460
1857680	663430
84	26
44	60
<u>17.0264</u>	<u>17.0170</u>

5	19618	16870
17.8	12800	1367682
18	00	88
	18	70
	<u>17.6818</u>	<u>17.6812</u>

6	18932	16870
17.8	1217072	1364236
19.1	74	30
	32	70
	<u>17.6760</u>	<u>17.6766</u>

7	17402	16880
17.8	8480	15800
19	80	00
	02	80
	<u>17.8922</u>	<u>17.8920</u>

8	18768	16508
18	1688694	8382
19.1	02	82
	68	08
	<u>19.1874</u>	<u>19.1874</u>

189	16522	16036	16112	17290
199	707068	15594	6536	16864
	66	94	36	64
	22	36	12	90
+	<u>18.9554</u>	<u>18.9558</u>	<u>19.9516</u>	<u>19.9574</u>

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Moon Measures

2

4
18
17

18844	"	16460
1857680		663430
84		26
44		60
<u>17.0264</u>		<u>17.0170</u>

5	19618	16870
7.8	12800	1367682
18	00	88
	18	70
	<u>17.6818</u>	<u>17.6812</u>

6	18932	16870
7.8	1217072	1364236
19.1	74	30
	32	70
	<u>17.6760</u>	<u>17.6766</u>

7	17402	16880
18.8	8480	15800
19.1	80	00
	02	80
	<u>17.8922</u>	<u>17.8920</u>

8	18768	16508
18	1688694	8382
19.1	02	82
	68	08
	<u>19.1874</u>	<u>19.1874</u>

18.9	16522	16036	16142	17290
19.4	707068	15594	6536	16864
	66	94	76	64
	22	96	42	90
	<u>9554</u>	<u>9558</u>	<u>19.9576</u>	<u>19.9574</u>

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Juno etc

Date Dec. 2 2, 1917

Exp. h Stars.	3	59	"	4	11	"
" " Moon	4	05	03.7	4	05	04.0
clock slow		02	06.1			
H. Sid. Time	4	07	09.95			
H. Long	4	44	31.05		+2	42
G. Sid. Time	8	51	41.00			
" " " M.N	18	01	52.83			
Interval	14	49	48.17			
Red		02	25.77			
G. m. T.	14	47	22.40	14	47	28.95

From Naut. Alman.	R.A.	Dec.
Moon 14 ^h	01 23	30.60 - +14 01 57.6 -
Motion 1 ^m		+2.2468 - +11.763 -
" 47 ^m 37.33 ^s	01	46.44 - +09 -17.2 -
Tabular Place	01 25	17.04 +14 11 14.8 -

$$93.4'' = 11.1$$

$$a = -504.8$$

$$+24.0$$

$$-477.8$$

Mean age 9d

Parallax	58	39.8
Semi-dian	16	07
R		960.7
ang		11.7
Int. 4		-04
R		972.0
R		2.0836
AR		-996
(1+1)R		1.9840
5R2		3.9363

8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

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Junes etc

3

Date Dec 2 2. 1917

Exp h stars	3	59		4	11	
" " moon	4	05	0 31 7	4	05	0 40
clock slow		02	06.1			
H Sid June	4	07	0 99 5			
+ Yang	4	44	31. 05			$\bar{E} = +2^h 42$
B Sid June	8	51	41. 00			
" " " M.N	18	01	52 8 3			
Interval	14	49	48. 17			
Red		02	25 7 7			
G. m. T	14	47	22. 40			$14^h 28 9 55$

From Nant Alman	RA			Dec.		
Moon 14^h	01	23	30.60	+14	01	57.6
Motion 1^m			+2 2468			+11.763
- $47^m 37.33$		01	46.44	+09		-17.2
Fabular Place	01	25	17.04	+14	11	148

934" = 11.1

$$a = -5^h 01.8$$

$$+240$$

$$-417.8$$

Moon age 9^d

Parallax	58	39.8
Semi-diam	15	07
R		960.7
ang		11.7
Dist 4		-04
R		972.0
R		20836
aR		-996
11+11.1		1.9840
=R2		39363

S_0	H_0	ΔS_0	-3.85	$+ .34 + 3$
$+ 0.87$	$- 13.10$	$+ 4$	$- 13 = + 1$	$- 4 = - 3$
$- 9.26$	$+ 9.37$	$- 41$	$+ 35 = - 6$	$+ 3 = - 3$
$+ 4.62$	$+ 9.73$	$+ 13$	$- 18 = - 5$	$+ 3 = - 2$
$- 2.43$	$- 0.12$	$+ 9$		$= + 12 + 0.04$
				<u><u> </u></u>

ΔH	-3.87	$+ 13 + 3$
$- 54$	$+ 50 = - 4$	$+ 1 = - 3$
$+ 42$	$- 36 = + 6$	$- 9 = - 3$
$+ 28$	$- 37 = - 9$	$+ 5 = - 4$
	0	$- 2 = + 1 = 0.0$

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Standard Coordinates -

4.

Cafe. No. 203	mg 8.6	Cafe. No. 192	mg 8.9	Cafe. No. 207	mg 3.8
C 1 24	07.25	1 18	41.20	01 26	07.87
q	07.27		41.20		07.87
E	07.23		41.21		07.86
m 1 24	07.25	1 18	41.20	01 26	07.87
Prec.	53.96		54.27		54.48
α 1 25	01.21	1 19	35.47	01 27	02.35
A 1 24	33.50	1 24	33.50	01 24	33.50
α-A +	27.71	-4	58.03	+2	288.5
Sin	+ 27.71		-298.01		+148.85
log	1.44264	2.47423	m		2.17275
cos	9.99047	9.98320			9.98311
S ₀	9.94095	0.96667	m		0.66510
S ₀ + 0.8717		-9.2612			+4.6249
S ₁ + 4		-40			+ 11
S 22.8721		12.7348			26.6260
X 22.8643		13.1126			26.3382
X-S -0.0078		+ 3.778			- 287.8
C + 1.1 52	19.6	14 47	01.1	14 49	49.3
q	18.7		00.0		48.9
E	18.3		00.0		48.8
m 11 52	18.9	14 47	0.4	14 49	49.0
Prec. +0.5	17.9	+0.5	20.7	+0.5	16.7
S +11 57	36.8	+14 52	21.1	14 55	05.7
θ 1.3 3.9	28.0	13 3.9	28.0	13 3.9	28.0
S-θ -1 41	51.2	+1 12	53.1	+1 15	37.7
tan	-6 113.0	+43 71.1		+ 45	38.4
log	3.78625	m	3.64059		3.65640
no	1.11740	m	0.97174		0.98805
tan δ	9.3260		9.4242		9.4256
S ₂	9.8807		1.9333		1.3302
η	6.2601		8.4109		7.8092
η ₀ -13.1039		+9.3700		+9.7286	
η ₁ 2		+ 25.8		+ 64	
η 4.8963		27.3958		27.7350	
η 5.5280		26.9103		27.2873	
η-η ₀ + 63.17		-48.55		-44.77	

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Standard Coordinates -

4

Cape No. 203	mag 8.6	Cape No. 192	mag 8.9	Cape No. 207	mag 3.8
C 1 24	07.25	1 18	41.20	01 26	07.87
q	07.27		41.20		07.87
E	07.23		41.21		07.86
m 1 24	07.25	1 18	41.20	01 26	07.87
P.A.	53.96		54.27		54.48
α 1 25	01.21	1 19	35.47	01 27	02.35
A 1 24	33.50	1 24	33.50	01 24	33.50
$\alpha - A$	+ 27.71	- 41	58.03	+ 2	28.85
Sum	+ 327.81	- 1298.08		+ 148.85	
log	1.44264	2.97423		2.17275	
cos	999047	998520		998511	
$\sin$	9.94035	0.96667		0.66510	
S_0	+ 0.8717	- 9.2612		+ 4.6249	
S_1	+ 4	- 40		+ 11	
S	22.8721	12.7348		26.6260	
X	22.8643	13.1126		26.3382	
X-S	- 0.078	+ 3.778		- 2.878	
C = 1 1 5-2	19.6	14 47	01.1	14 49	49.3
q	18.7		00.0		48.9
E	18.3		00.0		48.8
m 11 5-2	18.9	14 47	0.4	14 49	49.0
P.A.	+ 0.5	+ 0.5	20.7	+ 0.5	16.7
S + 11 5-7	36.8	+ 14 5-2	21.1	14 5-3	05.1
B 13 39	28.0	13 39	28.0	13 39	28.0
S-B - 1 41	5.12	+ 1 12	5.31	+ 1 15	37.7
tan	- 6.118.0	+ 43.71.1		+ 45.38.4	
log	3.78625	3.64059		3.65690	
η_0	1.11740	0.97174		0.98805	
tan S	9.3260	9.4242		9.4256	
S_0^2	9.8807	1.9333		1.3302	
η_1	6.2601	8.4109		7.8092	
η_0	- 13.1039	+ 9.3700		+ 9.7286	
η_1	2	+ 25.8		+ 6.4	
η	4.8963	27.3958		27.7350	
η	25.5280	26.9103		27.2873	
$\eta - \eta$	+ 63.17	- 48.55		- 44.77	

+
-
-
1

+
-
-
1

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5

Plate Center + Constants

$$\begin{array}{r}
 22.8643 \quad 5.5280 \quad 1.25 \quad 01.21 \quad 11'' \quad 57 \quad 36.8 \\
 22. \quad 18. \quad -27.66 \quad +01 \quad 41 \quad 51.2 \\
 \hline
 -08.043 \quad +12.4720 \\
 \hline
 32 \quad 490
 \end{array}$$

Plate Center

$$A = 1.24 \quad 33.55$$

$$B = +13.39 \quad 28.0$$

$$\begin{array}{l}
 X-S + 5.00X + \quad +48.54 \quad +1.8X -1166.3 \\
 +3778 + 6556 = 10334 + 1306 = 11640 + 23 = 11663 \\
 -0078 + 11432 = 11354 + 268 = 11622 + 42 = 11664 \\
 +2878 + 13164 = 10291 + 1324 = 11615 + 48 = 11663 \\
 19.6616 + 9831 \quad +877 \quad +35 = 19.5696
 \end{array}$$

$$\begin{array}{l}
 Y-Y + 5.00Y \quad -43X \quad +2.98 -81.15 \\
 -4855 + 13455 = 8600 - 564 = 8036 + 79 = 8115 \\
 +6317 + 2764 = 9081 - 983 = 8098 + 17 = 8115 \\
 -4477 + 13644 = 9167 - 1133 = 8034 + 80 = 8114 \\
 181078 + 9054 \quad -845 \quad +52 = 181224
 \end{array}$$

$$\begin{array}{l}
 \text{Tables } a = -0.5 \quad b = -1.0 \quad a-b = +0.5 \quad b+d = -2.9 \\
 \text{Obs. } -501.8 \quad -502.9 \quad +1.1 \quad = -51.5 \\
 -501.3 \quad -501.9 \quad +0.6 \quad -2.6
 \end{array}$$

1917phae.proj.20

1917phae.proj.20

1917phae.proj.20

1917phae.proj.20

1917phae.proj.20

1917phae.proj.20

1917phae.proj.20

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5-

Plate Center + Constants

$$\begin{array}{r}
 22.8643 \quad 5.5280 \quad 1.25 \quad 01.21 \quad 11'' \quad 57 \quad 36.8 \\
 22 \quad 18 \quad -27.66 \quad +01 \quad +1 \quad 51.2 \\
 \hline
 -08043 \quad +12.9720 \\
 \hline
 32 \quad 490
 \end{array}$$

Plate Center

$$A = 1.24 \quad 3355''$$

$$B = +13.39 \quad 28.0$$

$$\begin{array}{l}
 X - S + 5.00X + \quad +48.5''y \quad +1.8x \quad -1166. \\
 +3778 + 65''56 = 10334 + 1306 = 11640 + 23 = 11663 \\
 -0078 + 11432 = 11354 + 268 = 11622 + 42 = 11664 \\
 +2878 + 13164 = 10291 + 1324 = 11615 + 48 = 11663 \\
 19.66''6 + 9830 \quad +877 \quad +35'' = 19.5698
 \end{array}$$

$$\begin{array}{l}
 Y - \gamma + 5.00y \quad -43x \quad +2.9y \quad -8115'' \\
 -4855 + 13455 = 8600 - 564 = 8036 + 79 = 8115 \\
 +6317 + 2764 = 9081 - 983 = 8098 + 17 = 8115 \\
 -4477 + 13644 = 9167 - 1133 = 8034 + 80 = 8114 \\
 18.1078 + 9059 \quad -845 \quad +52 = 18.1224
 \end{array}$$

$$\begin{array}{l}
 \text{Tables a.} \quad -0.5 \quad b. \quad -0.0 \quad c. \quad +0.6 \quad h+d. \quad -2.9 \\
 \text{Obs.} \quad -501.8 \quad -502.9 \quad +1.1 \quad = -5.5
 \end{array}$$

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Moon Center

6

 $\Delta x = 2.9$ $\Delta y = 0$

1	19.6600	0.0000	-6	0.0000	3.9347	+ 16
2	19.0000	-0.6600	-5	0.4362	3.9395	+ 32
3	18.0176	-1.6424	-3	2.6984	3.9261	-102
4	17.6815	-1.9785	0	3.9145	3.9262	-101
5	17.6763	-1.9837	0	3.9351	3.9351	-12
6	17.8890	-1.7710	+3	3.1354	3.9311	-52
7	18.0000	-1.6600	+3	2.7546	3.9340	-23
8	18.9526	-0.7074	+5	0.4997	3.9296	-67
				73739	3.9363	

y

 $\Delta y = 0$

arc

1	16.1244	-1.9836		3.9347	180°
2	16.2363	-1.8717		3.5033	199
3	17.0000	-1.1080		1.2277	236
4	18.0000	-0.1080		0.0117	267
5	18.1080	-0.0000		0.0000	270
6	19.0000	+0.8920		0.7957	297
7	19.1940	+1.0860		1.1794	303
8	19.9600	+1.8520		3.4299	339

0824

40532

Range 159

Corr R: 1.9840

y min: 16.1244

y₀ = 18.1084

y min = 17.6763

x₀ = 19.6603

Moon center

x₀ 19.6600y₀ 18.1080

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Mean Center

6

07:25

0-C

1	19.6600	0 0 0 0 0 - 6	0 0 0 0 0	3 9 3 4 7	= 1 6
2	19.0000	- 0.6600 - 5	0 4 3 4 2	3 9 3 9 5	= 3 2
3	18.0176	- 1.6424 - 3	2.69 84	3 9 2 6 6	= 1 0 2
4	17.6815	- 1.9785 - 0	3.9 1 4 5	3 9 2 0 2	= 1 0 1
5	17.6763	- 1.9837 0	3 9 3.51	3 9 3 5 1	= 1 2
6	17.8890	- 1.7710 + 3	3.1 3 5 4	3 9 3 1 2	= 5 2
7	18.0000	- 1.6600 + 3	2.75 96	3 9 3 9 0	= 2 3
8	18.9526	- 0.7074 + 5	0 4 9 9 7	3 9 2 9 7	= 6 7
				3 9 3 6 3	

07:0

arc

1	16.1244	- 1.9836	3 9 3 4 7	18.00
2	16.2363	- 1.8717	3.50 33	149
3	17.0000	- 1.1080	1.22 7 7	236
4	18.0000	- 0.4080	00.11 2	267
5	18.1080	- 0.0000	000000	270
6	19.0000	+ 0.8920	0.79 5 7	297
7	19.1940	+ 1.0860	1.17 9 4	303
8	19.9600	+ 1.8520	3.42 9 9	339

Range 159

Cen R: 1.9840

y min: 16.1244

y₀: 18.1084

y min: 17.6763

x₀: 19.6603

Mean center

x₀ 19.6600y₀ 18.1080

Formation of normals.

1 + 0.00
 2 + 1.23
 3 + 1.82
 4 + 0.22
 5 0.00
 6 - 1.57
 7 - 1.79
 8 - 1.29

 + 3.27
 - 46.5

 - 1.38

792

+ 0.0
 - 21.1
 + 167.0
 + 200.0
 + 23.8
 + 92.0
 + 38.2
 + 47.0

 + 568.0
 - 21.1

 + 546.9

73

+ 31.8
 - 60.0
 + 113.5
 + 11.0
 0.0
 - 46.2
 - 24.8
 - 124.0

 + 156.3
 - 255.0

 - 98.7

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Conditional Equations.

7

1	0.00	-1.98	=	-16	0.0	+	8	=	+8	-	24
2	-0.66	-1.87	=	+32	21	+	7	=	-14	+	46
3	-1.64	-1.11	=	-102	51	+	4	=	-47	-	55
4	-1.98	-0.11	=	-101	62	+	0	=	-62	-	39
5	-1.98	0.00	=	+12	62		0	=	-62	+	50
6	-1.77	+0.89	=	-52	55	-	4	=	-59	+	7
7	-1.66	+1.08	=	-23	52	-	4	=	-56	+	33
8	-0.70	+1.85	=	-67	22	-	7	=	-29	-	38

$$+ 136 - 136$$
$$\text{ar } 36$$

$$+ 17.37 - 1.38 = + 546.9$$

$$1.38 + 1408 = 1409.38 \approx 1409.4$$

$$+ () - 0.1 \bar{1} = + 43,5$$

$$+ 13.9 \text{ r} = - 55.2$$

$$k = -3,95$$

$$+17.37 = +546.9 - 5.5 = +541.4 \text{ a} = +31.2''$$

arc 15-9

$\frac{p}{q} = 1.22 \checkmark$

$$\frac{EK}{h} = -2.5 \times 10^6$$

$$-\frac{2.5}{22} = -1.14^\circ$$

$\Delta R_1 = 0.1$

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Conditional Equations.

7

1	0 0 0	-1.98	= -1.68	0 0	+ 8.7	= + 8.7	- 2.4
2	-0.66	-1.87	= + 3.2	- 21	+ 2.7	= + 1.4	+ 4.4
3	-1.64	-1.11	= -10.2	- 5.11	+ 1.4	= - 4.1	- 5.5
4	-1.98	-0.11	= -10.1	- 62	+ 0	= - 6.2	= 3.9
5	-1.48	0.00	= + 1.2	- 42	0	= - 6.2	+ 5.0
6	-1.77	+ 0.89	= - 5.2	- 5.6	- 1.4	= - 5.9	+ 2.1
7	-1.66	+ 1.08	= - 2.3	- 5.2	- 1.4	= - 5.6	+ 3.3
8	-0.70	+ 1.85	= - 6.7	- 2.2	= 1.7	= + 2.9	- 3.8

+ 13.6 - 15.2
 arc 36

$$+ 17.37 - 1.38 = + 546.9$$

$$- 1.38 + 14.08 = - 48.7$$

$$+ 1 - 0.11 = + 43.5$$

$$+ 13.97 = - 55.2$$

$$A = + 3.95$$

$$+ 17.37 = + 546.9 - 5.5 = + 541.4 \quad \text{arc} = + 31.2$$

arc 15.9

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

$$\frac{\Sigma K}{h} = - 2.5$$

$$\frac{-2.5}{.22} = - 11.4$$

$$\Delta R = - 0.1$$

14448

Moon's Mean Position

8

$$\begin{array}{r} X_0 \quad 19.6600 \\ \quad \quad +16 \\ \hline 19.6616 \end{array}$$

$$\begin{array}{r} Y_0 \quad 18.1080 \\ \quad \quad -2 \\ \hline 18.1078 \end{array}$$

From Plate Constants

$$\begin{array}{r} 19.5696 \\ \underline{22} \\ -2.4304 \end{array}$$

$$\begin{array}{r} 18.1224 \\ \underline{18} \\ +0.1224 \end{array}$$

$$\begin{array}{r} 0.38568m \\ 9.98752 \\ 8.50724 \\ 1.89092 \end{array}$$

$$\begin{array}{r} 9.3859 \\ 0.7714 \\ 7.0534 \\ 7.2107 \end{array}$$

$$\begin{array}{r} -01 \quad 17.79 \\ A = 1 \quad 24 \quad 33.50 \end{array}$$

$$\alpha_0 \quad 1 \quad 23 \quad 15.71$$

$$\text{Red} \quad + \quad 4.69$$

$$\alpha' \quad 1 \quad 23 \quad 20.40$$

$$\lambda_1 + 0.0016$$

$$\gamma_0 + 0.1208$$

$$9.08207$$

$$7.33115$$

$$1.75092$$

$$+ 56.3$$

$$\delta = +13 \quad 39 \quad 28.0$$

$$\delta_0 + 13 \quad 40 \quad 24.3$$

$$\text{Red} \quad + 29.1$$

$$\delta' + 13 \quad 40 \quad 53.4$$

14444

Moon's Mean Position

8

$$\begin{array}{r} X_0 \quad 19.6600 \\ \quad \quad + 16 \\ \hline 19.6616 \end{array}$$

$$\begin{array}{r} Y_0 \quad 18.1080 \\ \quad \quad - 2 \\ \hline 18.1078 \end{array}$$

From Plate Constants

$$\begin{array}{r} 19.5698 \\ 22 \\ \hline - 2.4304 \end{array}$$

$$\begin{array}{r} 18.1224 \\ 18 \\ \hline + 0.11224 \end{array}$$

$$\begin{array}{r} - 0.38668 \\ 998752 \\ 850724 \\ 189082 \end{array}$$

$$\begin{array}{r} 93859 \\ 01714 \\ 70534 \\ 72107 \end{array}$$

$$\begin{array}{r} - 0.11 \quad 17.79 \\ A = 1 \quad 24 \quad 33.50 \end{array}$$

$$\alpha_0 \quad 1 \quad 23 \quad 15.71$$

$$\text{Red} \quad \quad \quad + 4.69$$

$$\alpha' \quad 1 \quad 23 \quad 20.40$$

$$\eta_1 \quad + 0.0016$$

$$\eta_0 \quad + 0.1208$$

$$9.08207$$

$$7.33115$$

$$1.75092$$

$$+ 56.3$$

$$\theta = +13 \quad 39 \quad 28.0$$

$$\delta_0 \quad + 13 \quad 40 \quad 24.3$$

$$\text{Red} \quad \quad \quad + 29.1$$

$$\delta' \quad + 13 \quad 40 \quad 53.4$$

$$\begin{array}{r}
 14 \quad 58.837 \\
 14 \quad 54.019 \\
 \hline
 + 4.818
 \end{array}$$

$$\begin{array}{r}
 19 \quad 56.852 \\
 19 \quad 52.444 \\
 \hline
 + 4.408
 \end{array}$$

$$\begin{array}{r}
 27 \quad 07.073 \\
 27 \quad 02.336 \\
 \hline
 + 4.737
 \end{array}$$

$$\begin{array}{r}
 50 \quad 14.97 \\
 49 \quad 41.37 \\
 \hline
 + 3.360
 \end{array}$$

$$\begin{array}{r}
 36 \quad 19.12 \\
 36 \quad 40.68 \\
 \hline
 + 2.156
 \end{array}$$

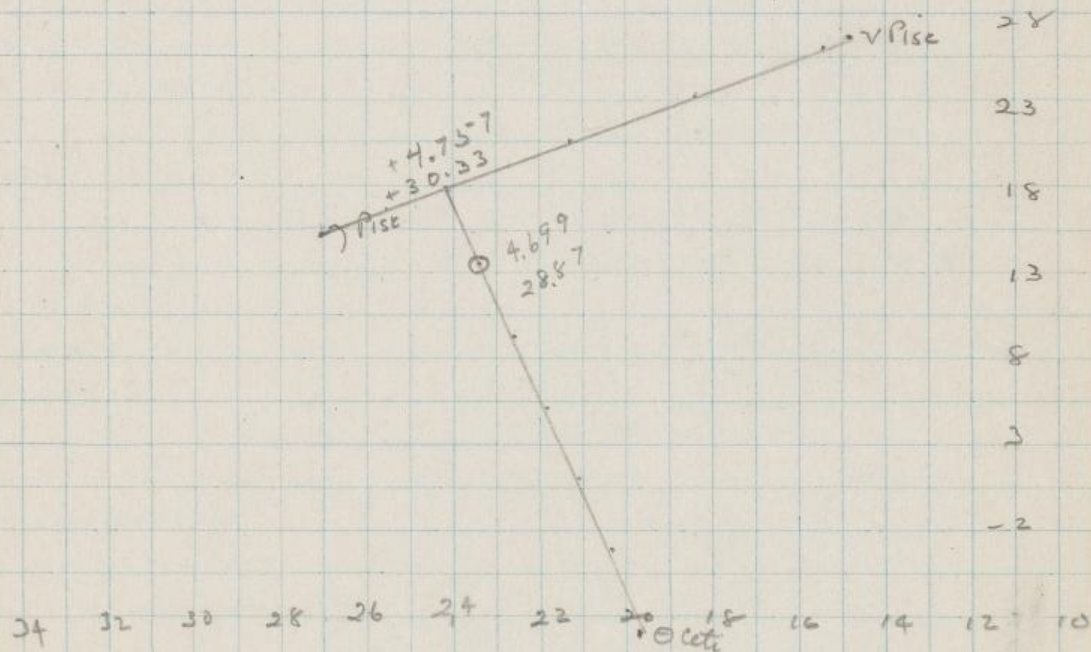
$$\begin{array}{r}
 55 \quad 35.30 \\
 55 \quad 6.06 \\
 \hline
 29.24
 \end{array}$$

$$\begin{array}{r}
 4.818 \\
 4.737 \\
 \hline
 .081
 \end{array}$$

$$\begin{array}{r}
 33.60 \\
 29.24 \\
 \hline
 4.36
 \end{array}$$

$$\begin{array}{r}
 4.757 \\
 4.408 \\
 \hline
 .349 \\
 .058
 \end{array}$$

$$\begin{array}{r}
 30.33 \\
 21.56 \\
 \hline
 8.77 \\
 1.46
 \end{array}$$



14448

Reduction to apparent Place.

9

$H + \alpha_0$ 01 20.6 $20^\circ 9'$
 H 23 57.3
 α_0 01 23.3
 β 0 01.6
 $\beta + \alpha_0$ 01 24.9 $21^\circ 13.5'$

$\delta_0 + 1.3$ 40.4
 $\cos \delta_0$ 9.9875
 $\log i$ -9.0198
 $" (i)$ 9.0073m
 $"$

$\cos \beta + \alpha_0$ 9.9695
 g 1.4207
 $\sin \beta + \alpha_0$ 9.5587
 $\tan \delta$ 9.3861
 8.8239

$\sin \delta_0$ 9.3736
 $\cos H + \alpha_0$ 9.9726
 h 1.3111
 $\sin H + \alpha_0$ 9.5372
 $\sec \delta$ 0.0125
 8.8239

$\log g'$ 1.3902
 $" g$ 9.1894

$\log h'$ 0.6573
 h 9.6847

g +4.050
 g +0.155
 h +0.484

 Red +4.689

g' +24.560
 h' +4.649
 i -0.102

 Red. +29.107

14448

Reduction to Apparent Place.

9

$H + \lambda_0$	01	20.6	$20^\circ 9'$
H	23	57.3	
λ_0	01	23.3	
G	0	01.6	
$G + \lambda_0$	01	24.9	$21^\circ 13.5'$

$S_0 + 1.3$	40.4
$\cos S_0$	9.9875
$\log i$	-9.0198
" (1)	9.0073
"	

$\cos G + \lambda_0$	9.9695
q	1.4207
$\sin G + \lambda_0$	9.5587
$\tan G$	9.3861
	8.8239

$\sin S_0$	9.3786
$\cos H + \lambda_0$	9.9726
h	1.3111
$\sin H + \lambda_0$	9.5372
$\sec S$	0.0125
	8.8239

$\log q$	1.3902
" q	9.1894

$\log h'$	0.6573
h	9.6847

f	+4.050
q	+0.155
h	+0.484
<u>Red</u>	+4.689

q'	+245.60
h'	+4.649
l	-0.102
<u>Red</u>	+29.107

14448

Lunar Parallax

10

α'	01	23	20.40"
θ	4	07	09.95"
$\theta - \alpha'$	+02	43	49.55"
$=$	+40	57	23.25"
$1/\alpha - \alpha'$		+14	40.26"
$\theta - \alpha' - "$	40	42	42.24"

9.95727
 0.00000
 0.12033
 0.07760

X	50	05	30.0"
δ'	+13	40	53.4"
$Y - \delta'$	+36	24	36.6"

9.82640
 9.77347
 0.11517
 8.23207
 7.94711

$\delta - \delta'$	+30	26.2
--------------------	-----	------

δ	+14	11	19.6
α/δ	+14	11	14.8
$O-C$			+ 4.8

curr. 0.0"

quad. Ord. Ref. 0.0

 π 58 - 39.8"

9.86913

 $\sin \pi$ 8.23207" $\sin \theta - \alpha'$ 9.81656" $\sec \alpha/\delta$ 0.01345" $\sin \alpha - \alpha'$ 7.93121" $\alpha - \alpha' + 29'$ 20.52" $= + 1$ 57.37" α 01 25 17.77" α/α 01 25 17.04" $O - C$ +0.73"

curr. +0.03

 $\alpha : 01$ 25 17.80 $O - C$ +0.76

14448

Lunar Parallax

10

$$\begin{array}{rcl}
 \alpha' & 01 & 23 \quad 20.90'' \\
 \epsilon & 4 & 07 \quad 09.95'' \\
 \epsilon - \alpha' & +02 & 43 \quad 49.55'' \\
 = & +40 & 57 \quad 22.25'' \\
 1/2 \alpha - \alpha' & & +14 \quad 40.26'' \\
 \epsilon - \alpha' - '' & 40 & 42 \quad 92.24''
 \end{array}$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 012033 \\
 007766
 \end{array}$$

$$Y \quad 5.0 \quad 03'' \quad 30.0''$$

$$\begin{array}{rcl}
 \delta' & +13 & 40 \quad 53.4'' \\
 Y - \delta' & +36 & 24 \quad 36.6'' \\
 Y - \delta & &
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 977347 \\
 011317 \\
 823207 \\
 7.94711
 \end{array}$$

$$S - \delta' \quad +30 \quad 26.2''$$

$$S \quad +14 \quad 11 \quad 19.6''$$

$$g/h \delta \quad +14 \quad 11 \quad 14.8''$$

$$O - C \quad +9.8''$$

$$curr \quad 0.0$$

$$2^{nd} \text{ And Ref.} \quad 0.0$$

$$\pi \quad 58.398''$$

$$9.86913$$

$$\sin \pi \quad 823207''$$

$$\sin \alpha' \quad 981656''$$

$$\cos \delta \quad 0.01345''$$

$$\sin \alpha - \alpha' \quad 793121''$$

$$\alpha - \alpha' + 29' \quad 20.52''$$

$$= +1 \quad 5.737''$$

$$\alpha \quad 01 \quad 25'' \quad 17.77''$$

$$g/h \alpha \quad 01 \quad 25'' \quad 17.04''$$

$$O - C \quad +0.73''$$

$$curr. \quad +0.03''$$

$$\alpha : 01 \quad 25'' \quad 17.80''$$

$$O - C \quad +0.76''$$

1
13
20

2
22
5

3
26
27

2
1

3
20
15

3
19
16

14447

Star Measures

11.

1	16455	16806	16989	16206
13.3	13835	9424	8140 47	15056
26.7	35	24	42	56
	55	06	89	06
	<u>13,2620</u>	<u>13,2618</u>	<u>26,8848</u>	<u>26,8850</u>

2	17704	16060	16572	16618
228	10568	13206 04	12872	10310
5.3	6466	02	72	10
	04	60	72	18
	<u>22,7138</u>	<u>22,7144</u>	<u>5,3700</u>	<u>5,3692</u>

3	16160	17708	16514	16385
26.5	11250	12628 24	15724	7170 69
27.0	50	20	24	68
	60	08	14	85
	<u>26,4910</u>	<u>26,4916</u>	<u>27,0790</u>	<u>27,0784</u>

Moon

1		16790	16985
20.5		14040 44	9730 51
16.2		48	32
		90	85
		<u>16,2746</u>	<u>16,2746</u>

2		16092	16632
20		13020	9694
16.3		20	94
		92	32
		<u>16,3072</u>	<u>16,3062</u>

3		16610	17192
19		8498 96	15300
16.8		94	00
		10	92
		<u>16,8114</u>	<u>16,8108</u>

4449

Star Measures

11

✓	16455	16806	16989	16206
3.3	13835	9424	8140 47	15056
26.9	35	24	42	56
	55	06	89	06
	<u>132620</u>	<u>132618</u>	<u>268848</u>	<u>268850</u>
2	17704	16060	16572	16618
28	10568	13206 04	12872	10310
5.3	64 66	02	72	10
	04	60	72	18
	<u>227138</u>	<u>227144</u>	<u>53100</u>	<u>53692</u>
3	16160	17708	16519	16385
6.5	11250	12628 34	15724	7170 69
7.0	50	20	24	68
	60	08	14	85
	<u>264910</u>	<u>264916</u>	<u>270790</u>	<u>270784</u>

Mean

✓	16790	16985
1.3	14040 44	9730 21
0.2	48	32
	90	85
	<u>162746</u>	<u>162746</u>
2	16092	16632
0	13020	9694
6.3	20	94
	92	32
	<u>163072</u>	<u>163062</u>
2	16610	17092
9	8498 96	15300
6.8	94	00
	10	92
	<u>168104</u>	<u>168108</u>

14449

Moon

16538	16236
12572	1019094
72	10298
38	36
<u>18.3966</u>	<u>18.3952</u>

16528	16230
12730	1001520
30	25
28	30
<u>18.3798</u>	<u>18.3790</u>

17176	17150
11990	1231220
90	28
76	50
<u>18.5186</u>	<u>18.5170</u>

15996	17238
8936	14280
36	86
96	38
<u>19.7060</u>	<u>19.7048</u>

16120	16820
1203738	1089800
39	02
20	20
<u>19.4082</u>	<u>19.4080</u>

14499

Moon

16538	16236
12572	10190
72	20298
38	36
<u>18.3966</u>	<u>18.3952</u>

16528	16230
12730	10015
30	2520
28	30
<u>18.3798</u>	<u>18.3790</u>

18176	17150
11990	12312
90	28
76	50
<u>18.5186</u>	<u>18.5170</u>

15996	17238
8936	14288
36	86
96	38
<u>19.660</u>	<u>19.7048</u>

16120	16820
12037	10898
38	00
39	02
20	20
<u>19.4082</u>	<u>19.4080</u>

14449

Jupiter etc

13

Date Dec. 22. 1917

Exp. h Stars	4	12	"	5	4	24	"
" " Moon	4	18	23.9	"	4	18	24.2
Clock Slow		2	06.1	"			
H. Sid. Time	4	20	30.15	"			
H. Long	4	44	31.05	"			
S. Sid. Time	9	05	01.20	"			
" " " M.N	18	01	52.83	"			
Interval	15	03	08.37	"			
Red		02	27.96	"			
G. m. T	15	0	40.41	"	15 ^h	0112	"

From Naut. Alman. R.A.

Dec.

Moon 15 ^h	01	25	45.43	"	+14	13	42.9	"
Moon 1 ^m			2.2486	"			+11.713	"
" 0 ^h 6735			+0.151	"			+7.9	"
Tabular Place	01	25	46.94	"	+14	13	50.8	"

$$934'' = 10.65''$$

Moon age 9^d

$$\begin{aligned} Q &= -501.7 \\ &+ 24.0 \\ &= -477.7 \end{aligned}$$

Parallax	58'	39.6"
Semi-diam	16	00.7
R		960.7
aug		11.3
Sur 4		-0.4
R		971.6
R		2.0827
Q.R		-995
(1/4)R		1.9832
R ²		3.9331

14449

Juius etc

13

Date Dec 22. 1917

Exp & Stars	4	12			4	24	
" " Moon	4	18	23.9		4	18	24.2
Clock Slow		2	06.1				
H Sid Juius	4	20	30.15				
H Yang	4	44	31.05				
S Sid Juius	9	05	01.20				
" " " A.M.N	18	01	52.83				
Interval	15	03	08.37				
Red		02	21.96				
G.M.T	15	0	40.41				
					15h	0112	

From Naut Alman. R.A.

Dec.

Moon 15h	01	25	45.43	+14	13	42.9
Motion 1~			2.2486			+1.713
" 0~67.35			+0.151			+7.9
Tabular Place	01	25	46.94	+14	13	50.8

934 " 10.65"

Moon's Age 9d

$$\begin{array}{r}
 9 = -501.7 \\
 + 24.0 \\
 \hline
 -477.7
 \end{array}$$

Parallax	58	39.6
Semi-diam	16	00.7
R		960.7
ang		11.3
Int 4		-0.4
R		971.6
R		208.27
Q.R		-945
1.4 R		1.9832
R ₂		3.9331

14449

Plate Constants.

14

$$\begin{array}{r} x \\ s \\ x-s \end{array} \begin{array}{r} 13.2619 \\ 12.7348 \\ +5271 \end{array}$$

$$\begin{array}{r} 22.7141 \\ 22.8721 \\ -1580 \end{array}$$

$$\begin{array}{r} 26.4913 \\ 26.6260 \\ -1347 \end{array}$$

$$\begin{array}{r} y \\ y \\ y-y \end{array} \begin{array}{r} 26.8849 \\ 27.3458 \\ -5109 \end{array}$$

$$\begin{array}{r} 5.3696 \\ 4.8963 \\ +473.3 \end{array}$$

$$\begin{array}{r} 27.0787 \\ 27.7350 \\ -6563 \end{array}$$

$$\begin{array}{r} x-s \\ +5271 \\ -1580 \\ -1347 \\ 20.3618 \end{array} \begin{array}{r} +500x \\ +6631 \\ +11357 \\ +13246 \\ +10181 \end{array} = \begin{array}{r} 11902 \\ 9777 \\ 11899 \end{array} \begin{array}{r} -988 \\ -2634 \\ -526 \\ -2654 \\ -1789 \end{array} \begin{array}{r} +1.7x \\ +22 \\ +39 \\ +45 \\ +35.20 \end{array} \begin{array}{r} -9290 \\ 9268 \\ 9251 \\ 9245 \\ 20.2755 \end{array}$$

$$\begin{array}{r} y-y \\ -5109 \\ +4733 \\ -6563 \\ 182569 \end{array} \begin{array}{r} +500y \\ +13442 \\ +2685 \\ +13539 \\ +9128 \end{array} = \begin{array}{r} 8333 \\ 7418 \\ 6976 \\ 6976 \end{array} \begin{array}{r} +102.5x \\ +1359 \\ +2328 \\ +2715 \\ +2087 \end{array} \begin{array}{r} +258 \\ +67 \\ +13 \\ +68 \\ +46 \end{array} \begin{array}{r} -9759 \\ 9759 \\ 9759 \\ 9759 \\ 18.4071 \end{array}$$

$$\begin{array}{r} \text{Tables} \\ a = -0.7 \\ -501.7 \\ -501.0 \end{array} \begin{array}{r} b = -1.2 \\ -502.5 \\ -501.3 \end{array} \begin{array}{r} a-b = +0.5 \\ = +0.8 \\ +0.3 \end{array} \begin{array}{r} b+d = -3.2 \\ -4.5 \\ -1.3 \end{array}$$

14449

Plate Constants.

14

$$\begin{array}{r} x \\ s \\ x-s \end{array} \begin{array}{r} 13.2619 \\ 12.7348 \\ +5.271 \end{array}$$

$$\begin{array}{r} 22.7141 \\ 22.8721 \\ -1.580 \end{array}$$

$$\begin{array}{r} 26.4913 \\ 26.6260 \\ -1.347 \end{array}$$

$$\begin{array}{r} y \\ \eta \\ y-\eta \end{array} \begin{array}{r} 26.8849 \\ 27.3458 \\ -5.109 \end{array}$$

$$\begin{array}{r} 35.3696 \\ 4.8963 \\ +47.33 \end{array}$$

$$\begin{array}{r} 27.0787 \\ 27.7350 \\ -6.563 \end{array}$$

$$\begin{array}{r} x-s \\ +5.271 \\ -1.580 \\ -1.347 \\ 20.3618 \end{array} \begin{array}{r} +5.001 \\ +66.31 \\ +11.357 \\ +13.246 \\ +101.81 \end{array} = \begin{array}{r} 11.902 \\ 97.77 \\ 118.79 \end{array} \begin{array}{r} -9.88 \\ -26.34 \\ -5.26 \\ -26.54 \\ -17.89 \end{array} \begin{array}{r} +1.71 \\ +22 \\ +39 \\ +45 \\ +35 \end{array} \begin{array}{r} -9296 \\ 929 \\ 925.1 \\ 9245 \\ 20.2755 \end{array}$$

$$\begin{array}{r} y-\eta \\ -5.109 \\ +47.33 \\ -65.63 \\ 18.2069 \end{array} \begin{array}{r} +5.008 \\ +13.442 \\ +26.85 \\ +13.539 \\ +9.128 \end{array} = \begin{array}{r} 83.33 \\ 74.18 \\ 69.76 \end{array} \begin{array}{r} +10.25 \\ +13.59 \\ +23.28 \\ +27.15 \\ +20.87 \end{array} \begin{array}{r} +25.8 \\ +67 \\ +13 \\ +66 \\ +46 \end{array} \begin{array}{r} -975.9 \\ 925.9 \\ 975.9 \\ 975.9 \\ 18.4091 \end{array}$$

$$\begin{array}{r} \text{Zetlus} \\ -5.017 \end{array} \begin{array}{r} a = -10.2 \\ -5.017 \end{array} \begin{array}{r} b = -1.2 \\ -5.025 \end{array} \begin{array}{r} a-b = +0.5 \\ +0.8 \end{array} \begin{array}{r} b+d = -3.2 \\ -4.5 \end{array}$$

14449

Moon Center

15-

o-e

1	203630	0.00000 - 6	0.00000	3.93339	+	8
2	20.0000	-0.3630 - 6	0.1322	3.9398	+	61
3	19.0000	-1.3630 - 4	1.8589	3.9524	+	193
4	18.3962	-1.9668 - 1	3.8687	3.9353	+	22
5	18.3794	-1.9836 0	3.9347	3.9347	+	16
6 +	18.5210	-1.8420 + 2	3.3923	3.9429	+	98
7	19.0000	-1.3630 + 4	1.8567	3.9217	-	114
8	19.4104	-0.9526 + 5	0.9063	3.9409	+	78
			5.492	3.9331		

$$\Delta y = 0$$

are:

1	16.2746	-1.9834	3.9339	180
2	16.3067	-1.9513	3.8076	191
3	+16.8111	-1.4469	1.0935	223
4	18.0000	-0.2580	0.0666	263
5	18.2580	0.0000	0.0000	270
6	19.0000	+0.7420	0.5506	292
7	19.7054	+1.4474	1.0650	317
8	20.0000	+1.7420	3.0346	331

Range

1512

$$x = 19$$
$$g =$$

16.8111

19.7054

3 6 5 1 6 5

90

18.25-83

4 mi

16. 2746

	R	

1. 9 8 3 7

Comm R

1	9	8	3	2
---	---	---	---	---

 $x \text{ min}$

18. 3 7 9 4

No

20. 36 31

Moon Cactus

 $x_0 = 20.3630$

4 18. 25-80

14449

Moon Center

15°

0-c

1	20 36 30	00000	-6	00000	39339	+	8
2	20 00 00	+0 36 30	-6	01322	39348	+	67
3	19 00 00	-1 36 30	-4	18589	39524	+	193
4	18 39 62	-1 96 68	-1	38687	39353	+	22
5	18 37 94	-1 98 36	0	39347	39347	+	16
6	18 52 10	-1 84 20	+2	38923	39429	+	98
7	19 00 00	-1 36 30	+4	18567	39217	-	118
8	19 41 04	-0 95 26	+5	09063	39409	+	78
					39331		

Δ₁₀

arc.

1	16 27 46	-1 98 34	39339	180
2	16 30 67	-1 95 13	38076	191
3	16 81 11	-1 49 69	10935	223
4	18 00 00	-0 25 80	00666	263
5	18 25 80	00000	00000	270
6	19 00 00	+0 74 20	05506	292
7	19 70 54	+1 44 74	10650	317
8	20 00 00	+1 74 20	30346	331

Range

151

x = 19

y =

16 81 11

19 70 54

36 51 65

y₀

18 25 83

y_{min}

16 27 46

R

1 98 37

Corr R

1 98 32

x_{min}

18 37 94

x₀

20 36 31

Moon Center

x₀ 20 36 30y₀ 18 25 80

1	- 0.00
2	+ 0.70
3	+ 1.97
4	+ 0.51
5	0.00
6	- 1.36
7	- 1.97
8	- 1.65
	+ 3.18
	- 4.98
	- 1.80

	0 0.0
-	24.1
-	262.1 $\frac{1}{4}$
-	43.3
-	31.7
-	180.0
+	155.0
-	74.0
	+ 155.0
	- 484.1
	- 329.1

-	15.8
-	130.1
-	280.0 $\frac{1}{4}$
-	5.7
-	0.0
+	72.5
-	165.0
+	135.0
	+ 207.5
	- 456.6
	- 249.1

14449

Conditional Equations

16

O-C

1	0.00	-1.98	= + 8	00	+42	= +42	-34
2	-0.36	-1.95	= +67	+ 8	+42	= +50	+17
3	-1.36	-1.45	= +193.4	+31	+31	= +62	+131
4	-1.97	-0.26	= +22	+45	+ 6	= +51	-29
5	-1.98	0.00	= +16	+46	0	= +46	-30
6	-1.84	+0.74	= +98	+42	-16	= +26	+72
7	-1.36	+1.45	= -114	+31	-31	= 0	-114
8	-0.95	+1.74	= +78	+22	-32	= -10	+68

+ 288 - 207

or 62

$$+15.95 - 1.80 = -329.1$$

$$-1.80 + 13.55 = -249.1$$

$$+ () - 0.21 = -37.1$$

$$+13.34 = -286.2$$

$$+ = -21.4$$

$$+15.95 = -329.1 - 38.6 = -367.7 \quad a = -23.0$$

anc 15.1

$$\frac{P}{n} = .16$$

$$\frac{\Sigma K}{n} = +10.1$$

$$\frac{+10.1}{.16} = +63$$

$$\Delta R = +0.8$$

14449

Conditional Equations

16

0-C

1	0 0 0	-4.98	= + 8	0 0	+42	= +42	-34
2	-0.36	-1.95	= +67	+ 8	+42	= +50	+17
3	-1.36	-1.45	= +193	+31	+31	= +62	+131
4	-1.97	-0.26	= +22	+45	+ 6	= +51	-29
5	-1.98	0 0 0	= +16	+46	0	= +46	-30
6	-1.84	+0.74	= +98	+42	-16	= +26	+72
7	-1.36	+1.45	= -114	+31	-31	= -0	-114
8	-0.95	+1.74	= +78	+22	-32	= -10	+68

+ 288 = 207

av 62

$$+15.95 - 1.80 = -329.1$$

$$-1.80 + 13.55 = -249.1$$

$$+ () - 0.21 = -37.1$$

$$+ 13.34 = -286.2$$

$$h = -21.4$$

$$+15.95 = -329.1 + 38.6 = -367.7 a = -28.0$$

arc 15.1

$$\frac{p}{h} = 16$$

$$\frac{E_V}{h} = +10.1$$

$$\frac{+10.1}{.16} = +63$$

$$\Delta R = +0.8$$

14449

Moon's Mean Position.

17

$$\begin{array}{r} X_0 \quad 20.3630'' \\ \quad \quad -12 \\ \hline 20.3618'' \end{array}$$

$$\begin{array}{r} Y_0 \quad 18.2580'' \\ \quad \quad -11 \\ \hline 18.2569'' \end{array}$$

Frame Plate Constants.

$$\begin{array}{r} 20.2755'' \\ 22 \\ \hline -1.7245'' \end{array}$$

$$\begin{array}{r} 18.4071'' \\ 18 \\ \hline +0.4071'' \end{array}$$

$$\begin{array}{r} 0.23666'' \\ 9.98744'' \\ 8.50724'' \\ 1.74198'' \end{array}$$

$$\begin{array}{r} 9.3870'' \\ 04733'' \\ 7.0534'' \\ 6.9137'' \end{array}$$

$$\begin{array}{r} \eta_1 \quad +0.0008'' \\ \eta_0 \quad +0.4063'' \end{array}$$

$$-55.20''$$

$$A = +01 \quad 24 \quad 33.50''$$

$$\alpha_0 \quad 01 \quad 23 \quad 38.30''$$

$$\text{Red} \quad + \quad 4.69''$$

$$\alpha' \quad 01 \quad 23 \quad 42.99''$$

$$\begin{array}{r} 9.60885'' \\ 7.33115'' \\ 2.27770'' \end{array}$$

$$+189.5''$$

$$+03 \quad 09.5''$$

$$D = +13 \quad 39 \quad 28.0''$$

$$S_0 \quad +13 \quad 42 \quad 37.5''$$

$$\text{Red} \quad +29.1''$$

$$S' \quad +13 \quad 43 \quad 06.6''$$

14499

Moons Mean Position

17

$$\begin{array}{r} \chi_0 \quad 20.3630'' \\ \quad \quad -1.2 \\ \hline 20.3618'' \end{array}$$

$$\begin{array}{r} 20.2885'' \\ \quad \quad -2.2 \\ \hline -1.7245'' \end{array}$$

$$\begin{array}{r} 0.23666'' \\ 998744'' \\ 850724'' \\ 1.74198'' \end{array}$$

$$-5520''$$

$$A: +01 \quad 24 \quad 33.50''$$

$$\alpha_0 \quad 01 \quad 23 \quad 38.30''$$

$$\text{Red} \quad + \quad 4.64''$$

$$\alpha' \quad 01 \quad 23 \quad 42.99''$$

$$\begin{array}{r} \chi_0 \quad 18.2580'' \\ \quad \quad -1.1 \\ \hline 18.2569'' \end{array}$$

$$\begin{array}{r} 18.4071'' \\ \quad \quad -18. \\ \hline +0.4071'' \end{array}$$

$$\begin{array}{r} 9.3870'' \\ 04738'' \\ 70534'' \\ 6.9137'' \end{array}$$

$$\begin{array}{r} \eta_1 \quad +00008'' \\ \eta_0 \quad +0.4063'' \end{array}$$

$$\begin{array}{r} 9.60885'' \\ 7.33115'' \\ 2.21770'' \end{array}$$

$$+189.5''$$

$$+03 \quad 09.5''$$

$$E: +13 \quad 39 \quad 28.0''$$

$$\delta_0 +13 \quad 42 \quad 37.5''$$

$$\text{Red} \quad +29.1''$$

$$\delta' +13 \quad 43 \quad 46.6''$$

14449

Lunar Parallax.

18

α	1	23	42.99"	II	58" 39.6"
δ	4	20	30.15"		
$\delta - \alpha'$	+ 2	56	47.16"		9.86913
"	+ 44°	11	47.40"		8.23205"
$\alpha - \alpha'$		15	36.31"		9.84331"
$\delta - \alpha' - "$	+ 43	56	11.09"		0.01353"
					7.95802"
			9.45727"		
			0.00000		
			0.14260		
			0.09987"		
				$\alpha - \alpha'$	+ 31 12.62"
				"	+ 2 04.84"

γ	51	31	50.8"
δ'	13	43	06.6"
$\gamma - \delta'$	37	48	44.2"

9.82640
 9.78751"
 0.10627"
 8.23205"
 7.95223"

$\delta - \delta'$ + 30 47.8"

δ	14	13	54.4"
$\gamma - \delta$	14	13	50.8"
$\delta - \epsilon$			+ 3.6"

curr. 0.0"
 Geo. Cnd. Ref. 0.0

α 01 25 47.83"

$\epsilon - \alpha$ 01 25 46.94"

$\delta - \epsilon$ + 0.89"

curr. + 0.03"

Edge of Moon hard to measure.

α 01 25 47.86

$\delta - \epsilon$ + 0.92

4449

Lunar Parallax.

18

$$\begin{array}{rcl}
 \alpha & 1 & 23 \quad 42.99 \\
 \epsilon & 4 & 20 \quad 30.15 \\
 \alpha' & +2 & 56 \quad 47.16 \\
 - & +4.4^\circ & 11 \quad 47.40 \\
 \lambda & & 15 \quad 36.31 \\
 \alpha - \lambda & +43 & 56 \quad 10.07
 \end{array}$$

$$\begin{array}{rcl}
 \Pi & 58 & 39.6 \\
 & 986 & 913 \\
 & 823 & 205 \\
 & 989 & 332 \\
 & 001 & 353 \\
 & 795 & 802
 \end{array}$$

$$\begin{array}{rcl}
 & 995 & 727 \\
 & 000 & 000 \\
 & 014 & 260 \\
 & 0.0 & 9987
 \end{array}$$

$$\begin{array}{rcl}
 \alpha - \alpha' & +31 & 12.62 \\
 = & +2 & 0489
 \end{array}$$

$$\begin{array}{rcl}
 \gamma & 51 & 31 \quad 50.8 \\
 \delta & 13 & 43 \quad 06.6 \\
 \gamma - \delta & 37 & 48 \quad 44.2
 \end{array}$$

$$\begin{array}{rcl}
 & 982 & 640 \\
 & 978 & 754 \\
 & 0.10 & 629 \\
 & 823 & 205 \\
 & 795 & 228
 \end{array}$$

$$\delta - \delta' \quad +30 \quad 47.8$$

$$\begin{array}{rcl}
 \delta & 14 & 13 \quad 54.4 \\
 \gamma - \delta & 14 & 13 \quad 50.8 \\
 \alpha - \epsilon & & +3.6
 \end{array}$$

$$\begin{array}{rcl}
 \text{cum} & & 0.0 \\
 \text{geoc. Ref.} & & 0.0
 \end{array}$$

$$\begin{array}{rcl}
 \alpha & 01 & 25 \quad 47.83 \\
 \epsilon - \alpha & 01 & 25 \quad 46.99 \\
 \alpha - \epsilon & & +0.89 \\
 \text{cum} & & +0.03
 \end{array}$$

$$\begin{array}{rcl}
 \alpha & 01 & 25 \quad 47.86 \\
 & & +0.92
 \end{array}$$

Cage no 75-9.

57	188 19	17312
99	89 40	17180
13	44 42	80
	14	12
	<u>19.98 72</u>	<u>19.98 62</u>

16300	16496
14000	8796
99	46
00	96
<u>3.2304</u>	<u>3.2300</u>

Cape no 75-9.

$\frac{57}{19.9}$
 $\frac{33}{18814}$
 $\frac{19.9}{894042}$
 $\frac{33}{4414}$
 $\frac{19.9}{19.9872}$

$\frac{17312}{17180}$
 $\frac{80}{12}$
 $\frac{19.9868}{19.9868}$

$\frac{16300}{14000}$
 $\frac{349496}{96}$
 $\frac{00}{00}$
 $\frac{3.2304}{3.2304}$

$\frac{16496}{8796}$
 $\frac{96}{96}$
 $\frac{3.2300}{3.2300}$

14454

Star Measures.

21.

L	17244	16902	16622	15978
148	9484 ₈₂	14660 ₇₀	793430	14660
68	80	80	26	60
	4.4	02	22	78
	<u>147762</u>	<u>147768</u>	<u>6.8692</u>	<u>6.8682</u>
2	16705	16392	16236	16072
215	14072 ₆₉	9028	11458	10848
55	66	28	54 ₅₆	40 ₄₄
	05	92	36	72
	<u>21.2636</u>	<u>21.2636</u>	<u>5.4780</u>	<u>5.4772</u>
3	17248	16730	16946	16420
249	7628	16344	16302	7066
28	28	48 ₄₆	0805	6465
	48	30	46	20
	<u>22.9620</u>	<u>22.9616</u>	<u>28.0641</u>	<u>28.0645</u>
4	16092	16530	16540	16494
291	14498 ₉₄	8124	1104448	11980
266	90	24	52	80
	92	30	40	94
	<u>29.1598</u>	<u>29.1594</u>	<u>26.5492</u>	<u>26.5486</u>

Moon

L		16742	16524
21		158.20 ₂₂	743638
171		24	4038
		42	24
		<u>17.0920</u>	<u>17.0914</u>
2	17716	17830	
20	17298 ₉₆	824.644	
18	94	42	
	16	30	
	<u>20.0420</u>	<u>20.0414</u>	

L
14
682
215
532
228
281
5
4

1

14459

Star Measures.

21.

L	17249	16902	16622	15978
148	9484 ²²	14666 ⁷⁰	7934 ³⁰	14660
68	80	80	26	60
	44	62	22	78
	<u>14.7762</u>	<u>14.7208</u>	<u>68692</u>	<u>68682</u>
3	16705	16392	16236	16072
215	14072	9028	11458	10898
53	66 ⁶¹	28	54 ⁵²	40 ⁴⁴
	05	92	36	72
	<u>21.2636</u>	<u>21.2636</u>	<u>54780</u>	<u>54772</u>
2	17248	16730	16946	16420
228	7628	16344 ⁴⁶	16302	1066
28	28	48	0805	646
	48	30	46	20
	<u>22.9620</u>	<u>22.9616</u>	<u>280641</u>	<u>280645</u>
	16092	16530	16540	16494
1	14498 ⁹⁴	8124	11044 ⁴⁸	11980
5	90	24	52	80
4	92	30	80	94
	<u>29.1598</u>	<u>29.1594</u>	<u>26.5692</u>	<u>26.5486</u>

mean

16742	16524
158.20 ²²	7436 ³⁸
24	40
42	24
<u>17.0920</u>	<u>17.0914</u>

17716	17830
11298 ⁴⁶	8246 ⁴⁴
94	42
16	30
<u>20.0420</u>	<u>20.0414</u>

14454

Moon

22

3	17386	16366	
19.9	9006	14758	5.2
18.7	06	46	
	86	66	
	<u>19.8380</u>	<u>19.8386</u>	

4	17750	16034	
19.9	931214	14472	
19	16	72	
	50	34	
	<u>19.8436</u>	<u>19.8438</u>	

5	17120	16928	
20	10690	13358	
19.6	90	58	
	20	28	
	<u>19.6430</u>	<u>19.6430</u>	

6	16804	17488	
20.3	14796	9488	
20	96	88	
	04	88	
	<u>20.2008</u>	<u>20.2000</u>	

7	16398	16250	
21	997066	1267478	
20.6	62	82	
	98	50	
	<u>20.6432</u>	<u>20.6428</u>	

8	16996	16842	
21.8	896664	14880	
20.8	62	80	
	96	42	
	<u>20.8032</u>	<u>20.8038</u>	

14454

Moon

22

3	17386	16366
199	9006	14758
187	06	46
	86	66
	<u>19.8380</u>	<u>19.8326</u>

4	17750	16034
199	9312	14472
19	16	72
	50	34
	<u>19.8436</u>	<u>19.8438</u>

5	17120	16928
20	10690	13358
116	90	58
	20	28
	<u>19.6430</u>	<u>19.6420</u>

6	16809	17488
203	14796	9488
20	96	88
	09	88
	<u>20.2008</u>	<u>20.2000</u>

7	16398	16250
21	9970	12674
206	62	82
	98	50
	<u>20.6432</u>	<u>20.6428</u>

8	16996	16842
218	8966	14880
208	82	80
	96	82
	<u>20.8032</u>	<u>20.8038</u>

14454

Juno etc

23

Date Dec. 26, 1917

Exp. to Stars	04	51	"	5	03	"
" to Moon	04	56	47.9	4	56	48.2
Clock slow		2	08.6			

H. Sid. Time	04	58	56.65		
H. Long	04	44	31.05		$\Theta = -0^h 16^m$
S. Sid. Time	9	43	27.70		
" " " M.N	18	17	39.07		
Interval	15	25	48.63		
Red.		02	31.67		
G. M. T	15	23	16.96	15 ^h	38804

From Naut. Alman. R.A.				Dec.		
Moon 15 ^h	5	13	28.04	+24	08	11.2
Motion 1 ^m			2.4114			-0.352
" 23 ^m 28.266			56.14			-08.2
Tabular Place.	5	14	24.18	24	08	03.0

934": 149"

Moon's Age 12.6

$a = -499.6$
 $+24.0$
 -475.6

Parallax	56	59.6
Semi-dian	15	33.3
R		933.3
Aug		14.9
Sur 5		-03
R		947.9
R		20319
QR		-966
11+QR		1.9353
R ²		3.7454

14454

June etc

23

Date Dec 26, 1917

Exp to Stars	04	51		5	03	
" to Moon	04	56	47.9	4	56	48.2
Clock slow		2	08.6			

H. Sid June	04	58	56.65
H. Lang	04	44	31.05
B Sid June	9	43	27.70
" " M.N	18	17	39.07
Interval	15	25	48.63
Red		02	31.67
G M.T	15	23	16.96

G = - 0.16

15.6 38804

From Naut. Alman R.A

Dec.

Moon 15.6	5	13	28.04	+24	08	11.2
Motion 1			2.9114			-0.352
" 23.28266			56.14			-08.2
Fatular Place.	5	14	24.18	24	08	03.0

934". 14.9

Moon's Age 12.6

$\alpha = -499.6$
 $+24.0$
 -475.6

Parallax	56	59.6
Semi-diam	15	33.3
R		933.3
Aug		14.9
Dec 5		-03
R		947.9
R		20319
a R		466
1144 R		1.9353
R ²		37454

Cape No 759 mag 7.8

A B

1722 mag 7.8.

0.5 12 32.05

32.09

32.07

0.5 12 32.07

01 01.08

0.5 13 33.15

A 0.5 14 40.00

- 01 06.85

- 66.85

1.82510 m

9.96807

0.30041 m

22

- 1.9971

- 12

S 20.0017

X 19.9872

- .0145

9.994

0.145

9.899

+ 21 41 07.3

07.0

06.8

21 41 07.0

+ 01 09.3

S 21 42 16.3

B 23 43 01.0

S-B - 2 0 44.7

- 72 47.6

- 3.86020

1.19135 m

9.5999

06.008

7.2541

- 15.5364

0.0018

7 2.4654

y 3.2302

y-7 + .7648

16.15

7.648

9.263

C

g

E

m

Prec

α

A

α-A

sin

log

cos

S₀S₀S₁

S

y

15

C

g

E

m

Prec

S

D

S-D

tan

log

S₀

tan

S₂n₁m₀m₁

y

y

y-7

0.5 17 52.66

01 02.57

0.5 18 55.23

0.5 14 40.00

+ 4 15.23

+ 255.22

2.40691

9.95768

0.87183

+ 7.4444

+ 0.0026

29.4470

29.1596

- .2874

14580

11706

24 51 59.8

+ 01 03.8

S + 24 53 03.6

D 23 43 01.0

S-D + 1 10 02.6

+ 42 03.2

3.62358

0.95473

9.6664

1.7437

8.4635

+ 9.0102

+ 0.0291

27.0393

26.5520

- 4873

103276

4873

8403

Did not
use these
stars

14454

Standard Coordinates

24

Cape No. 752 mag. 6.2

Cape No. 761 mag. 5.1

Cape No. 764 mag. 5.2

C	05	09	26.98	5	13	16.07	5	14	09.17
q			27.01			16.04			09.23
z			26.98			16.04			09.15
Mean	05	09	26.98	5	13	16.05	5	14	09.18
Prec		+01	01.24		01	01.24		01	02.66
α	05	10	28.22	5	14	17.29	5	15	11.84
A	05	14	40.00	5	14	40.00	5	14	40.00
$\alpha-A$		-4	11.78			-22.71			+31.84
Sin			-251.77			-22.71			+31.84
log	2.40	101		1.35	622		1.50	297	
cos	9.96	658		9.96	713		9.95	697	
S	0.8	7483		9.8	3059		9.9	6718	

S ₀	-7.49	60		-0.67	70		+0.92	72	
S ₁		36			4			3	
S	14.50	04		21.32	26		22.92	75	
K	14.77	65		21.26	36		22.96	18	
S-S	+27.61			-05.90			+03.43		

C	22	10	13.1	21	59	35.1	25	04	06.20
q			13.0			35.0			05.6
z			12.9			34.9			05.4
m	+22	10	13.0	+21	59	35.0	+25	04	05.7
Prec		+01	13.9		+01	07.0		+01	07.0
S	+22	11	26.9	+22	0	42.0	+25	05	12.7
S	23	43	01.0	23	43	01.0	23	43	01.0

$\alpha-A$	-1	31	34.1	-1	42	19.0	+1	22	11.7
Sin			-5495.4			-6140.8			+4932.6
log	3.74	000		3.78	823		3.69	307	
cos	1.07	115		1.11	938		1.02	422	

log tan	9.66	06		9.60	67		9.67	04	
S ₂	1.74	96		9.66	12		9.93	44	
log	8.41	36		6.32	13		6.65	82	

m ₀	-11.78	00		-13.16	36		+10.57	36	
m ₁	-02.59			+00.02			+0.00	04	
m	6.24	59		4.83	66		28.57	40	
y	6.86	87		5.47	76		+28.06	43	
y-z	+6.22	82		+6.41	10		-50.97		

14459

Cape No. 752 mag. 6.2

Standard Coordinates

Cape No. 764 mag. 5.12

Cape No. 769 mag. 8.2

24

C	0.5	0.9	26.98	5	13	16.01	5	14	09.17
1			27.01			16.04			09.23
2			26.98			16.04			09.15
Mean	0.5	0.9	26.98	5	13	16.05	5	14	09.18
Puc		-0.1	01.24		01	01.24		01	02.66
α	0.5	1.0	28.22	5	14	17.29	5	15	11.89
λ	0.5	1.4	40.00	5	14	40.00	5	14	40.00
$\alpha-A$		-4	11.78			-22.71			+31.94
λ_m			-251.77			-22.71			+31.84
$\log$	2.90	0.00	+	1.35	6.22	~	1.50	2.97	
$\cos$	9.96	60.8		9.96	71.3		9.95	69.7	
S_0	0.8	74.8	3	9.8	30.5	9	9.9	67.1	8

S_0	-7.49	60	-	0.6	770	-	0.9	272	-
S_1	-	36	-	-	4	-	+	3	-
S	14.5	00.4		21.3	226		22.9	275	
λ	14.7	77	-	21.2	636		22.9	618	
$\lambda-S$	+	27.6		-	05.90		+	03.43	

C	22	10	13.1	21	5.9	35.1	25	0.9	06.20
1			13.0			35.0			05.60
2			12.9			34.9			05.40
m	+22	+10	13.0	-21	+5.9	35.0	-25	0.9	05.7
Puc		01	13.9		01	07.0		01	07.0
S	+22	11	26.9	-22	0	42.0	-25	0.5	12.7
S_0	23	43	01.0	23	43	01.0	23	43	01.0
$\alpha-A$	-1	31	34.2	-1	42	19.0	+	1	22
λ_m			-549.54			-6140.8			+4932.6
$\log$	3.74	0.00	~	3.75	8.23	~	3.69	3.07	
$\cos$	1.07	1.15	~	1.11	9.38	~	1.02	4.22	
$\log$	9.6	0.06		9.6	0.67		9.6	7.04	
S_0	1.74	9.6		9.6	6.12		9.9	3.44	
$\log$	8.4	4.36		6.3	2.13		6.6	5.82	

λ_0	-11.78	00	-	13.1	6.36	-	+10.57	36	-
λ_1	+	0.25	9	+	00.02		+	00.00	4
λ_2	6.2	4.52		4.8	3.66		28.5	7.40	
λ_3	6.5	6.87		5.4	7.76		28.0	6.43	
λ_4	+	6.22	8	+	6.41	0	-	5.09	7

S_0	H_0	ΔS	$-S^S$	$+1H$	$+1$
-7.50	-11.78	-37	+ 37 =	0 - 1 =	-1
-0.68	-13.16	- 3	+ 3 =	0 - 1 =	-1
+0.93	+10.57	+ 2	- 5 =	-3 + 1 =	-2
M -0.25	+ 0.90		+ 1	0 = +2 =	+0.01

ΔH_0	$-3.6H$	$-S^S$	$+9$
-55	+ 42 =	-13 + 4 =	-9
-56	+ 41 =	-9 + 0 =	-9
+30	- 38 =	-8 - 0 =	-8
	- 3	0 = +6 =	+0.3

14454

Plate Center + Constants

25-

$$\begin{array}{r}
 22.9618 \quad 28.0643 \quad 5 \quad 15 \quad 11.84 + 25 \quad 05 \quad 12.7 \\
 22. \quad 18. \quad -31.74 \quad -1 \quad 22 \quad 1.15 \\
 \hline
 -0.9618 \quad -10.0643 \\
 \quad 33 \quad \quad 490 \\
 \hline
 -31.74 \quad -493.15
 \end{array}$$

$$A = 5 \quad 14 \quad 40.10$$

Plate Center

$$B + 23 \quad 43 \quad 01.2$$

$$\begin{array}{r}
 X-S + 500X \quad -78.94 \quad -4X \quad -9601 \\
 +2761 + 7388 = 10149 - 542 = 9607 - 6 = 9601 \\
 -0590 + 10632 = 10042 - 433 = 9609 - 8 = 9601 \\
 +0343 + 11481 = 11824 - 2214 = 9610 - 9 = 9601 \\
 21.7730 + 10887 \quad -1489 \quad -8 = 21.7519
 \end{array}$$

$$\begin{array}{r}
 Y-T + 500Y \quad +79.7X \quad +358 \quad -10862 \\
 +6228 + 3434 = 9662 + 1177 = 10839 + 23 = 10862 \\
 +6410 + 2739 = 9149 + 1695 = 10844 + 18 = 10862 \\
 -5097 + 14032 = 8935 + 1830 = 10765 + 98 = 10863 \\
 18.8671 + 9434 \quad +1735 \quad +66 = 18.9044
 \end{array}$$

Tables	a = +0.4	b = +0.4	a-b = 0	b+d = 0.0
abs.	-499.6	-503.5	+3.9	-0.8
	-500.0	-503.9	+3.9	-0.8

14454

Plate Center + Constants

25"

$$22.9618$$

$$28.0643$$

$$5^{\circ} 15'$$

$$11.89 - 25^{\circ}$$

$$0.5^{\circ}$$

$$12.7$$

$$22.$$

$$18.$$

$$-31.79$$

$$+1$$

$$22$$

$$11.5^{\circ}$$

$$-0.9618$$

$$-10.0643$$

$$32$$

$$490$$

$$-31.79$$

$$-493.5$$

$$A = 5^{\circ} 14' 40.10$$

Plate Center

$$B = 23^{\circ} 43' 01.2$$

$$1-S + 500X$$

$$-7898$$

$$-4X$$

$$-9601$$

$$2761 + 7388 = 10149 - 592 =$$

$$9607 - 6 = 9601$$

$$0590 + 10632 = 10042 - 433 =$$

$$9609 - 8 = 9601$$

$$1343 + 11481 = 11224 - 2214 =$$

$$9610 - 9 = 9601$$

$$21.7730 + 10887$$

$$-1489$$

$$-8$$

$$= 21.7519$$

$$4-7 + 5008$$

$$+ 79.7X$$

$$+ 3.58$$

$$= 10862$$

$$+ 6228 + 3434 =$$

$$9662 + 1177 =$$

$$10839 + 23 =$$

$$10862$$

$$+ 6410 + 2739 =$$

$$9149 + 1695 =$$

$$10844 + 18 =$$

$$10862$$

$$- 5097 + 14032 =$$

$$8935 + 1830 =$$

$$10765 + 98 =$$

$$10863$$

$$18.8671 + 9434$$

$$+ 1735$$

$$+ 66 =$$

$$18.9049$$

Tables

$$a + 0.4$$

$$b + 0.4$$

$$G - 0.0$$

$$f + d = 0.0$$

Abs.

$$- 494.6$$

$$- 503.5$$

$$+ 3.9$$

$$- 0.8$$

1
2
3
4
5
6
7
8

14454

Moon Center

26

 $\Delta x = 0$

0 - c

1	21.0000	-0.7740	0	0.5991	3.7511	+	57
2	20.0417	-1.7323		3.0008	3.7525	+	71
3	19.8383	-1.9357		3.7469	3.7469	-	15
4	19.8437	-1.9303		3.7261	3.7438	-	16
5	20.0000	-1.7740		3.1471	3.7493	+	39
6	20.2024	-1.5716		2.4699	3.7536	+	82
7	21.0000	-0.7740		0.5991	3.7466	+	12
8	21.7740	-0.0000		0.0000	3.7504	+	50
				3.890	3.7454		

 $\Delta y = 4$

arc

1	17.0917	-1.7753	-1	3.1520	2.04
2	18.0000	-0.8670	-0	0.7517	243
3	18.8670	0.0000	0	0.0000	270
4	19.0000	+0.1330	0	0.0177	274
5	19.6430	+0.7760	0	0.6022	294
6	20.0000	+1.1330	0	1.2837	306
7	20.6410	+1.7740	+1	3.1475	336
8	20.8035	+1.9365	+1	3.7504	360
				7.052	Range 1.56

$$x = 21 \quad y = 17.0917$$

$$20.6430$$

$$37.7347$$

$$y \quad 18.8673$$

$$y_{\max} \quad 20.8035$$

$$R \quad 1.9362$$

$$\text{Com R} \quad 1.9353$$

$$x_{\min} \quad 19.8383$$

$$x_0 \quad 21.7745$$

$$y_0 \quad 21.7740$$

Moon Center

$$y_0 = 18.8670$$

14454

Moon Center

26

5800

0-C

21.0000	-0.7740	0	0.5991	375111	+	57
20.1917	-1.7323		3.0008	37525	+	71
19.8383	-1.9357		3.7469	37469	+	15
19.8437	-1.9303		3.7261	37438	-	16
20.0000	-1.7740		3.1471	37493	+	39
20.2029	-1.5716		2.4699	37536	+	82
21.0000	-0.7740		0.5991	37466	+	1
21.7740	-0.0000		0.0000	37509	+	50
				37454		

A7.9

arc

17.0917	-1.7753	-1	31520	204
18.0000	-0.8670	-0	0.7517	243
18.8670	0.0000	0	0.0000	270
19.0000	+0.1330	0	0.0177	294
19.6430	+0.7760	0	0.6022	294
20.0000	+1.1330	0	1.2837	306
20.6460	+1.7740	+1	31985	336
20.8035	+1.9365	+1	37509	360

Range 156

$X = 21$
 $Y = 17.0917$
 20.6430
 31.7347
 18.8673
 $Y_{max} = 20.8035$
 $R = 1.9362$
 $Com R = 1.9353$
 $X_{min} = 19.8383$
 $X_0 = 21.7745$

Moon Center

 $X_0 = 21.7740$ $Y_0 = 18.8670$

$$\begin{array}{r}
 1 \quad + 1.35 \\
 2 \quad + 1.51 \\
 3 \quad 0.00 \\
 4 \quad - 0.25 \\
 5 \quad - 1.38 \\
 6 \quad - 1.76 \\
 7 \quad - 1.36 \\
 8 \quad - 0.00 \\
 \hline
 + 2.86 \\
 - 4.75 \\
 \hline
 - 1.89
 \end{array}$$

$$\begin{array}{r}
 - 43.8 \\
 - 122.9 \\
 - 29.2 \\
 + 30.9 \\
 - 64.1 \\
 - 129.0 \\
 - 9.2 \\
 - 0.0 \\
 \hline
 + 30.9 \\
 - 403.2 \\
 \hline
 - 372.3
 \end{array}$$

$$\begin{array}{r}
 - 100.0 \\
 - 61.8 \\
 - 0.0 \\
 - 2.1 \\
 + 30.4 \\
 + 92.7 \\
 + 21.2 \\
 + 97.0 \\
 \hline
 + 241.3 \\
 - 163.9 \\
 \hline
 + 77.4
 \end{array}$$

14454

Conditional Equations.

27

							0 - e
1	- 0.77	- 1.76	= + 5.7	+ 1.6	- 5	= + 11	+ 46
2	- 1.73	- 0.87	= + 7.1	+ 3.6	- 3	= + 33	+ 38
3	- 1.94	0.01	= + 1.5	+ 4.1	0	= + 41	- 26
4	- 1.93	+ 0.13	= - 1.6	+ 4.1	+ 0	= + 41	- 57
5	- 1.77	+ 0.78	= + 3.9	+ 3.7	+ 2	= + 39	0
6	- 1.57	+ 1.13	= + 8.2	+ 3.3	+ 3	= + 36	+ 46
7	- 0.77	+ 1.77	= + 1.2	+ 1.6	+ 5	= + 21	- 9
8	- 0.00	+ 1.94	= + 5.0	+ 0	+ 6	= + 6	+ 44
							+174 - 92

$$+17.39 \quad -1.89 = -372.3$$

or 33

$$-1.89 \quad +12.70 = +10.81$$

$$+ (1) \quad - 0.21 = -40.5$$

$$+12.49 = +36.9 \quad t = +29.6$$

$$+17.39 = -372.3 + 5.6 = -366.7 \quad e = -211$$

arc 156

$$\frac{\phi}{n} = .20$$

$$\frac{\Sigma v}{n} = +10.2$$

$$\frac{+10.2}{.20} = +51$$

$$\Delta R = +0.6$$

1
2
3
4
5
6
7

14454

Conditional Equations

27

1	-0.77	-1.76	= +57	+16	-	5	= +11	+46	
2	-1.73	-0.87	= +71	+3.6	-	3	= +33	+38	
3	-1.94	0.00	= +15	+41		0	= +41	-26	
4	-1.93	+0.13	= -16	+41	+	0	= +41	-57	
5	-1.77	+0.78	= +39	+37	+	2	= +39	0	
6	-1.57	+1.13	= +82	+33	+	3	= +36	+46	
7	-0.77	+1.77	= +12	+16	+	5	= +21	-9	
✓	-0.00	+1.94	= +50	+0	+	6	= +6	+44	

+179 - 92

$$+17.39 \quad -1.892 \quad -372.3$$

or 33

$$-1.89 \quad +12.70 = +77.4$$

$$+0.1 \quad -0.21 = -40.5$$

$$+12.49 = +36.9$$

$$+ + 296$$

$$+17.39 = -372.3 + 57.6 = -366.7 \quad \leftarrow -211$$

arc 156

$$\frac{P}{n} = 20$$

$$\frac{\sum v}{n} = +10.2$$

$$\frac{+10.2}{.20} = +51$$

$$\Delta R = +0.6$$

14459

Moon's Mean Position

28

$$\begin{array}{r} X_0 \quad 21.7740'' \\ \quad \quad - 10 \\ \hline 21.7730 \end{array}$$

$$\begin{array}{r} Y_0 \quad 18.8670'' \\ \quad \quad + 1 \\ \hline 18.8671 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 21.7519 \\ \quad \quad 22 \\ \hline - 0.2481'' \end{array}$$

$$\begin{array}{r} 18.9044'' \\ \quad \quad 18 \\ \hline + 0.9044'' \end{array}$$

$$\begin{array}{r} 9.39463'' \\ 9.96129'' \\ 8.50724'' \\ 0.92610'' \end{array}$$

$$- 8.43''$$

$$A \quad 5' \quad 14 \quad 40.00''$$

$$\alpha_0 \quad 5' \quad 14 \quad 31.57''$$

$$\text{Red} \quad \quad \quad + 6.30''$$

$$\alpha' \quad 5' \quad 14 \quad 37.87''$$

$$\begin{array}{r} 9.6452'' \\ 8.7893'' \\ 7.0534'' \\ 5.4879'' \end{array}$$

$$\eta_0 \quad + 0.9044''$$

$$\begin{array}{r} 9.95636 \\ 7.33115'' \\ 2.62521'' \end{array}$$

$$+ 421.9$$

$$+ 7 \quad 01.9$$

$$D = +23 \quad 43 \quad 01.0''$$

$$\delta_0 = +23 \quad 50 \quad 02.9''$$

$$\text{Red} \quad \quad \quad + 6.6''$$

$$\delta' = +23 \quad 50 \quad 09.5''$$

1445-7

Moon's Mean Position :

2

$$\begin{array}{r} X_0 \quad 21.7740 \\ \quad \quad - 10 \\ \hline 21.7730 \end{array}$$

$$\begin{array}{r} Y_0 \quad 18.8670 \\ \quad \quad + 1 \\ \hline 18.8671 \end{array}$$

From Plate Constants.

$$\begin{array}{r} 21.7519 \\ 22 \\ \hline - 0.2481 \end{array}$$

$$\begin{array}{r} 18.9044 \\ 18 \\ \hline + 0.9044 \end{array}$$

$$\begin{array}{r} 939463 \\ 946129 \\ 850724 \\ 092610 \end{array}$$

$$\begin{array}{r} 964572 \\ 87893 \\ 70534 \\ 54879 \end{array}$$

- 8.43

70 + 09044

A 5 14 40.10

$$\begin{array}{r} 995636 \\ 733115 \\ 262521 \end{array}$$
 α_0 5 14 31.57

Red + 630

+ 421.9

 α' 5 14 37.87

+ 7 01.9

 $D = + 23 \quad 43 \quad 01.0$ $\delta_0 = + 23 \quad 50 \quad 02.9$

Red 06.6

 $\delta' + 23 \quad 50 \quad 09.5$

$$\begin{array}{r}
 11) \quad 05 \quad 07 \quad 51.869^{\circ} \\
 \underline{44.741^{\circ}} \\
 + 7.128
 \end{array}$$

$$\begin{array}{r}
 38 \quad 53 \quad 23.49 \\
 \underline{14.50} \\
 + 8.99
 \end{array}$$

$$\begin{array}{r}
 2 \quad 05 \quad 13 \quad 25.337^{\circ} \\
 \underline{18.021^{\circ}} \\
 + 7.316
 \end{array}$$

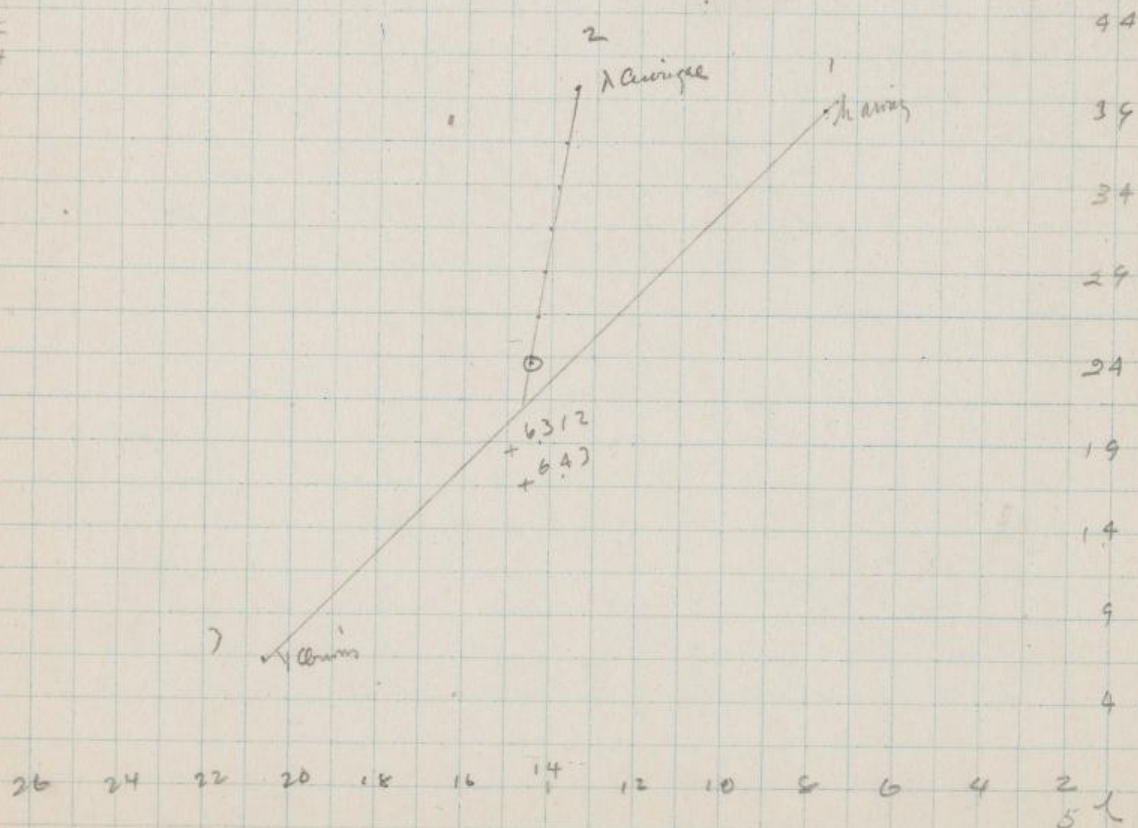
$$\begin{array}{r}
 40 \quad 01 \quad 43.24 \\
 \underline{35.62} \\
 + 8.62
 \end{array}$$

$$\begin{array}{r}
 3 \quad 05 \quad 20 \quad 46.327^{\circ} \\
 \underline{40.711^{\circ}} \\
 + 5.616
 \end{array}$$

$$\begin{array}{r}
 6 \quad 16 \quad 35.43 \\
 \underline{31.57} \\
 + 4.36
 \end{array}$$

$$\begin{array}{r}
 7.128 \\
 \underline{5.616} \\
 1.512
 \end{array}$$

$$\begin{array}{r}
 7.316 \\
 \underline{6.312} \\
 1.004
 \end{array}$$



4454

Reduction to Apparent Place.

29

$H + \alpha_0$	4°	56.6	74°	$9'0$	δ_0	23°	50.1
H	23	42.1			$\cos \delta_0$		9.9613
α_0	5°	14.5			$\log i$		$9.8387m$
β	0	03.0			$..(11)$		$9.8000m$
$B + \alpha_0$	5°	17.5	79°	22.5			

$\cos B + \alpha_0$	9.2664
q	1.4267
$\sin B + \alpha_0$	9.9925
$\tan \delta_0$	9.6452
	8.8239

$\sin \delta_0$	9.6065
$\cos H + \alpha_0$	9.4364
h	1.3109
$\sin H + \alpha_0$	9.9832
$\sec \delta_0$	0.0387
	8.8239

$\log q'$	0.6931
	9.8883
q	

$\log h'$	0.3538
h	0.1567

q'	$+4.096$
q	$+0.773$
q	$+1.434$
Red	$+6.303$

q'	$+4.933$
q	$+2.258$
i	-0.631
Red.	$+6.560$

14454

Reduction to Apparent Place.

29

$H + \lambda_0 = 4 \quad 56.6$
 $H = 23 \quad 42.1$
 $\lambda_0 = 5 \quad 14.5$
 $C = 0 \quad 03.0$
 $C + \lambda_0 = 5 \quad 17.5$

74° 9' 0"

 λ_0

23° 50.1'

cos λ_0

9.9613

log 1

9.8387 m

(11)

9.8000 m

79° 22.5'

cos $C + \lambda_0 \quad 9.2664$
 $\lambda_0 \quad 1.4267$
 sin $C + \lambda_0 \quad 9.9925$
 tan $\lambda_0 \quad 9.6452$
 $\quad \quad 8.8239$

sin λ_0

9.6065

cos $H + \lambda_0$

9.4369

h

1.3109

sin $H + \lambda_0$

9.9832

sec λ_0

0.0397

8.8239

log q' 0.6931
 $\quad \quad 9.8883$

 q' log h'

0.3538

h

0.1567

 λ_0 + 4.096 λ_0 + 0.773 λ_0 + 1.434

Red + 6.303

 q'

+ 4.933

 λ_0

+ 2.258

1

+ 0.631

Red.

+ 6.560

14459

Lunar Parallax

30

α' 5 14 37.87"
 δ 4 58 56.65"
 $\delta - \alpha'$ - 1.5 41.22"
 $=$ -30 55 18.30"
 $\frac{1}{2} \alpha - \alpha'$ - 1 34.80"
 $\delta - \alpha' - "$ -3 53 43.50"

π 56 59.6"
 $\sin \pi$ 9.86913
 $\sin \delta - \alpha'$ 8.21953"
 $\sec \delta$ 0.03972"
 $\sin \alpha - \alpha'$ 6.96340"

9.45727
 0.00000
 0.000100"
 9.95827"

$\alpha - \alpha'$ - 3' 9.60"
 $=$ -12.64"

γ 42 15 04.8"
 δ +23 50 09.5"
 $\gamma - \delta$ 18 24 55.3"

9.82640
 8.21953"
 9.49955"
 0.17238"
 7.71786"

$\delta - \delta'$ + 17 57.2

δ 24 08 06.7
 $\gamma - \delta$ +24 08 03.0"
 $\delta - \delta'$ + 3.7

curr + 0.2"

2nd Ord. Ref - 0.0

δ +24 08 06.9

$\delta - \delta'$ + 3.9

α 05 14 25.23"
 $\gamma - \alpha$ + 05 14 24.18"
 $\delta - \alpha$ + 1.05"

curr + 0.01"

α 05 14 25.24

$\delta - \alpha$ + 1.06

14454

Lunar Parallax

30

α 5 14 37.87
 ϵ 4 54 56.65
 $L \cdot x$ - 15 41.22
 $\quad$ - 30 55 18.30
 $\frac{1}{2} x \cdot x$ - 1 34.80
 $\epsilon - x - "$ - 3 53 43.50

9.45727
 0.00000
 0.00100
 9.45827

Y 42 15 64.8

δ 423 50 69.5

λ 18 24 55.3

9.82640
 8.21953
 9.49955
 0.17238
 7.71786

$\delta \cdot \delta$ + 17 57.2

δ 24 08 06.7

$\frac{1}{2} \delta \cdot \delta$ + 24 08 03.0

$\delta \cdot \epsilon$ + 03.7

Cur + 0.2

$2^{\text{nd}} \text{ Ord. Ref}$ - 0.0

δ + 24 08 06.9

$\delta \cdot \delta$ + 39

$\bar{\pi}$ 56. 59.6

9.86913

$\Sigma \bar{\pi}$ 8.21953

$\Sigma \epsilon \cdot x$ 8.83502

$\Sigma \epsilon \cdot \delta$ 0.03972

$\Sigma x \cdot x$ 6.96340

$\lambda \cdot x$ - 3 9.60

$\quad$ - 12.64

α 05 14 25.23

$\frac{1}{2} \alpha \cdot \alpha$ + 05 14 24.18

$\alpha \cdot \epsilon$ + 1.05

Cur + 0.01

α 05 14 25.24

$\alpha \cdot \alpha$ + 1.06

