

KG
11366
v.948

LXXI

3536

3601

Harvard Lunar Plates

Measures and Reductions

Mary Fowler

Volume LXXI

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Star measures

1914 May 7.

1

d

y

n

d

n

N

1 17421

16160

18340

17940

8.6 11322

1226770

1519588

1109082

27.6 2917

6470

90

8682

30

58

50

40

27.610361088.68486.854

2 16935

1114945

1208780

11138

23.1 1547071

6150

7880

1053946

9.2

62

9700

11520

4246

30

9.1466145123.05620590

3 12661

1025660

16723

16235

26.7 11612

50

1384052

910000

33.2 1621

9221

39

00

45

33.1045103426.71197142

Grade 2.

3536

Star-measures

1914 May 7

1

α μ ν
 $\frac{1}{17421}$ 16160
 8.6 11322 1226770
 27.6 2917 64
 30 58
 27.6103 6108

α μ ν
 18340 17940
 15195 88 1109082
 90 86
 50 40
 8.6848 6854

$\frac{2}{16935}$ 1114945
 231 1547071 6150
 92 62 9700
 30
 9.1466 1451

1208780 11138
 78 10.53946
 11520 42
 23.0562 0596

$\frac{3}{12661}$ 1025660
 467 11612 50
 33.2 1621 9221
 33.1045 1034

16723 16235
 1384052 910000
 39 00
 29 45
 26.7119 7142

Grade 2.

Re-measures

<u>3</u>	16984	15250
	1311501	9150
	09	4949
	94	55
	<u>19.3880</u>	<u>.3896</u>

<u>4</u>	18179	16720
	1205862	1187962
	52	65
	85	73
	<u>20.4875</u>	<u>4903</u>

<u>6</u>	16311	14571
	734770	13520
	637150	1929
	28	89
	<u>21.8966</u>	<u>.8950</u>

<u>8</u>	15991	14958
	1124858	9699
	5048	9899
	97	68
	<u>22.4743</u>	<u>.4736</u>

Approx Center

$20 - 20.04 = 19.3888$
 21.8958
 41.2846
 $Y_0 = 20.6423$
 $21 - \text{min} = 22.4740$
 $R = 1.8317$
 $X_0 - \text{max} = 20.4889$
 $X_0 = 18.6572$

3536. y moon - Measures

2

d	v	d	v
1 18929	17995	15476	19020
197 17610	931660	1245150	1203030
191 0505	06	49	2930
29	89	76	15
<u>19.1322</u>	<u>1317</u>	<u>19.6974</u>	<u>6986</u>

2 18894	18037
20.0 15029	1190705
19.5 1615	10
99	19
<u>19.3876</u>	<u>3881</u>

3
20.4
20.0

17720	18510
11489	1473730
1560	27
16	06
<u>20.3767</u>	<u>3777</u>

4
20.5
20.6
max
in
x

18189	18576
13070	1368078
7875	82
00	80
<u>20.4880</u>	<u>4878</u>

5
20.5
21.0

18156	19642
1274750	1504244
47	40
70	40
<u>20.9585</u>	<u>4599</u>

6 20.0 16776	19845
21.9 782122	1880101
29	90
88	45
<u>21.8965</u>	<u>8952</u>

3536 known measures

2

α	δ	α	δ	α	δ	α	δ
18929		17995		15476		19020	
197 17010		931660		1245150		1203030	
191 0505		06		49		29	
29		89		76		15	
19.1322		1317		19.6974		6986	

2 18894	18037
20 15029	1190705
155 1611	10
99	19
<u>19.3876</u>	<u>3881</u>

3
204
200

17720	18510
11489	1473730
16	27
	06
<u>20.3767</u>	<u>3777</u>

4
20.5
20.6
max
20

18189	18576
13070	1368078
7875	82
00	80
<u>20.4880</u>	<u>4878</u>

5
20.5
210

18156	19642
1274750	1504244
47	40
70	40
<u>20.9585</u>	<u>4599</u>

200 16776	19845
219 7821	1880101
22 29	90
88	45
<u>21.8965</u>	<u>8952</u>

3556

d

4

known measures

x

3

$$\begin{array}{r}
 7 \quad 17108 \quad 15035 \\
 19.0 \quad 1266470 \quad 9475 \\
 22.9 \quad \quad 69 \quad 75-78 \\
 \quad \quad 10 \quad 29 \\
 \hline
 22.4441 \quad 4444
 \end{array}$$

$$\begin{array}{r}
 8 \quad 17140 \quad 15000 \\
 18.6 \quad 1238885- \quad 975854 \\
 22.5 \quad \quad 90 \quad 5954 \\
 \text{max} \quad 49 \quad 95 \\
 \text{in} \quad 22.4756 \quad 4760
 \end{array}$$

$$\begin{array}{r}
 9 \quad 16220 \quad 15919 \\
 18.0 \quad 1273105 \quad 943328 \\
 22.9 \quad \quad 2810 \quad 21 \\
 \quad \quad 19 \quad 19 \\
 \hline
 22.3502 \quad 3508
 \end{array}$$

3536

d

known measures

3

2	17108	15035
190	1266470	9475
229	69	75-78
	10	29
	<u>22.4441</u>	<u>4444</u>

8	17140	15000
186	1238885-	9758
225	90	5954
max	49	95
	<u>22.4716</u>	<u>4760</u>

9	16220	15919
180	1273105	943328
229	2810	21
	19	19
	<u>22.3502</u>	<u>3508</u>

3536	Times etc.								
App. to star	1913 July 22,	23 ^h	37 ^m			-23 ^h	49 ^m		
all worn		23	42	45.4		-23	42	45.6	
clockfast			1	41.1					
H Sid T.		23	41	044		0-0	-0 ^h	05 ^m	
Khomp		4	44	31.05					
G. Sid T.		28	25	3545					
Sid T. in moon		7	58	31.54					
Interval		20	27	0391					
Red.			3	2102					
G. W. T.		20	23	4289					

From Hunt Allen	R. A.	Decl.			
Moon 20 ^h	23 ^h 45 ^m	17° 46'	-10° 32'	28.0	
Motion in 1.7328 ^v			1412 ^v		
23.715 ^v	T 41.09 ^v		+5	35.0	
Tabular place	23 45 58.55 ^v	-1	26	53.0	

Moon's age 19 days

parallax

semidiameter

R

Augmentation

Irradiation (2) 3.7

R

R

$$a = -499.4$$

$$(1+a)R$$

$$R^2$$

$$54' 08'' 16''$$

$$14' 46.7''$$

$$886.7''$$

$$+102''$$

$$-0.5''$$

$$896.4''$$

$$1.9215 - 0960$$

$$1.8255$$

$$3.3325$$

$$1.9215 - 920$$

$$1.8295$$

$$3.3470$$

35-36	Times etc							
Exp. station 1913 July 22,	23 ^h	37 ^m			-23 ^h	49 ^m		
" Moon	23	42	454		-23	42	456	
Clockfast		1	411					
H Sid T.	23	41	044		0-23	-0 ^h	05 ^m	
H Hourp	4	44	3105					
G Sid T.	28	25	3545					
Sid T in Moon	7	58	3159					
Interval	20	27	0391					
Recl		3	2102					
G in T	20	23	4289					

From Mount Allen			R A		Recl		
Moon 20 ^h	23 ^h	45 ^m	1746		-1 ^h	32 ^m	28 ^s 0
Moon at 17328					14125		
23.715			4109		15	350	
Tabular place	23	45	5855		-1	26	530

Moon's age 19 days

parallax	54	0816	
semidiam	14	46.7	
R		8807	
Augmentation		+102	
Parallax (v)		-0.5	
R		8964	
R		19215	-960
(1+a)/R		18255	
R ²		33325	

$$a = -499.4$$

$$19215 - 920$$

$$18295$$

$$33470$$

2
3
2-
9
2
4-
2
-
-1
-1
18
18
4
-1
+
-1
2
2

3536

Plate Constants

α	86851	23.0576	26.7130
δ	93976	24.6593	28.2749
$\alpha-\delta$	-7125	-1.6017	-1.5619

η	276106	9.1458	33.1040
μ	28.1700	89120	341081
$\eta-\mu$	-5594	+2338	-1.0041

$$\begin{array}{rcll}
 \alpha-\delta & +500x & -92.84 & -0.62 & +5350 \\
 -7125 + 4343 & = -2782 & -2562 & -5344 & -5 & = -5349 & = +1 \\
 -16017 + 11529 & = -4488 & -849 & -5337 & -14 & = -5351 & = -1 \\
 -15619 + 13357 & = -2262 & -3072 & -5334 & -16 & = -5350 & = 0 \\
 18.6711 + 9336 & = & -1916 & -11 & = 199470 \\
 18.6662 + 9333 & & -1916 & -11 & = 19.9418
 \end{array}$$

$$\begin{array}{rcll}
 \eta-\mu & +500y & +9362 & +2.44 & -9090 \\
 -5594 + 13805 & = +8211 & +813 & +9024 & +66 & = +9090 & = 0 \\
 +2338 + 4573 & = +6911 & +2158 & +9069 & +22 & = +9091 & = +1 \\
 -10041 + 16552 & = +6511 & +2500 & +9011 & +79 & = +9090 & = 0 \\
 20.6474 + 10324 & & +1748 & +50 & = 20.9506 \\
 20.6449 + 10322 & & +1747 & +50 & = 20.9478
 \end{array}$$

$$\begin{array}{lcl}
 \text{Tables } a = -0.8 & c = -3.6 & a - c = +2.8 & b + a = +0.0 \\
 \text{Obs } a = -499.4 & c = -502.4 & a - c = +3.0 & b + a = -0.8
 \end{array}$$

$$O - C \quad +498.6'' \quad +498.8'' \quad -0.8$$

1913phae.proj.19

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3530

Plate Constants

α	86851	230576	267130
δ	93976	246593	282749
$\alpha-\delta$	-7125	-16017	-15619

η	276106	91458	331040
η	281700	89120	341081
$\eta-\eta$	-5594	+2338	-10041

$2-3$	+5002	-9284	-0.62	+5350
-7125 + 4343	= -2782	-2562	= -5344	-5 = -5349 = +1
-16017 + 11529	= -4488	-849	= -5337	-14 = -5351 = -1
-15619 + 13357	= -2262	-3072	= -5334	-16 = -5350 = 0
180711 + 9336	= 19007	-1916	= -11	2199470
186662 + 9333	= 19599	-1916	= -11	= 199418

$\eta-\eta$	+15004	+9362	+241	-9090
-5594 + 13805	= +8211	+813	= +9024	+66 = +9090 = 0
+2338 + 4573	= +6911	+2158	= +9069	+22 = +9091 = +1
-10041 + 16552	= +6511	+2500	= +9011	+79 = +9090 = 0
206474 + 10324	= 21679	+1748	= +50	= 2094506
206449 + 10322	= 21671	+1747	= +50	= 209478

Tables $a = -0.8$ $c = -3.6$ $a - c = +2.8$ $b + a = +0.0$
 obs $a = -4.994$ $c = -5.024$ $a - c = +3.0$ $b + a = -0.8$

1
2
3
4
5
6
7
8
91
2
3
4
5
6
7
8
9

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Moon's Center.

	x	$z - x_0$	$(z - x_0)^2$	$(z - x_0)^2 + (y - y_0)^2$	$0 - c$
1	19.6980	+1.0410	1.0837	3.3650	+325
2	20.0000	+1.3430	1.8036	3.3774	+449
3	20.3772	+1.7202	2.9591	3.3715	+390
4	20.4889	+1.8319	3.3558	3.3558	+233
5	20.4592	+1.8022	3.2479	3.3761	+436
6	20.0000	+1.3430	1.8036	3.3764	+439
7	19.0000	+0.3430	0.1176	3.3673	+348
8	18.6570	0.0000	0.0000	3.3647	+322
9	18.0000	-0.6570	0.4316	3.3520	+195

Comp $R^2 = 33325$

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	19.1320	-1.5100	-4	2.2813	146 ✓
2	19.3878	-1.2542	-3	1.5738	133 ✓
3	20.0000	-0.6420	-2	0.4124	110 ✓
4	20.6420	0.0000	0	0.0000	90 ✓
5	21.0000	+0.3580	0	0.1282	79 ✓
6	21.8958	+1.2538	+3	1.5728	47 ✓
7	22.4442	+1.8022	+5	3.2497	11 ✓
8	22.4758	+1.8338	+5	3.3647	0 ✓
9	22.3505	+1.7085	+4	2.9204	339 ✓

Range 167

Approximate Center.

$$x = 20.0 \quad y = 19.3878$$

$$21.8958$$

$$412836$$

$$y_0 = 20.6418$$

$$y = \max = 22.4758$$

$$R = 1.8340$$

$$x = \max = 20.4889$$

$$x_0 = 18.6549$$

Remeasures

$$19.3888$$

$$21.8958$$

$$412846$$

$$20.6423$$

$$22.4740$$

$$1.8317$$

$$20.4889$$

$$18.6572$$

see next Page

$$\text{Center } \left\{ \begin{array}{l} x_0 = 18.6570 \\ y_0 = 20.6420 \end{array} \right.$$

$$x_0 = 18.6640$$

1
2
3
4
5
6
7
8
91
2
3
4
5
6
7
8
9

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Moon's Center

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	19.6980 + 1.0410	1.0837	3.3650	+ 325	
2	20.0000 + 1.3430	1.8036	3.3774	+ 449	
3	20.3772 + 1.7202	2.9591	3.3715	+ 390	
4	20.4889 + 1.8319	3.3558	3.3558	+ 233	
5	20.4592 + 1.8022	3.2479	3.3761	+ 436	
6	20.0000 + 1.3430	1.8036	3.3764	+ 439	
7	19.0000 + 0.3430	0.1176	3.3673	+ 348	
8	18.6570 0 0000	0.0000	3.3647	+ 322	
9	18.0000 - 0.6570	0.4316	3.3520	+ 195	

Comp R^2 : 33325

	y	$y - y_0$	Δy	$(y - y_0)^2$	
1	19 1320	-1.5100	-4	2.2813	146
2	19 3878	-1.2542	-3	1.5738	183
3	20 0000	-0.6420	-2	0.4124	110
4	20.6420	0.0000	0	0.0000	90
5	21 0000	+0.3580	0	0.1282	99
6	21.8958	+1.2538	+3	1.5728	47
7	22.4442	+1.8022	+5	3.2497	11
+8	22.4758	+1.8338	+5	3.3647	0
9	22.3505	+1.7085	+4	2.9204	339

Range 167

Approximate Center.

$x = 20.0 \quad y = 19.3878$

21.8958

4.12836

$y_0 = 20.6418$

$y = \max = 22.4758$

$R = 1.8340$

$x = \max = 20.4889$

$x_0 = 18.6549$

Remainders

19.3888

21.8958

4.12846

20.6423

22.4740

1.8317

20.4889

18.6572

$$\text{Center } \left\{ \begin{array}{l} x_0 = 18.6570 \\ y_0 = 20.6420 \end{array} \right.$$

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Moon's Center

7

	x	$(x - x_0)$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$o - c$
1	19.6980	+1.0340	1.0692	3.3505	+180
2	20.0000	+1.3360	1.7849	3.3587	+262
3	20.3772	+1.7132	2.9351	3.3475	+150
4	20.4889	+1.8249	3.3302	3.3302	-23 $\frac{1}{4}$ wt
5	20.4592	+1.7952	3.2227	3.3509	+184
6	20.0000	+1.3360	1.7849	3.3577	+252
7	19.0000	+0.3360	0.1129	3.3626	+301
8	18.6570	-0.0070	0.0000	3.3647	+322
9	18.0000	-0.6640	0.4409	3.3613	+288

Comp $R^2 = 3.3325$ Comp $R^2 = 3.3470$

	$(y - y_0)^2$	$o - c$
1	2.2813	+35
2	1.5738	+117
3	0.4124	+5
4	0.0000	-168
5	0.1282	+39
6	1.5728	+107
7	3.2497	+156
8	3.3647	+177
9	2.9204	+143

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Moon's Center

	x	$(x - x_0)$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$O - C$
1	19.6480	+1.0340	1.0692	3.3505	+1.50
2	20.0000	+1.3360	1.7849	3.3587	+2.62
3	20.3772	+1.7132	2.9351	3.3475	+1.50
4	20.4889	+1.8249	3.3302	3.3302	-2.3 $\frac{1}{4}$
5	20.4592	+1.7952	3.2227	3.3509	+1.84
6	20.0000	+1.3360	1.7849	3.3577	+2.52
7	19.0000	+0.3360	0.1129	3.3626	+3.01
8	18.6570	-0.0070	0.0000	3.3647	+3.22
9	18.0000	-0.6640	0.4409	3.3613	+2.88

Comp R^2 ~~3.3325~~Comp R^2 3.3470

$O - C$
 + 3.5
 + 1.17
 + .5
 - 1.68
 + .39
 + 1.07
 + 1.56
 + 1.77
 + 1.43

 $(y - y_0)^2$

1	2.2813
2	1.5738
3	0.4124
4	0.0000
5	0.1282
6	1.5728
7	3.2497
8	3.3647
9	2.9204

Formation of Normals

1	- 1.56	+ 185.8	- 272.0
2	- 1.67	+ 351.0	- 327.5
3	- 1.09	+ 256.5	- 96.0
⁴ ₄	+ 0.00	- 2.6	- 0.0
5	+ 0.65	+ 331.0	+ 66.3
6	+ 1.67	+ 338.0	+ 315.0
7	+ 0.61	+ 102.2	+ 542.0
8	- 0.02	- 3.2	+ 589.0
9	- 1.13	- 190.0	+ 493.0
	- 254	+ 1368.7	+ 1309.8

See page 10

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Moon's Center Conditional Equations.

8

	O	C	O - C
1	+ 1.03 - 1.51 = + 180	+ 147 - 163 = - 16	+ 196
2	+ 1.34 - 1.25 = + 262	+ 191 - 135 = + 56	+ 206
3	+ 1.71 - 0.64 = + 150	+ 243 - 69 = + 174	- 24
$\frac{1}{4}$ 4	+ 1.82 + 0.00 = - 23	+ 65 + 0 = + 65	- 71 $\frac{1}{4}$ wt
5	+ 1.80 + 0.36 = + 184	+ 256 + 39 = + 295	- 111
6	+ 1.34 + 1.25 = + 252	+ 191 + 135 = + 326	- 74
7	+ 0.34 + 1.80 = + 301	+ 48 + 194 = + 242	+ 59
8	- 0.01 + 1.83 = + 322	- 1 + 197 = + 196	+ 126
9	- 0.66 + 1.71 = + 288	- 94 + 184 = + 90	+ 198
			+ 785 - 280

Average = 129

Normal Equations.

$$\begin{array}{rcl}
 + 11.56 - 25.4 & = & + 1369 \\
 - 25.4 + 15.50 & = & + 1310
 \end{array}$$

$$\begin{array}{rcl}
 + 25.4 - 0.56 & = & + 301 \\
 + 14.94 & = & + 1611
 \end{array}$$

$$b = + 107.8$$

$$+ 11.56 = + 1369 + 274 = + 1643$$

$$a = + 142.2$$

see page 10

$$\text{Arc measured} = 167^\circ \quad \text{Average}(O-C) = +61$$

$$\frac{p_0}{n} = 0.24$$

$$+ \frac{61}{24} = +2.54 \quad \Delta n = +2.3$$

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Procrustes Conditional Equations

8

	O	C	O - C
1	+ 1.03 - 1.51 = + 1.80	+ 147 - 163 = - 16	+ 196
2	+ 1.34 - 1.25 = + 2.62	+ 191 - 135 = + 56	+ 206
3	+ 1.71 - 0.64 = + 1.50	+ 243 - 69 = + 174	- 24
4	+ 1.82 + 0.00 = - 23	+ 65 + 0 = + 65	- 71 $\frac{1}{4}$
5	+ 1.80 + 0.36 = + 1.84	+ 256 + 39 = + 295	- 111
6	+ 1.34 + 1.25 = + 2.52	+ 191 + 135 = + 326	- 74
7	+ 0.34 + 1.80 = + 3.01	+ 48 + 194 = + 242	+ 59
8	- 0.01 + 1.83 = + 3.22	- 1 + 197 = + 196	+ 126
9	- 0.66 + 1.71 = + 2.88	- 99 + 184 = + 90	+ 198
			+ 785 = 280

Normal Equations

Average = 129

$$\begin{aligned}
 + 11.56 &= 2.54 = + 1369 \\
 - 2.54 + 1.51 &= + 1310
 \end{aligned}$$

$$\begin{aligned}
 - 2.54 &= 0.56 = + 301 \\
 + 14.94 &= + 1611
 \end{aligned}$$

$$+ 11.56 = + 1369 + 274 + 1693$$

$$b = + 107.8$$

$$a = + 142.2$$

see page 10

$$\text{Arc measured} = 167^\circ \quad \text{Average}(O-C) = +61$$

$$\frac{61}{24} = 0.24$$

$$+ \frac{61}{24} = + 2.54 \quad \Delta z = + 2.3$$

35-36 Moon's mean Position (1913.0)

$$\begin{array}{r} X_0 = 18.6640 \quad Y_0 = 20.6420 \\ \pm a = + \quad 71 \quad \pm b = + \quad 54 \\ \hline 18.6711 \quad 20.6474 \end{array}$$

From plate constant $X = 19.9470$ $Y = 20.9506$

$$z = +1.9470$$

$$\eta = -1.0494$$

$$\begin{array}{r} \log z = 0.28937 \\ -\cos \delta = 9.99971 \\ 8.50724 \\ \hline 1.78242 \end{array}$$

$$\begin{array}{r} \log \tan \delta = 8.5610m \\ 0.5787 \\ 7.0534 \\ \hline 6.1931m \end{array}$$

$$\eta_1 = -1$$

$$\delta - A = + 1 \ 00.59.$$

$$H = 23 \ 45 \ 00$$

$$X_0 = 23 \ 46 \ 00.59$$

$$\text{Red:} \quad + \quad 2.55$$

$$V = 23 \ 46 \ 03.14$$

$$\eta_0 = \sqrt{1.0493}$$

$$\begin{array}{r} \log \eta_0 = 0.02090m \\ 7.33115 \end{array}$$

$$2.68995m$$

$$\delta - D = - \quad 8 \ 09.5$$

$$D = -1 \ 56 \ 36$$

$$S_0 = -2 \ 04 \ 45.5$$

$$\text{Red:} \quad + \quad 16.1$$

$$X = -2 \ 04 \ 29.4$$

see page

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35-36 known mean Position (1913.0)

$$X_0 = 18.6640 \quad Y_0 = 20.6420$$

$$\begin{array}{r} 18.6640 \\ + \quad 71 \\ \hline 18.6711 \end{array} \quad \begin{array}{r} 20.6420 \\ + \quad 54 \\ \hline 20.6474 \end{array}$$

from plate constant $X = 19.9470 \quad Y = 20.9506$

$$z = +1.9470$$

$$\eta = -1.0494$$

$$\begin{array}{r} \log z = 0.28937 \\ \text{cos} \quad 9.99971 \\ 8.50724 \\ \hline 1.78242 \end{array}$$

$$\begin{array}{r} \log \tan \delta = 8.5610 \\ 0.5787 \\ \hline 7.0534 \\ 6.1931 \end{array}$$

$$\eta_1 = -1$$

$$\delta - A = +1.0059$$

$$A = 23 \quad 45 \quad 00$$

$$\alpha_0 = 23 \quad 46 \quad 00.59$$

$$\text{Red:} \quad + \quad 2.55$$

$$v = 23 \quad 46 \quad 03.14$$

$$\eta_1 = 1.0493$$

$$\begin{array}{r} \log \eta_1 = 0.02090 \\ 7.33115 \end{array}$$

$$2.68995$$

$$\delta - D = -8.09.5$$

$$D = -1.56.36$$

$$S_0 = -2.04.45.5$$

$$\text{Red:} \quad + \quad 16.1$$

$$x = -2.04.29.4$$

Formation of Normals

an

bn

 $\Delta 145 -$

1	+ 149.4	- 219.0
2	+ 194.3	- 181.2
3	+ 247.9	- 92.8
4	+ 17.4	- 0.0
5	+ 261.0	+ 52.2
6	+ 194.3	+ 181.2
7	+ 49.3	+ 261.0
8	- 1.4	+ 265.4
9	- 95.7	+ 248.0
	+ 1016.5	+ 514.8

$$\begin{array}{r}
 + 1368.7 \\
 - 1016.5 \\
 \hline
 + 352.2
 \end{array}$$

$$\begin{array}{r}
 + 1369.8 \\
 + 514.8 \\
 \hline
 + 795.0
 \end{array}$$

- a	- b	- 7 ^v + ΔC
+ 5	- 3	- 5 ^v
+ 7	- 2	- 2 ^v
+ 8	- 1	+ 0 ^v
+ 9	+ 0	+ 2 ^v
+ 9	+ 1	+ 3 ^v
+ 7	+ 2	+ 2 ^v
+ 2	+ 4	- 1 ^v
- 0	+ 4	- 3 ^v
- 3	+ 3	- 7 ^v

$$- 25.7 + 15.50 = + 3.55 \Delta$$

$$+ [] - 0.06 = + 0.19 \Delta$$

$$+ 15.89 = + 3.78 \Delta$$

$$+ 11.56 = + 8.71 \Delta + 0.61 \Delta = + 8.32 \Delta$$

3536

10

Conditional Equations

	O	C	O-C	Corr
1	+1.03 - 1.51 = +35	+48 - 89 = -41	+76	+71
2	+1.34 - 1.25 = +117	+62 - 74 = -12	+129	+129
3	+1.71 - 0.64 = +5	+79 - 38 = +41	-36	-36
4	+1.82 + 0.00 = -168	+21 + 0 = +21	-63	-61
5	+1.80 + 0.36 = +39	+84 + 21 = +105	-66	-63
6	+1.34 + 1.25 = +107	+62 + 74 = +136	-29	-27
7	+0.34 + 1.80 = +156	+16 + 106 = +122	+34	+33
8	-0.01 + 1.83 = +177	0 + 108 = +108	+69	+66
9	-0.66 + 1.71 = +143	31 + 101 = +70	+73	+66

+381 - 194

Average = 70

Normal Equations

$$+1156 - 254 = +352$$

$$+8.71 \Delta$$

$$-254 + 1550 = +795$$

$$+3.55 \Delta$$

$$+254 - 0.56 = +77$$

$$+1494 = +872$$

$$t = +58.9 + 0.24 \Delta$$

$$+1156 + 352 + 149 = +507$$

$$a = +43.5 + 0.72 \Delta$$

$$\text{In } 3.7 \quad p = 1.83$$

$$-2RC = -0.37$$

$$\Delta \delta = -0.09 \quad \Delta \alpha = 0.0$$

$$\Delta \eta = -0.27 \quad \Delta \kappa = -0.01$$

$$\text{Arc measured } 167^\circ \quad \text{Average}(O-C) = +23$$

$$\frac{nc}{n} = 0.24$$

$$+ \frac{23}{24} = +0.94 \quad \Delta n = +1.0$$

$$\text{Corr} = +.1$$

$$\Delta R = +0.9$$

3536

Conditional Equations

	O	C	O-C
1	+ 1.03 - 1.51 = + 35	+ 48 - 89 = - 41	+ 76
2	+ 1.34 - 1.25 = + 1.17	+ 62 - 74 = - 12	+ 1.29
3	+ 1.71 - 0.64 = + 5	+ 79 - 38 = + 41	- 36
4	+ 1.82 + 0.00 = - 1.68	+ 21 + 0 = + 21	- 63
5	+ 1.80 + 0.36 = + 39	+ 84 + 21 = + 105	- 66
6	+ 1.34 + 1.25 = + 1.07	+ 62 + 74 = + 136	- 29
7	+ 0.34 + 1.80 = + 1.56	+ 16 + 106 = + 122	+ 34
8	- 0.01 + 1.83 = + 1.77	- 0 + 108 = + 108	+ 69
9	- 0.66 + 1.71 = + 1.43	- 31 + 101 = + 70	+ 73
			+ 381 - 194
			Average = 70

Normal Equations

$$+ 11.56 - 2.54 = + 352$$

$$- 2.54 + 15.50 = + 795$$

$$+ 2.54 - 0.56 = + 77$$

$$+ 14.94 = + 872$$

$$+ 11.56 + 352 + 149 = + 531$$

$$t = + 58.9$$

$$a = + 48.5$$

Arc measured 117° Horizontal (O-C) = + 23

$$\frac{nc}{n} = 0.24$$

$$+ \frac{23}{24} = + 0.94 \quad \Delta n = + 1.0$$

$$\begin{array}{r}
 3536 \\
 \alpha = 23^h 46^m 03.14 \\
 \delta = 23 \quad 41 \quad 09.4 \\
 G - \alpha = -4 \quad 58.74 \\
 \quad \quad \quad 1^{\circ} 14' 44'' \\
 \quad \quad \quad 0 \quad 26 \\
 \quad \quad \quad 1 \quad 14 \quad 15
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.00010 \\
 \hline
 9.95737
 \end{array}$$

$$\begin{array}{r}
 \delta = 42 \quad 11 \quad 34 \\
 \quad \quad - 2 \quad 04 \quad 29 \\
 \quad \quad 44 \quad 16 \quad 03
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 8.19719 \\
 9.84386 \\
 \hline
 017287 \\
 8.04032
 \end{array}$$

$$\delta - \delta' = +37 \quad 43.4$$

$$\delta = -1 \quad 26 \quad 46.0$$

$$\text{Naut Alt } \delta = -1 \quad 26 \quad 53.0$$

$$0 - c$$

$$+ 7.0$$

Lunar Parallax.

$$\delta' = -2^{\circ} 04' 29.4''$$

$$\pi = 54' 08.16''$$

$$\begin{array}{r}
 9.86913 \\
 8.19719 \\
 8.33682 \\
 0.00014 \\
 \hline
 6.40328
 \end{array}$$

$$\alpha - \alpha' = 0' 52.21''$$

$$= -03.48$$

see next page

$$\alpha = 23 \quad 45 \quad 59.66$$

$$\alpha = 23 \quad 45 \quad 58.55$$

$$+ 1.11$$

1000 0.0000

8000 0.0000

1000 0.0000

2000 0.0000

3000 0.0000

4000 0.0000

5000 0.0000

6000 0.0000

7000 0.0000

8000 0.0000

9000 0.0000

10000 0.0000

11000 0.0000

12000 0.0000

13000 0.0000

14000 0.0000

15000 0.0000

16000 0.0000

17000 0.0000

18000 0.0000

19000 0.0000

20000 0.0000

$$\begin{array}{r}
 3536 \\
 \alpha - 23'' 46 - 03.14 \\
 \delta - 23 41 09.4 \\
 \theta - \alpha - 4 58.74 \\
 - 1 14' 40'' \\
 - 0 26 \\
 - 1 14 15
 \end{array}$$

$$\begin{array}{r}
 995727 \\
 000000 \\
 000010 \\
 \hline
 995737
 \end{array}$$

$$\begin{array}{r}
 \delta = 42 11 34 \\
 - 2 04 29 \\
 44 16 03
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 8.19719 \\
 9.84386 \\
 \hline
 0.17287 \\
 8.04032
 \end{array}$$

$$\delta - \delta' = +37 43.4$$

$$\delta = -1 26 46.0$$

$$\text{Naut Ellip } \delta = -1 26 53.0$$

$$0 - \epsilon + 7.0$$

Lunar Parallax.

$$\delta = -2^{\circ} 04' 29''$$

$$\bar{\pi} = 54' 08''.16$$

$$\begin{array}{r}
 986913 \\
 819719 \\
 833682m \\
 000014 \\
 \hline
 640328m
 \end{array}$$

$$\alpha - \alpha' = 0' 52.21$$

$$= - 03.48$$

see next page

$$\alpha = 23 45 59.66$$

$$\alpha = 23 45 58.55$$

$$+ 1.11$$

Red. ad locum aff.

$$S = -2^{\circ} 04' 47''$$

$$\begin{aligned} H + \alpha & 9^{\circ} 55' = 148^{\circ} 45' \\ H & 10 \quad 09 \\ \alpha = 23 & 46 \quad 00 \\ G & 21 \quad 33 \\ \alpha + \kappa & 21 \quad 19 = 319^{\circ} 45' \end{aligned}$$

$$\begin{aligned} \cos S & 9.9997 \\ \ell & 0.6085 \\ (\ell) & 0.6082 \end{aligned}$$

$$\begin{aligned} \cos(G + \alpha) & 9.8827 \\ g & 1.1733 \\ \sin \dots & 9.8103 \\ \tan S = & 8.5608 \\ & 8.8239 \end{aligned}$$

$$\begin{aligned} g' & 1.0560 \\ g & 8.3683 \end{aligned}$$

$$\begin{aligned} f & 41.83 \\ g & + 0.02 \\ h & + 0.69 \\ & \hline & + 2.54 \end{aligned}$$

$$\begin{aligned} \cos S & 8.5598 \\ \cos(H + \alpha) & 9.9319 \\ \ell & 1.3024 \\ \sin \dots & 9.7100 \\ \sec S & 0.0003 \\ & 8.8239 \\ \ell' & 9.7941 \\ \ell & 9.8416 \end{aligned}$$

$$\begin{aligned} g' & + 11.38 \\ h' & + 0.62 \\ \ell & + 4.06 \\ & \hline & + 16.06 \end{aligned}$$

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

$$\text{Err Corr } S = \quad 0.0 \quad \delta = \quad -0.01$$

$$S = -1 \quad 26 \quad 47.3 \quad \delta = 2.3 \quad 25 \quad 59.78$$

$$O - C = \quad + 5.7 \quad + 0.93$$

3536 Moon's mean Position (1913.0)

$$\begin{array}{r}
 X_0 = 18.6640 \quad Y_0 = 20.6420 \\
 + 22 \quad + 29 \\
 \hline
 18.6662 \quad 20.6449
 \end{array}$$

Template Constants $X = 19.9418$ $Y = 20.9478$

$$Z = +1.9418$$

$$\begin{array}{r}
 \log Z = 0.28821 \\
 \cos Z = 9.99971 \\
 8.50724
 \end{array}$$

$$(X-A) = 1.78126$$

$$X-A = +1.0043$$

$$A = 23.4500$$

$$\alpha_0 = 23.460043$$

$$\text{Red} = +2.54$$

$$\alpha' = 23.460299$$

$$\text{Lunar par.} = -0.348$$

$$\alpha = 23.455949$$

$$\text{Tables} = 23.455855$$

$$O-C = +0.94$$

$$\text{curv. of Plate} = -0.03$$

$$\eta = -1.0522$$

$$\begin{array}{r}
 \log \tan S = 8.5608 \\
 0.5764 \\
 7.0534 \\
 \hline
 6.1906m
 \end{array}$$

$$\eta_0 = -1.0521$$

$$\begin{array}{r}
 \log \eta_0 = 0.02206m \\
 7.33115
 \end{array}$$

$$(A-D) = 2.69091m$$

$$S-D = -8.108$$

$$D = -1.5636$$

$$S_0 = -2.04468$$

$$\text{Red} = +16.1$$

$$S' = -2.04309$$

$$\text{Lunar par.} = +37.434$$

$$S = -1.2647.3$$

$$\text{Tables} = -1.2653.0$$

$$O-C = +5.7$$

3536 (moving mean Position (1913.0))

$$\begin{array}{r}
 x = 186640 \quad y = 206420 \\
 \quad \quad \quad + 22 \quad \quad \quad + 29 \\
 \hline
 186663 \quad \quad 206449
 \end{array}$$

Template Constant $X = 199418 \quad Y = 209478$

$$Z = +19419$$

$$\begin{array}{r}
 \log Z = 0.28821 \\
 \cos Z = 999971 \\
 \sin Z = 850724
 \end{array}$$

$$X - A = 178126$$

$$X - A = +10043$$

$$A = 234500$$

$$\alpha_0 = 23460043$$

$$\text{Red} = +254$$

$$\alpha' = 23460297$$

$$\text{mag} = -0398$$

$$\alpha = 23455949$$

$$\text{alt} = 23455855$$

$$O - C = +094$$

$$\eta = -1.0522$$

$$\begin{array}{r}
 \log \tan \delta = 8.5608 \\
 \quad \quad \quad 05764 \\
 \hline
 70534 \\
 6.1906
 \end{array}$$

$$\eta_0 = -1.0521$$

$$\begin{array}{r}
 \log \eta_0 = 0.02206 \\
 \quad \quad \quad 733115
 \end{array}$$

$$(d \cdot D) = 269091$$

$$S(1) = 8108$$

$$D = -156.36$$

$$S_0 = -204468$$

$$\text{Red} = +161$$

$$S' = -204307$$

$$\text{mag} = +37434$$

$$S = -12647.3$$

$$\text{alt} = -126530$$

$$O - C = +5.7$$

3535 Lunar Parallaxes

$$\begin{aligned} \alpha' &= 23^h 45^m 48^s.23 \\ \delta &= 23 \quad 26 \quad 59.85 \\ \alpha - \alpha' &= -18 \quad 48.38 \\ &= -4^0 \quad 42' \quad 08'' \end{aligned}$$

$$\begin{aligned} & - \quad \quad \quad 1 \quad 34 \\ & - \quad 4 \quad 40 \quad 38 \end{aligned}$$

$$\begin{aligned} & 9.95727 \\ & 0.00000 \\ & 0.00145 \\ \hline & 9.95872 \end{aligned}$$

$$\gamma = 42 \quad 16 \quad 53$$

$$\begin{aligned} \delta &= -2 \quad 07 \quad 51 \\ & 44 \quad 24 \quad 44 \end{aligned}$$

$$\begin{aligned} & 9.82640 \\ & 8.19718 \\ & 9.84499 \\ & 0.17214 \\ \hline & 8.04071 \end{aligned}$$

$$\delta - \delta' = +37 \quad 45.4$$

$$\delta = -1 \quad 30 \quad 05.6$$

$$\text{Nautical miles} = -1 \quad 30 \quad 11.3$$

$$O - C \quad + \quad 5.7$$

$$\text{2nd. ord. ref.} \quad + \quad 0.5$$

$$\begin{aligned} \text{Lun. corr} & \quad \quad \quad + \quad 0.0 \\ & \quad \quad \quad + \quad 0.6 \end{aligned}$$

$$\delta = -1 \quad 30 \quad 05.0$$

$$O - C \quad + \quad 6.3$$

$$\delta' = -2^0 \quad 07' \quad 51.0''$$

$$\pi = 54' \quad 08.1''$$

$$\begin{aligned} & 9.86913 \\ & 8.19718 \\ & 8.91364 \\ & 0.00015 \\ \hline & 6.98010 \end{aligned}$$

$$\alpha - \alpha' = -3' \quad 17.03''$$

$$= -13.14''$$

$$\alpha = 23 \quad 45 \quad 350.9$$

$$\alpha = 23 \quad 45 \quad 34.23$$

$$\begin{aligned} & +0.86 \\ & -0.85 \end{aligned}$$

$$\text{Curv.} \quad -0.85$$

$$+0.08$$

$$\alpha \quad 23 \quad 45 \quad 35.17$$

$$+0.97$$

3535 Lunar Parallax

$$\alpha - 23^{\circ} 45' 48.40''$$

$$\delta - 23 \quad 26 \quad 59.85''$$

$$\alpha - \alpha' = -18 \quad 48.55''$$

$$= -4^{\circ} 42' 08''$$

$$- \quad \quad \quad 1 \quad 34$$

$$- \quad 4 \quad 40 \quad 34$$

$$9.95727$$

$$0.00000$$

$$0.00145$$

$$9.95872$$

$$\alpha - 42 \quad 16 \quad 53$$

$$\delta - 2 \quad 07 \quad 49$$

$$44 \quad 24 \quad 42$$

$$9.82640$$

$$8.19718$$

$$9.84498$$

$$0.17214$$

$$8.04070$$

$$\delta - \delta' = +37 \quad 45.4$$

$$\delta - -1 \quad 30 \quad 04.0$$

$$\text{Hankellens} \delta = -1 \quad 30 \quad 11.3$$

$$\alpha - \alpha' = +73$$

Circ.

2nd ord. ref.

$$+ \quad 0.5$$

$$0.0$$

$$\delta = -2^{\circ} 07' 49.4''$$

$$\pi = 54 \quad 08.1$$

$$9.86913$$

$$8.19718$$

$$8.91369$$

$$0.00015$$

$$6.98015$$

$$\alpha - \alpha' = -3' \quad 17.05''$$

$$-13.14$$

$$\alpha = 23 \quad +5 \quad 35.26$$

$$\alpha = 23 \quad 45 \quad 34.23$$

$$+10.3$$

Circ.

$$-0.08$$

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1913 Aug. 12

3601

Stars - measures

1914 May 7.

$\begin{array}{r} d \\ 1 \quad 13817 \\ 84 \quad 798175- \\ w.l. \quad 80 \\ \quad 29 \\ \hline 25.5845- \end{array}$

$\begin{array}{r} 3 \quad 20400 \\ 14.2 \quad 1823030 \\ 10.3 \quad 30 \\ \quad 95 \\ \hline 10.2169 \end{array}$

$\begin{array}{r} 3 \quad 19421 \\ w.l. \quad 1081817 \\ w.r. \quad 19 \\ \quad 18 \\ \hline 30.8600 \end{array}$

$\begin{array}{r} d \\ 1 \quad 15440 \\ \quad 937179 \\ \quad 82 \\ \quad 40 \\ \hline 8.3537 \end{array}$

$\begin{array}{r} 20561 \\ 1242630 \\ \quad 30 \\ \quad 41 \\ \hline 14.1884 \end{array}$

$\begin{array}{r} 20140 \\ 1615048 \\ \quad 58 \\ \quad 50 \\ \hline 25.6008 \end{array}$

Grade 4.

$\begin{array}{r} 3 \\ 26.4 \quad 17895 \\ 31.5 \quad 12815 \\ \quad 15 \\ \quad 80 \\ \hline 31.4574 \end{array}$

$\begin{array}{r} 17660 \\ 1353030 \\ \quad 21 \\ \quad 45 \\ \hline 31.4127 \end{array}$

instead of (2) faint

$\begin{array}{r} 17.1 \quad 15795 \\ 18.4 \quad 725176 \\ \quad 6169 \\ \quad 95 \\ \hline 18.8531 \end{array}$

$\begin{array}{r} 20055 \\ 1411003 \\ \quad 04 \\ \quad 40 \\ \hline 26.4060 \end{array}$

$\begin{array}{r} 14825 \\ \quad 3029 \\ 14231 \\ \hline 26.0597 \end{array}$

1912 Aug 12

3601

Stars - measures

1914 May 7.

$\frac{1}{13817}$ $\frac{16767}{12610}$
 $\frac{79817}{80}$ $\frac{0906}{59}$
 $\frac{29}{255845}$ $\frac{1895}{1895}$

$\frac{15440}{9.37179}$ $\frac{16248}{12690}$
 $\frac{82}{80}$ $\frac{40}{40}$
 $\frac{83537}{3562}$

$\frac{20400}{142}$ $\frac{15761}{7935}$
 $\frac{18230}{103}$ $\frac{25}{29}$
 $\frac{30}{95}$ $\frac{59}{2171}$
 $\frac{102169}{102169}$

$\frac{20561}{12426}$ $\frac{16369}{14460}$
 $\frac{30}{30}$ $\frac{60}{60}$
 $\frac{41}{50}$ $\frac{50}{50}$
 $\frac{141884}{1901}$

$\frac{19421}{10818}$ $\frac{15472}{14073}$
 $\frac{19}{75}$ $\frac{74}{70}$
 $\frac{18}{8662}$

$\frac{20140}{16150}$ $\frac{14532}{8500}$
 $\frac{48}{58}$ $\frac{62}{10}$
 $\frac{50}{32}$ $\frac{16028}{16028}$

Group 4

$\frac{17395}{12815}$ $\frac{17249}{11817}$
 $\frac{15}{10}$ $\frac{16}{42}$
 $\frac{80}{4569}$

$\frac{20055}{14110}$ $\frac{18120}{14049}$
 $\frac{08}{09}$ $\frac{31}{38}$
 $\frac{40}{4074}$

$\frac{17660}{13530}$ $\frac{18235}{12339}$
 $\frac{30}{21}$ $\frac{42}{49}$
 $\frac{45}{29}$ $\frac{4111}{4111}$

$\frac{14825}{3029}$ $\frac{12641}{12021}$
 $\frac{14231}{10}$ $\frac{11}{42}$
 $\frac{260597}{10625}$

instead of (2) point

$\frac{17.1}{15.4}$ $\frac{15795}{725176}$ $\frac{14708}{1323840}$
 $\frac{6169}{95}$ $\frac{38}{99}$
 $\frac{188531}{188531}$ $\frac{5532}{5532}$

$\frac{972016}{22}$ $\frac{10751}{10170}$
 $\frac{9160}{66}$ $\frac{70}{70}$
 $\frac{17.0559}{17.0559}$ $\frac{.0586}{.0586}$

3601 moon-measures

	d	y	~	d	x	w
1	18521		16582			
20.0	1677162		835649			
21.3	64		51			
min	13		82			
in						
21.1753			11768			

3 scratch

19.6	18576	17982	17880	18329
21.2	1620700	1035763	1367980	1254531
	69	59	75	38
	66	76	79	11
21.2369		2383	195798	5781

3	17510	18970
19.0	1253820	1394550
21.0	25	58
	02	60
21.4978		4986

4
18.5
22.0

5
18.3
23.0
min
x

6
18.5
24.0

17462	19642
1245860	1463123
61	30
50	29
185004	6008
17340	19100
910920	1734240
12	35
40	30
18.1774	1807
16221	19489
1062011	1506158
19	60
11	80
18.4402	4425

3601 Moon - measures

$$\begin{array}{r}
 1 \quad 18521 \\
 20.0 \quad 1677162 \\
 21.3 \quad 64 \\
 \sim \quad 13 \\
 \hline
 21.1753
 \end{array}
 \quad
 \begin{array}{r}
 16582 \\
 83104 \\
 517 \\
 82 \\
 \hline
 1768
 \end{array}$$

23.5 - 21.2

$$\begin{array}{r}
 17.6 \quad 18576 \\
 21.2 \quad 1620700 \\
 \quad 69 \\
 \quad 66 \\
 \hline
 21.2869
 \end{array}
 \quad
 \begin{array}{r}
 17982 \\
 1035763 \\
 \quad 59 \\
 \quad 76 \\
 \hline
 2383
 \end{array}$$

$$\begin{array}{r}
 17860 \\
 1367950 \\
 \quad 75 \\
 \quad 79 \\
 \hline
 195798
 \end{array}
 \quad
 \begin{array}{r}
 18329 \\
 1259531 \\
 \quad 38 \\
 \quad 11 \\
 \hline
 5781
 \end{array}$$

$$\begin{array}{r}
 3 \quad 17510 \\
 17.0 \quad 1253820 \\
 21.1 \quad 25 \\
 \quad 02 \\
 \hline
 21.9978
 \end{array}
 \quad
 \begin{array}{r}
 18970 \\
 1394150 \\
 \quad 58 \\
 \quad 60 \\
 \hline
 4986
 \end{array}$$

$$\begin{array}{r}
 7 \\
 18.1 \\
 22.0
 \end{array}$$

$$\begin{array}{r}
 5 \\
 18.3 \\
 23.0 \\
 \sim \\
 2
 \end{array}$$

$$\begin{array}{r}
 6 \\
 18.5 \\
 24.0
 \end{array}$$

$$\begin{array}{r}
 17962 \\
 1245860 \\
 \quad 61 \\
 \quad 50 \\
 \hline
 185004
 \end{array}
 \quad
 \begin{array}{r}
 19642 \\
 1463123 \\
 \quad 30 \\
 \quad 29 \\
 \hline
 1008
 \end{array}$$

$$\begin{array}{r}
 17340 \\
 910920 \\
 \quad 12 \\
 \quad 40 \\
 \hline
 18.1774
 \end{array}
 \quad
 \begin{array}{r}
 17150 \\
 1734240 \\
 \quad 35 \\
 \quad 30 \\
 \hline
 1507
 \end{array}$$

$$\begin{array}{r}
 16221 \\
 1062011 \\
 \quad 19 \\
 \quad 11 \\
 \hline
 18.4402
 \end{array}
 \quad
 \begin{array}{r}
 19909 \\
 1506158 \\
 \quad 60 \\
 \quad 80 \\
 \hline
 4425
 \end{array}$$

3601

moon - measures.

d

y

z

d

v

7 15601
 19.0 968590
 24.6 91
 05

24.5914

19887
 1580908
 95
 80

5920~~8~~ scratch

19.6 9735
 24.7 3622
 8550

24.8819

13331
 1216269
 66

5835

15070

1240090

90

58

19.7326

14888

755150

49

64

7335

3601

moon - measures

d

4

2

d

2

2 15601
 190 968590
 24.6 91
 05

245914

19887
 1580108
 95
 80

5920~~8~~ 5 watch

17.6 9735
 24.7 3622
 8550

248819

13331
 12162
 66

5835

15070

14888

1240090

755150

90

49

58

64

#973267335

3601 Times etc. ✓
 Exh to stars 1913 Aug 12, $18^h 34^m$ ✓
 " moon $18^h 40^m$ 14.0 ✓
 clock fast 1 57.6 ✓

H Sid T. 18 38 16.55 ✓ $\Theta - \alpha = + 0^h 6^m$
 H long 4 44 31.05 ✓
 G Sid T. 23 22 47.60 ✓
 Sid T. in moon 9 21 19.23 ✓
 Interval 14 01 28.37 ✓
 Red 2 17.86 ✓
 G. in T. 13 59 10.51 ✓

From front almu R.A. ✓ decl. ✓
 moon 14^h $18^h 31^m$ 26.96 ✓ $-28^\circ 19' 01.0''$
 motion in 23682 ✓ 2381 ✓
 -0.8233 -194 ✓ -20 ✓
 Tabular place 18 32 25.02 ✓ -28 19 03.0 ✓

moon age 11 days

parallax $55' 40.35$ ✓
 semidiameter $15' 11.8$ ✓

✓
 $9.34 = 5.2$
 $9.12 = 5.0$

R 9118 ✓
 Augmentation $+ 5.0$ ✓
 Irradiation (4/5) $- 0.8$ ✓

a -500
 $+ 24$
 476

R 9160
 K 1.9636 -0.987
 AK -934
 $(a+1)R$ 18702
 R^2 34976

3601

Times etc.

Exp. 1 Star	19.3 Aug 12.	18	34	-18	46	
moon		18	40	140	18	40
clock fast			1	576		143
H. dist.		18	38	1655	0-2	+0
H. long		4	44	3105		
G. dist.		23	22	4760		
dist 7 in moon		9	21	1923		
Interval		14	01	2837		
Red			2	1786		
G. in T.		13	59	1051		

Transit alt.		R A		Decl.	
moon 14"	18	38	2696	-28°	19' 01"
moon 14"	23682			2381	
-0.8233		-	194		20
Tabular place	18	32	2502	-28	19 030

moons age 11 days

parallel 55' 40.35"
 semidiam 15' 11.8"

9.39 = 5.2

9.12 = 5.0

R 911.8
 Augment 5.0
 Irradiation (4) - 0.8
 R 916.0
 K
 11.12/R
 R²

20	4
8.3550	25.5845
14.1894	10.2170
17.0572	18.8532
26.0611	31.4119

-0.72	+1.14	-4479
+4461 - 6 =	+4455 + 27 =	+4482 = +3
+4473 - 10 =	+4463 + 11 =	+4474 = -5
+4475 - 12 =	+4463 + 20 =	+4483 = +4
+4461 - 18 =	+4443 + 33 =	+4476 = -3
-14	+25	= 20.3886

-1.54	+1.14	-15611
15634 - 38 + 9 + 15600 =	-6	
15616 - 16 + 16 + 15616 =	+5	
15615 - 28 + 19 + 15606 =	-5	
15624 - 47 + 29 + 15617 =	+6	
-36 + 22 - 15611 =	228898	

+0.7	-248	-1
-499.3		
Obs a + 0.7	e = -27.5	a - e = +28.2
	f + d = -3.3	
c - 0 + 500.0	e = +502.7	a - e = -2.7
		+2.3
0 - c - 500.0	-502.7	-2.3

3601

Plate Constants

x	y	R.A.	Decl.
8.3550	25.5845	18 ^h 25 ^m 00 ^s	-28° 51' 12"
14.1894	10.2170	25 40	30 56 57
26.4611	31.4119	35 56	28 02 21
3/4815	6666	88 96	186 109 90
16.05	2222	18 29 52	-29 16 50
-18	-22.00	+1	-1 42
1.95	22	18 30 52	-29 18 32
31	46.5		
60°	102		

$$\begin{cases} X = 18^h 30^m 52^s \\ D = -29^\circ 18' 32'' \end{cases}$$

$$\begin{aligned} x-3 & +500x & -92.97 & -0.54 & -4467 \\ +2673 + 4178 & = +6851 & -2377 & = +4474 & -13 = +4461 = -6 \\ -1668 + 7095 & = +5427 & -949 & = +4478 & -5 = +4473 = +6 \\ -2294 + 8529 & = +6235 & -1751 & = +4484 & -9 = +4475 = +8 \\ -5636 + 13031 & = +7395 & -2918 & = +4477 & -16 = +4461 = -6 \\ 20.0483 + 10024 & & -2141 & & -12 \end{aligned}$$

$$\begin{aligned} y-m & +500y & +96.32 & +28.44 & \\ +1310 + 12792 & = +14102 & +804 & = +14906 & +727 = +15633 \\ +8871 + 5108 & = +13979 & +366 & = +14345 & +290 = +15635 \\ +4029 + 9427 & = +13456 & +1643 & = +15099 & +535 = +15634 \\ -3445 + 15706 & = +12261 & +2510 & = +14771 & +892 = +15663 \\ y-n & +500y & +94.52 & +29.4 & -15625 \\ +1310 + 12792 & = +14102 & +2790 & = +14892 & +742 = +15634 = +9 \\ +8871 + 5108 & = +13979 & +1341 & = +15320 & +296 = +15616 = -9 \\ +4029 + 9427 & = +13456 & +1612 & = +15068 & +547 = +15615 = -10 \\ -3445 + 15706 & = +12261 & +2463 & = +14724 & +911 = +15635 = +10 \\ 23.0438 + 11522 & & +1895 & & +668 \end{aligned}$$

$$\begin{aligned} \text{Tables } a & = +0.7 & c & = -24.8 & a-c & = +25.5 & b+d & = -1.0 \\ \text{Obs } a & = -0.0 & c & = -29.0 & a-c & = +29.0 & b+d & = -1.0 \\ a & = -500.0 & c & = -529.0 & & & & \end{aligned}$$

$$c-0 \quad +500.7 \quad +504.2 \quad +3.5 \quad +0.1$$

3601

Plate Constants

x	y	R.A.	Decl.
8.3550	25.5845	18 ^h 25 ^m 00 ^s	-28° 51' 12"
14.1894	10.2170	28 40	30 56 57
26.0618	31.4149	35 56	28 02 21
<u>4815</u>	<u>6666</u>	<u>88 96</u>	<u>86 109 90</u>
16.05	2222	18 29 52	-29 16 50
-18	202	+1	-1 +2
<u>1.95</u>	<u>.22</u>	<u>18 30 52</u>	<u>-29 18 32</u>
<u>31</u>	<u>405</u>		
60	102		

$$\begin{cases} X = 18^{\circ} 30' 52'' \\ Y = -29^{\circ} 18' 32'' \end{cases}$$

$$\begin{aligned} x-3 & +500x & -92.97 & -0.54 & -44.67 \\ +2673 + 4178 & +6851 - 2377 & +4474 - 13 & +4461 & = -6 \\ -1668 + 7095 & +5427 - 9492 & +4478 - 5 & +4473 & = +6 \\ -2294 + 8529 & +6235 - 1751 & +4484 - 9 & +4475 & = +8 \\ -5636 + 13031 & +7395 - 2918 & +4477 - 16 & +4461 & = -6 \\ 20.0483 + 10024 & -2141 & -12 & & \end{aligned}$$

$$\begin{aligned} y-m & +500y & +96.32 & +28.94 & \\ +1310 + 12792 & = +14102 + 804 & +14906 + 727 & +15633 \\ +8871 + 5108 & = +13979 + 1366 & +15345 + 290 & +15635 \\ +4029 + 9427 & = +13456 + 1643 & +15099 + 535 & +15634 \\ -3445 + 15706 & = +12261 + 2510 & +14771 + 892 & +15625 \\ y-m & +500y & +94.52 & +29.4 & -15625 \\ +1310 + 12792 & = +14102 + 790 & 4892 + 742 & +15634 & = +9 \\ +8871 + 5108 & = +13979 + 1341 & +15320 + 296 & +15616 & = -9 \\ +4029 + 9427 & = +13456 + 1612 & +15068 + 547 & +15615 & = -10 \\ -3445 + 15706 & = +12261 + 2463 & +14724 + 911 & +15635 & = +10 \\ 23.0438 + 11522 & +1895 & +668 & & \end{aligned}$$

$$\begin{aligned} \text{Tables } a & = +1.7 & c & = 20.3 & a-b & = +2.0 & b+c & = +1.0 \\ \text{Obs } a & = -0.0 & c & = -29.0 & a-c & = +29.0 & b+a & = -1.6 \\ a & = -500 & c & = -529.0 & & & & \end{aligned}$$

	ξ	η	$\Delta \xi$	-3.25	-1.67	-3		
1	-9.91	+3.51	-28	+32	+7	-2	+2	-1
2	-3.64	-12.66	-16	+12	-7	+7	+3	0
3	+8.62	+9.80	+37	-28	+9	-6	+3	0
4	-0.71	-3.55	-0	+2	+2	+2	+4	+1
M	+2.39	+0.89	0	-8	-1			-12

$\Delta \eta$	-3.44	-1.93	+2	-7
+ 10	- 12 = -2	+ 14 = +12	+8	
- 52	+ 43 = -9	+ 5 = -4	-8	
+ 40	- 33 = +7	- 12 = -5	-9	
- 1	+ 12 = +11	+ 13 = +12	+8	
0	~~-8~~	-3	-1	-10
	-3			

Second Order Refraction.

η	η^2
+345	11.90
-1267	16053
+976	9526
<u>-355</u>	<u>1260</u>
2943	428029
	<u>70.07</u>
	61

$\times 0.6 = +0.7$

3601

Standard Coordinates

20

Cape W. 25 28 m 7.5 Cape W. 25 38 m 7.2 Cape W. 25 57 m 7.7
 C 18" 24" 10.59" 18" 27" 49.61" 18" 35" 06.69"
 L 69 67 71

mean 18 24 10.64" 18 27 49.64" 18 35 06.70"
 Prec + 49.46" + 50.28" + 49.09"
 A 18 25 00.10" 18 28 39.92" 18 35 55.79"
 A 18 30 52" 18 30 52" 18 30 52"
 d-A - 5 51.90" - 2 12.08" + 5 03.79"
 cap-A - 351.56" - 132.08" + 303.77"
 log. 2.54637" 2.12083" 2.48254"
 " 9.94244" 9.93329" 9.94578"
 " 0.99605" 0.56136" 0.93556"
 3. -9.9095" -3.6422" +8.6210"
 3. - 28" - 16" + 37"
 3. 80877" 14.3562" 26.6247"
 2. 63550" 14.1894" 26.0611"
 10-3 +2673" -1668" +5636"

C -28° 51' 40.5" -30° 57' 28.6" -28° 03' 01.0"
 L 40.1 28.9 00.6
 2

mean -28 51 40.3" -30 57 28.8" -28 03 00.8"
 Prec + 27.9" + 32.0" + 40.2"
 S -28 51 12.4" -30 56 56.8" -28 02 20.6"
 D -29 18 32" -29 18 32" -29 18 32"
 (S-D) +27 19.6" -1 38 24.8" +1 16 11.4"
 tan(S-D) +1639.6" -59064" +45722"
 log. 3.21474" 3.77132" 3.66013"
 " 0.54589" 1.10247" 0.99128"
 tan 9.7411" 9.7779" 9.7264"
 3. 1.9921" 1.1227" 1.8711"
 4. 87866" 7.9540" 8.6509"
 10 +3.5147" -12.6611" +9.8012"
 11 - 612" - 90" - 448"
 12 25.4535" 9.3299" 37.7564"
 13 25.5845" 10.2170" 31.4119"
 14 +1310" +8871" -3445"

3601 Standard Coordinates

20

Cape W. 25° 28' 10.59" 18° 24' 10.59" 18° 27' 49.61" 18° 35' 06.69" 18° 35' 06.69" 18° 35' 06.69"

mean	18	24	10.64	18	27	49.64	18	35	06.70
Pre	+		49.46	+		50.28	+		49.09
A	18	25	00.10	18	28	39.92	18	35	55.79
A	18	30	52	18	30	52	18	30	52
A	-	5	51.90	-	2	12.08	+	5	03.79
A	-	3	51.86	-	1	32.08	+	3	03.77
log	2	54	63.7	2	12	08.3	2	48	25.4
log	9	94	24.4	9	93	32.9	9	94	57.8
log	0	99	60.5	0	56	13.6	0	93	55.6
log	-	9	90.95	-	3	64.22	+	8	62.10
log	-		28	-		16	+		37
log	8	08	77	1	43	56.2	2	66	24.7
log	6	35	50	1	41	89.4	2	64	06.7
log	+	2	67.3	-	1	66.8	-	1	02.29

C	-28°	51'	40.5"	-30°	57'	28.6"	-28°	03'	01.0"
L			40.1			28.9			00.6
mean	-28	51	40.3	-30	57	28.8	-28	03	00.8
Pre	+		27.9	+		32.0	+		40.2
S	-28	51	12.4	-30	56	56.8	-28	02	20.6
D	-29	18	32	-29	18	32	-29	18	32
S-A	+	27	19.6	-1	38	24.8	+	1	16
S-A	+	16	39.6	-	59	06.4	+	45	72.2
log	3	21	47.4	3	77	13.2	3	66	01.3
log	0	54	58.9	1	10	24.7	0	49	12.8
log	9	74	11	9	77	79	9	72	64
log	1	99	21	1	12	27	1	87	11
log	8	78	66	7	95	40	8	65	09
log	+	3	51.47	-	12	66.11	+	9	80.12
log	-		61.2	-		90	-		49.8
log	2	54	53.5	9	32	97	3	77	56.4
log	2	55	84.1	1	02	17.0	3	64	57.2
log	+	1	31.0	+	22	71			

Standard Coordinates

21

Cape W. 2544 mp 6.7

C 18^h 29^m 36.61

L 68

Mean 18 29 36.64

Pre- + 49.80

A 18 30 26.44

A 18 30 52

$\alpha - A$ - 25.56

$\sin(\alpha - A)$ - 25.56

$\log \dots$ 1.40756 m

$\dots$ 993854

$\dots$ 9.85334 m

$\dots$ - 0.7134

$\dots$ 0

$\dots$ 17.2866

$\dots$ 17.0572

$\dots$ - 2294

C - 29° 46' 42" 0

L 41.8

Mean - 29 46 41.9

Pre- + 34.1

A - 29 46 07.8

D - 29 18 32

$\alpha - D$ - 27 35.8

$\sin(\alpha - D)$ - 16558

$\log \dots$ 3.21901 m

$\dots$ 0.55016 m

$\dots$ 9.7574 m

$\dots$ 9.7067

$\dots$ 65175 m

$\dots$ - 3.5494

$\dots$ 3

$\dots$ 18.4503

$\dots$ 18.8532

$\dots$ + 4029

Standard Coordinates

21

Cape W. 2544 m 6.7
 C 18" 29" 36.61
 L 68
 Mean 18 29 36.64
 Prec + 49.80
 A 18 30 26.44
 A 18 30 52
 x-A - 25.56
 Cent-A1 - 25.56
 log... 1.40756 m
 .Wd 9.93854
 30 9.85334 m
 30 - 9.71334
 31 - 0
 3 17.2866
 x 17.0572
 x - 3 - 22.94

C - 29° 46' 42" 0
 L 41.8
 Mean - 29 46 41.9
 Prec + 34.1
 8 - 29 46 07.8
 D - 29 18 32
 8-D - 27 35.8
 Cent-A1 - 16.558
 log... 3.21901 m
 - 40 0.55016 m
 .Wd 9.7574 m
 32 9.7067
 41 6.5175 m
 40 - 3.5494
 41 - 3
 4 18.4503
 4 18.8532
 4 - 27 + 4.029

3601 Proion Center

	x	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$O - C$
1	20.0000	-0.0460	-2	0.0021	3.5113	+137
2	19.5790	-0.4670	-2	0.2183	3.5002	+26
3	19.0000	-1.0460	-2	1.0945	3.4979	+3
4	18.5006	-1.5454	-1	2.3886	3.4856	-120
5	18.1790	-1.8670	0	3.4857	3.4877	-99
6	18.4414	-1.6046	+1	2.5744	3.4906	-70
7	19.0000	-1.0460	+2	1.0937	3.4968	-8
8	19.7330	-0.3130	+2	0.0979	3.4905	-71

$$R^2 = 3.4976$$

	y	$y - y_0$	Δy	$(y - y_0)^2$	
-1	21.1760	-1.8690	-43	3.5092	180 "
2	21.2376	-1.8074	-41	3.2819	195 "
3	21.4982	-1.5468	-35	2.4034	214 "
4	22.0000	-1.0450	-24	1.0970	235 "
5	23.0000	-0.0450	-1	0.0020	270 "
6	24.0000	+0.9550	+22	0.9162	301 "
7	24.5917	+1.5467	+35	2.4031	326 "
8	24.8827	+1.8377	+42	3.3926	350 "
					Range 170

Approximate Center

$$x = 19.0 \quad y = 21.4982$$

$$24.5917$$

$$46.0899$$

$$y_0 = 23.0450$$

$$y_{\text{mean}} = 21.1760$$

$$R = 1.8690$$

$$x_{\text{mean}} = 18.1790$$

$$x = 20.0480$$

$$\text{Center } \begin{cases} x_0 = 20.0460 \\ y_0 = 23.0450 \end{cases}$$

3601 Approx Center

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)(y - y_0)$	$y - y_0$	
1	200000	-00460	-2	0.0021	3.5113	+137
2	195790	-04670	-2	0.2183	35002	+26
3	190000	-10460	-2	1.0945	34979	+3
4	185006	-15454	-1	2.3886	34856	-120
-5	181790	-18670	0	3.4857	34877	-99
6	184414	-16046	+1	2.5744	34906	-70
7	190000	-10460	+2	1.0937	34968	-8
8	197330	-03130	+2	0.0979	34905	-71

$$\Sigma = 3.4976$$

	y	$y - Y_0$	$(y - Y_0)^2$	
-1	211760	-18690	-43	3.5092
2	212376	-18074	-41	3.2819
3	214982	-15468	-35	2.4034
4	220000	-10450	-24	1.0970
5	230000	-00450	-1	0.0020
6	240000	+09550	+22	0.9162
7	245917	+15467	+35	2.4031
8	248827	+18377	+42	3.3926
				<u>35.0</u>
				Range 170

Range 170

Approx Center

$$x = 190 \quad y = 214982$$

$$245917$$

$$460899$$

$$y_0 = 230450$$

$$y = \text{min} = 211760$$

$$R = 18690$$

$$x = \text{min} = 181790$$

$$x = 200480$$

$$\text{Center} \begin{cases} x_0 = 20.0460 \\ y_0 = 23.0450 \end{cases}$$

Formation of Normals

1	+ 0.09	-	6.8	- 256.0
2	+ 0.87	-	12.5	- 47.1
3	+ 1.63	-	3.2	- 4.7
4	+ 1.63	+	186.0	+ 126.0
5	+ 0.09	+	185.0	+ 4.9
6	- 1.54	+	112.0	- 67.3
7	- 1.63	+	8.4	- 12.4
8	- 0.57	+	22.0	- 130.8
	+ 0.57	+	490.9	- 387.4

			- 37	
- a	- b	+	ΔC	
+	1	+	5	- 31 ✓
+	13	+	5	- 19 ✓
+	28	+	5	- 4 ✓
+	42	+	3	+ 8 ✓
+	50	+	0	+ 13 ✓
+	43	-	3	+ 3 ✓
+	28	-	5	- 14 ✓
+	8	-	6	- 35 ✓

-280

$$+ 0.57 + 17.01 = -1.98 \Delta$$

$$+ [] + 0.03 = -0.41 \Delta$$

$$+ 16.98 = -1.57 \Delta$$

$$+ 10.96 + 0.57 = -7.96 \Delta$$

$$= -7.96 + 0.05 = -7.91$$

3601

Moon's Center Conditional Equations

s	0	c	$0-c$	Corr.
1	$-0.05 - 1.87 = +1.37$	$-2 + 45 = +43$	$+94$	$+63$
2	$-0.48 - 1.81 = +26$	$-22 + 44 = +22$	$+4$	-15
3	$-1.05 - 1.55 = +3$	$-48 + 38 = -10$	$+13$	$+9$
4	$-1.55 - 1.05 = -1.20$	$-71 + 25 = -46$	-74	-66
5	$-1.87 - 0.05 = -99$	$-86 + 1 = -85$	-14	-1
6	$-1.60 + 0.96 = -70$	$-74 - 23 = -97$	$+27$	$+30$
7	$-1.05 + 1.55 = -8$	$-48 - 38 = -86$	$+78$	$+64$
8	$-0.31 + 1.84 = -71$	$-14 - 45 = -59$	-12	-47

 $+216 - 100$

Average = 40

Normal Equations

$$\begin{aligned}
 +10.96 + 0.57 &= +491 & -7.96 \Delta \\
 +0.57 + 17.01 &= -387 & -1.98 \Delta
 \end{aligned}$$

$$\begin{aligned}
 -0.57 - 0.03 &= -26 \\
 +16.98 &= -413
 \end{aligned}$$

$$k = -243 \quad -0.093 \Delta$$

$$+10.96 = +491 + 14 = +505$$

$$a = +46.0 \quad -0.72 \Delta$$

Arc measured = 170° Average $(0-c) = +14.5$

$$\frac{pc}{n} = 26$$

$$\frac{+14.5}{26} + 0.56 \quad \Delta n = +0.6$$

$$\begin{aligned}
 \text{In } 3'' \quad R \quad 1.87 \\
 -2RC = -1.87 \quad -37
 \end{aligned}$$

$$\text{Corr } +0.5''$$

$$\Delta \delta = +0.17'' \quad \Delta \delta = +0.1''$$

$$\Delta \mu = +0.1$$

$$\Delta \alpha = +0.35'' \quad \Delta \alpha = +0.03''$$

1
1
2
3
4
5
6
7
8

3601

Moon's Center, Conditional Equations.

	a	b	c	O-C
1	-0.05	-1.87	+1.87	-2+45+43+94
2	-0.48	-1.81	+2.6	-2+44+22+4
3	-1.05	-1.55	+3	-48+28+10+13
4	-1.55	-1.05	-1.20	-71+25-46-74
5	-1.87	-0.05	-79	-86+1-85-14
6	-1.60	+0.96	-70	-74-23-97+27
7	-1.05	+1.55	-8	-48-38-86+78
8	-0.31	+1.84	-71	-14-45-59-12
				+216-100
				Average = 40

Normal Equations.

$$+10.96 + 0.57 = +491$$

$$+0.57 + 17.01 = 387$$

$$-0.57 - 0.03 = 26$$

$$+1698 = -413$$

$$b = -24.3$$

$$+10.96 = +491 + 14 + 505$$

$$a = +46.0$$

Arc measured 170° Average $(O-C) = +14.5$

$$\frac{P-C}{n} = 26$$

$$\frac{+14.5}{10} + 0.56 \Delta = +0.6$$

3601 Moon's Mean Position (1913.0)

$$\begin{array}{r}
 X_0 = 200460 \\
 \text{ha} = + 23 \\
 \hline
 200483
 \end{array}
 \qquad
 \begin{array}{r}
 Y_0 = 230450 \\
 \text{lg} = - 12 \\
 \hline
 230438
 \end{array}$$

From plate constants $X = 203886$ $Y = 228898$

$$\begin{array}{r}
 \xi = +2.3886 \\
 \log \xi = 0.37814 \\
 \cos \xi = 9.94101 \\
 \qquad \qquad 8.50724
 \end{array}$$

$$(\alpha - A) = 1.92989$$

$$\alpha - A = + 1.2509$$

$$A = 18 \ 30 \ 52$$

$$X_0 = 18 \ 32 \ 17.09$$

$$\text{Red} = + 3.74$$

$$X' = 18 \ 32 \ 20.83$$

$$\eta = +0.8898$$

$$\begin{array}{r}
 \log \tan \delta = 9.7467m \\
 \qquad \qquad 0.7563 \\
 \qquad \qquad \hline
 \qquad \qquad 7.0534 \\
 \qquad \qquad \hline
 \qquad \qquad 7.5564m
 \end{array}$$

$$\eta_1 = -36$$

$$\eta_0 = +0.8934$$

$$\begin{array}{r}
 \log \eta_1 = 9.95105 \\
 \qquad \qquad 7.33115 \\
 \qquad \qquad \hline
 \qquad \qquad 2.61990
 \end{array}$$

$$S - D = + \quad 6 \ 56.8$$

$$D = -29 \ 18 \ 32$$

$$S_0 = -29 \ 11 \ 35.2$$

$$\text{Red} = -7.7$$

$$S' = -29 \ 11 \ 42.9$$

3601 Orions Mean Position (1913.0)

$$\begin{array}{r}
 \lambda_0 = 20.0460 \\
 \quad + \quad 23 \\
 \hline
 20.0483
 \end{array}
 \qquad
 \begin{array}{r}
 \gamma_0 = 23.0450 \\
 \quad - \quad 12 \\
 \hline
 23.0438
 \end{array}$$

From plate constants $X = 20.3886$ $Y = 22.8898$

$$Z = +23886$$

$$\begin{array}{r}
 \log Z = 0.37814 \\
 \log S = 9.94101 \\
 8.50724
 \end{array}$$

$$(H-A) = 1.92989$$

$$A-A = +1.2509$$

$$A = 18.3052$$

$$\lambda_0 = 18.3217.09$$

$$Red = +3.74$$

$$\lambda' = 18.3220.83$$

$$\gamma = +0.8898$$

$$\begin{array}{r}
 \log \gamma = 9.7467 \\
 0.7563 \\
 \hline
 7.0534 \\
 7.5564
 \end{array}$$

$$\gamma_0 = -36$$

$$\gamma_0 = +0.8934$$

$$\begin{array}{r}
 \log \gamma_0 = 9.95105 \\
 7.33115 \\
 \hline
 2.61990
 \end{array}$$

$$S-D = +6.56.8$$

$$D = -29.18.52$$

$$S_0 = -29.11.35.2$$

$$Red = -7.7$$

$$S' = -29.11.42.9$$

$$\begin{array}{r}
 18 \quad 11 \quad 48.32 \\
 \underline{44.46} \\
 + 386
 \end{array}$$

$$\begin{array}{r}
 - 36 \quad 47 \quad 30.5 \\
 \underline{18.7} \\
 - 11.8
 \end{array}$$

$$\begin{array}{r}
 18 \quad 15 \quad 29.10 \\
 \underline{25.46} \\
 + 3.64
 \end{array}$$

$$\begin{array}{r}
 - 29 \quad 51 \quad 67.2 \\
 \underline{57.6} \\
 - 9.6
 \end{array}$$

$$\begin{array}{r}
 18 \quad 22 \quad 39.64 \\
 \underline{36.10} \\
 + 3.54
 \end{array}$$

$$\begin{array}{r}
 - 25 \quad 28 \quad 22.7 \\
 \underline{14.8} \\
 - 7.9
 \end{array}$$

$$\begin{array}{r}
 18 \quad 40 \quad 16.96 \\
 \underline{13.27} \\
 + 3.69
 \end{array}$$

$$\begin{array}{r}
 - 27 \quad 04 \quad 58.4 \\
 \underline{51.8} \\
 - 6.6
 \end{array}$$



3601

Red ad locum app.

$$\begin{array}{rcl}
 H + \alpha & 3^{\circ} & 23.0 : 50^{\circ} 45' \\
 H & 8 & 50.7 \\
 \alpha & 18 & 323 \\
 \delta & 21 & 426 \\
 H + \alpha & 16 & 14.9 : 243^{\circ} 44'
 \end{array}$$

$$\begin{array}{rcl}
 S & -29^{\circ} 11' 35'' \\
 \text{loss } S & 9.9410 \\
 i & \underline{0.7937} \\
 (i) & 0.7347
 \end{array}$$

$$\begin{array}{rcl}
 \text{loss } (H + \alpha) & 9.6460m \\
 \delta & 1.2067 \\
 \sin & 9.9527m \\
 \tan S & 9.7472m \\
 & 8.8239 \\
 & \underline{8}
 \end{array}$$

$$\begin{array}{rcl}
 \delta & 0.8527m \\
 \delta & 9.7505m
 \end{array}$$

$$\begin{array}{rcl}
 \delta & +2.03 \\
 \delta & +0.56 \\
 h & \underline{+1.15} \\
 & +3.74
 \end{array}$$

$$\begin{array}{rcl}
 \text{loss } S & 9.6882m \\
 -\cos(H + \alpha) & 9.8012 \\
 h & 1.2901 \\
 \sin & 9.8890 \\
 \sec S & 0.0590 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 h' & 0.7795m \\
 h & 0.0620
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & -7.12 \\
 h' & -6.02 \\
 (i) & \underline{+5.43} \\
 & -7.71
 \end{array}$$

3601

Red ad locumaph.

				S	-29° 11' 35"
H + A	3	23.0	50° 45'		
H	8	50.7		lcos S	9.9410
A	18	32.3		i	<u>0.7937</u>
S	21	42.6		(L)	0.7347
B + A	16	14.9	243° 44'		

lcos (B + A)	9.6460
S	1.2067
sin "	9.9527
lcos S	9.7472
	8.8239
	S

8	0.8527
8	9.7505

f	+2.03
g	+0.56
h	<u>+1.15</u>
	+3.74

l sin S	9.6882
-cos (H + A)	9.8012
h	1.2901
sin "	9.8890
acc S	0.0590
	8.8239

h'	0.7795
h	0.0620

g'	-7.12
h'	-6.02
(L)	<u>+5.43</u>
	-7.71

3601

human parallax

$$\begin{array}{r}
 \alpha' = 18^h 32^m 20.83 \\
 \theta = 18 \quad 38 \quad 16.55 \\
 \theta - \alpha' \quad + \quad 5 \quad 55.72 \\
 \quad \quad + \quad 1^{\circ} \quad 28' \quad 5.6''
 \end{array}$$

$$+ \quad \quad \quad 36$$

$$+ \quad 1 \quad 28 \quad 20$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 0.00014 \\
 \hline
 9.95741
 \end{array}$$

$$\delta = 42 \quad 11 \quad 43$$

$$- 29 \quad 11 \quad 43$$

$$71 \quad 23 \quad 26$$

$$\begin{array}{r}
 9.82640 \\
 8.20935 \\
 9.97668 \\
 0.17285 \\
 \hline
 8.18528
 \end{array}$$

$$\delta - \delta' = +52 \quad 40.3$$

$$\delta - 28 \quad 19 \quad 02.6$$

$$\text{Ann Eph } \delta = -28 \quad 19 \quad 03.0$$

$$0 - c \quad \quad \quad + \quad 0.4$$

$$\text{C. of P} \quad - 0.6$$

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

$$\text{In Cor} \quad + 0.1$$

$$\delta - 28 \quad 19 \quad 02.5$$

$$0 - c \quad \quad \quad + 0.5$$

$$\delta' = -29^{\circ} 11' 42.9''$$

$$\pi = 55' 40.35''$$

$$\begin{array}{r}
 9.86913 \\
 8.20935 \\
 8.41760 \\
 0.05535 \\
 \hline
 6.55143
 \end{array}$$

$$\alpha - \alpha' = +1' 13.43''$$

$$+ \quad 4.90$$

$$\alpha \quad 18 \quad 32 \quad 25.73$$

$$\alpha \quad 18 \quad 32 \quad 25.02$$

$$+ 0.71$$

$$- 0.07$$

$$0$$

$$+ 0.03$$

$$\alpha \quad 18 \quad 32 \quad 25.76$$

$$0 - c \quad \quad \quad + 0.79$$

3601

human parallaxes

$$\begin{array}{r}
 \alpha' - 18^{\circ} \quad 32^m \quad 20.83 \\
 \Theta \quad 18 \quad 38 \quad 16.55 \\
 \Theta - \alpha' \quad + 5 \quad 55.72 \\
 \quad \quad + 1^{\circ} \quad 28' \quad 56''
 \end{array}$$

$$+ \quad \quad \quad 36$$

$$+ \quad 1 \quad 28 \quad 20$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 \hline
 0.00014 \\
 9.95741
 \end{array}$$

$$9 \quad 52 \quad 11 \quad 43$$

$$9 \quad 11 \quad 43$$

$$71 \quad 23 \quad 26$$

$$982640$$

$$820935$$

$$997668$$

$$017285$$

$$818528$$

$$S - S \quad + 52 \quad 40.3$$

$$S \quad - 28 \quad 19 \quad 02.6$$

$$\text{Sun Eph } S \quad - 28 \quad 19 \quad 03.0$$

$$O - G \quad + \quad 0.4$$

$$\text{Circumference of Earth} \quad - 0.06$$

$$S = -29^{\circ} \quad 11' \quad 42''$$

$$\Pi: \quad 55' \quad 40'' \quad 35''$$

$$9.86913$$

$$8.20935$$

$$8.41760$$

$$0.05535$$

$$6.55143$$

$$N - \alpha' \quad + 1' \quad 13.43$$

$$+ \quad 4.90$$

$$\alpha \quad 18 \quad 32 \quad 25.73$$

$$\alpha \quad 18 \quad 32 \quad 25.02$$

$$+ 0.71$$

$$- 0.07$$

