

KG

11366

v. 959

LXXXII



4303



4304

4309

4303

Stars - measures

1915 Feb 17

1

	α	δ	α	δ	α	δ	α	δ
1	9820	13733	19244	19250				
14.7	9253	3830	15942	12519				
27.1	5054	13179	4030	21				
			38	30				
	<u>27.0568</u>	<u>0555</u>	<u>14.6695</u>	<u>6717</u>				
2								
14.9	14120	17963	14761	13790				
15.8	1218	16531	13949	8078				
	12675	2821	40	12970				
		70						
	<u>15.8558</u>	<u>4562</u>	<u>14.9184</u>	<u>9187</u>				
3								
29.3	17950	17170	18153	17654				
27.6	12241	12875	11191	14600				
	3037	7873	8188	9090				
	42	78	43	50				
	<u>27.5710</u>	<u>5700</u>	<u>29.3041</u>	<u>3064</u>				

Grade 3.

4303

Stars - measures

1915 Feb 17

1

	d	y	N	d	N
✓	9820		13733	19244	19250
147	9258		3830	15942	1251918
271	5054		13179	4030	21
				38	30
	<u>47.0568</u>		<u>.0555</u>	<u>17.6695</u>	<u>6717</u>
2					
149	14120		17968	14761	13790
158	1218		16531	1394945	8078
	12675		2821	40	12970
			70		
	<u>15.8558</u>		<u>.8562</u>	<u>14.9184</u>	<u>9187</u>
3					
29.3	17950		17170	18158	17654
27.6	1224137		1287573	1119188	1460090
	30		7873	81	90
	42		78	43	50
	<u>27.5710</u>		<u>5700</u>	<u>29.3041</u>	<u>3064</u>

page 3.

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Onion-Measures

1915 Feb. 17

2

α	λ
$\frac{1}{17.0}$ 17985	20119
177 9888	18210
79	2920
97	16
<u>17.8113</u>	<u>.8101</u>

$$\begin{array}{r} 2 \\ 20.3 \\ 18.0 \end{array}$$

$$\begin{array}{r} 3 \\ 20.6 \\ 19.0 \end{array}$$

$$\begin{array}{r} 4 \\ 20.7 \\ 19.3 \\ \text{max} \\ \text{in } x \end{array}$$

$$\begin{array}{r} 5 \\ 20.5 \\ 20.0 \end{array}$$

$$\begin{array}{r} 6 \\ 20.0 \\ 20.6 \end{array} \begin{array}{r} 19647 \\ 12674 \\ 6481 \\ 50 \\ \hline 20.6976 \end{array}$$

$$\begin{array}{r} 17719 \\ 14650 \\ 6348 \\ 29 \\ \hline 6922 \end{array}$$

$$\begin{array}{r} 17629 \\ 9550 \\ 6055 \\ 42 \\ \hline 20.1916 \end{array}$$

$$\begin{array}{r} 16541 \\ 12948 \\ 4148 \\ 42 \\ \hline 20.6405 \end{array}$$

$$\begin{array}{r} 16518 \\ 13171 \\ 6162 \\ 28 \\ \hline 20.6644 \end{array}$$

$$\begin{array}{r} 15450 \\ 10576 \\ 6875 \\ 49 \\ \hline 20.5124 \end{array}$$

$$\begin{array}{r} 19905 \\ 17988 \\ 7985 \\ 10 \\ \hline 1922 \end{array}$$

$$\begin{array}{r} 16180 \\ 9740 \\ 5148 \\ 85 \\ \hline 6437 \end{array}$$

$$\begin{array}{r} 16211 \\ 9550 \\ 3036 \\ 01 \\ \hline 6665 \end{array}$$

$$\begin{array}{r} 16290 \\ 11145 \\ 5042 \\ 80 \\ \hline 5140 \end{array}$$

4303

Moon - measures

1915 Feb. 17

2

	α	λ
$\frac{1}{w.o}$	17985	20119
177	9888 ⁶⁰	18210
	79	29 ²⁰
	97	16
	<u>17.8113</u>	<u>.8101</u>

$$\begin{array}{r} 2 \\ w.o \\ 180 \end{array}$$

$$\begin{array}{r} 3 \\ w.o \\ 19.0 \end{array}$$

$$\begin{array}{r} 4 \\ w.o \\ 19.3 \\ w.o \\ w.o \end{array}$$

$$\begin{array}{r} 5 \\ w.o \\ w.o \end{array}$$

$\frac{6}{w.o}$	19647	17719
$\frac{w.o}{w.o}$	12674 ⁸¹	14650
	64	6348
	50	29
	<u>20.6975</u>	<u>.6922</u>

$$\begin{array}{r} 17629 \\ 9550 \\ 6055 \\ 42 \\ \hline 201916 \end{array}$$

$$\begin{array}{r} 16541 \\ 1294848 \\ 41 \\ 42 \\ \hline 20.6405 \end{array}$$

$$\begin{array}{r} 16518 \\ 1317162 \\ 61 \\ 28 \\ \hline 20.6644 \end{array}$$

$$\begin{array}{r} 15450 \\ 1057675 \\ 68 \\ 49 \\ \hline 20.5124 \end{array}$$

$$\begin{array}{r} 19905 \\ 17988 \\ 7985 \\ 10 \\ \hline 1922 \end{array}$$

$$\begin{array}{r} 16180 \\ 9740 \\ 5148 \\ 85 \\ \hline 6437 \end{array}$$

$$\begin{array}{r} 16211 \\ 955036 \\ 30 \\ 01 \\ \hline 6665 \end{array}$$

$$\begin{array}{r} 16290 \\ 11.14542 \\ 50 \\ 80 \\ \hline 5140 \end{array}$$

7
19
21

18
2
3
5
2

19
18
21

4303 Moon - measured 1915 Feb. 17.

3

	α	δ
7	19609	17700
190	18245	905150
212	60	53
	28	98
	<u>21.1369</u>	<u>1353</u>

8	18640	18680
188	1713231	1018372
212	28	80
max	42	86
μ	<u>21.1510</u>	<u>1492</u>

9	1380185	13635
180	1378584	1349878
21.0-	13640	89
	<u>20.9848</u>	<u>9853</u>

$$\begin{array}{r} 19 \\ 21 \\ \hline 40 \end{array}$$

4203

Moon - Measures

1915 Feb. 17

3

d

4

v

d

v

1	19609	17700
190	18249	905150
212	609	53
	28	95
	<u>21.1369</u>	<u>1353</u>

8	18640	18680
188	1713231	1018372
212	28	80
max	42	86
9	<u>21.1510</u>	<u>1492</u>

9	1380185	13635
180	~~137~~ 8584	1349878
21.0-	13640	8978
	<u>20.9848</u>	<u>9853</u>

4303	Times etc						
24h to stars	1913 Nov. 14	4 ⁿ	50 ^m			-5 ^m 02 ^m	
" Moon		4	56	05.5	-4	56	05.7
Clock fast			0	30.4			
H. sid. T.		4	55	35.2		$\theta - \alpha = +37^m$	
H. long		4	44	31.05			
G. Sid. T.		9	40	06.25			
Sid. T. in moon		15	31	55.37			
Interval		18	08	10.88			
Red.			2	58.27			
Obs. T.		18	05	12.61			

From hour. alum.				R. A.		Decl.	
moon 18h	4 ⁿ	17 ^m	53 ^s 6.4		+26° 20'	31.1	
motion in 1 ^m = 2.3205					6.184		
" " 5.2102				+ 12.09			32.2
Tabular place	4	18	05.73		+26	21	03.3

moon's age = 16 days.
 " parallax. 55' 56.38
 " semidiam. 15 16.1

$$934 = 14.95$$

$$916 = 14.4$$

$$R = 916.1$$

$$\text{Augmentation} = +14.4$$

$$\text{Irradiation (3)} = 0.3$$

$$R = 930.2$$

$$R = 19940$$

$$aR = -958$$

$$(1+a)R = 1898.2$$

$$R^2 = 3.6032$$

$$a = -504.3$$

$$24.0$$

$$-480.3$$

4303 Times etc
 24 h to stars 1913 Nov 14 4ⁿ 50^m - 5ⁿ 02^m
 4 56 05.5 - 4 56 05.7
 Clock fast 0 30.4

H. lid T. 4 55 35.2 6-X₂ + 37^m
 H. long 4 4.4 31.05
 G. Sid. 9 40 06.25
 Sid. T. in norm 1 5ⁿ 31 55.37
 Interval 18 08 10.88
 Rest. 2 58.27
 Rel. T. 18 05 12.61

From Hank. Alum. R. A. decl.
 moon 18ⁿ 4ⁿ 17^m 53^s 6.4 + 26° 20' 31"
 motion 1ⁿ 2.3205 6.184
 ... 5ⁿ 2102 + 1209 - 322
 Tabular place 4 18 05.73 + 26 21 03.3

moon's age = 16 days
 parallax 55' 5-6.38
 semidiam. 15' 16.1

934 = 1795^m
 916 = 14.4

R = 916.1
 Augmentation = 14.4
 Irradiation(3) = 0.3
 R = 930.2
 R = 19940
 AR = 918
 (1+AR)R = 18982
 R² = 36032

a = 5043

4 = 0.3

4303

Plato Constants etc

5

$$\begin{array}{r}
 \times \\
 14.6706 \\
 14.9186 \\
 29.3051 \\
 \hline
 3 \overline{) 58.8943} \\
 19.63 \\
 -18 \\
 \hline
 1.63 \\
 31 \\
 \hline
 51^3
 \end{array}$$

$$\begin{array}{r}
 \gamma \\
 27.0562 \\
 15.8560 \\
 27.5705 \\
 \hline
 70.48 \\
 23.49 \\
 -22 \\
 \hline
 1.49 \\
 466 \\
 \hline
 694'' \\
 -11' 34''
 \end{array}$$

$$\begin{array}{r}
 R. A \quad Dec. \\
 4 \quad 15 \quad 00 \quad +27 \quad 08 \quad 36 \\
 15 \quad 12 \quad +25 \quad 37 \quad 09 \\
 23 \quad 57 \quad +27 \quad 12 \quad 47 \\
 \hline
 53 \quad 69 \quad 19 \quad 57 \quad 92 \\
 4 \quad 18 \quad 03 \quad +26 \quad 39 \quad 31 \\
 - \quad 51 \quad - \quad 11 \quad 34 \\
 \hline
 4 \quad 17 \quad 12 \quad +26 \quad 28 \quad 00
 \end{array}$$

$$\text{Center } \left\{ \begin{array}{l} A = 4^h 17^m 10^s \\ D = +26^\circ 28' 00'' \end{array} \right.$$

$$\begin{array}{r}
 x - \bar{x} \quad +500x \quad = 44.94 \quad +4.3x \quad -101.02 \\
 +3918 + 7335 = +11253 - 1214 = +10039 + 63 = +10102 = 0 \\
 +3290 + 7419 = +10749 - 712 = +10037 + 64 = +10101 = -1 \\
 -3439 + 14653 = +11214 - 1238 = +9976 + 126 = +10102 = 0 \\
 18.7668 + 9383 = -864 \quad +81 \quad = 18.6166
 \end{array}$$

$$\begin{array}{r}
 y - \bar{y} \quad +100y \quad +467.7y \quad +5.3y \quad -1x \quad -12618 \\
 -1737 + 13528 = +11791 + 685 = +12476 + 143 = +12619 - 1 = +12618 = 0 \\
 +3911 + 7928 = +11839 + 697 = +12536 + 84 = +12620 - 1 = +12619 = +1 \\
 -2679 + 13785 = +11106 + 1369 = +12475 + 146 = +12621 - 3 = +12618 = 0 \\
 19.2520 + 9626 \quad +876 \quad +102 \quad -2 = 19.0504
 \end{array}$$

$$\text{Tables } a = 0.0 \quad e = 0.0 \quad a - e = 0.0 \quad b + a = 0.0$$

$$\text{Obs } a = -504.3 \quad e = -505.3 \quad +0.0 \quad b + a = -1.7$$

$$0 - e \quad -507.3'' - 505.3'' \quad -1.7$$

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Plate Constants etc

5

$$\begin{array}{r}
 \times \\
 14.6706 \\
 14.9186 \\
 29.3051 \\
 \hline
 3 \overline{) 58.8943} \\
 19.63 \\
 \hline
 1.63 \\
 31 \\
 \hline
 51^5
 \end{array}$$

$$\begin{array}{r}
 \gamma \\
 27.0562 \\
 15.5560 \\
 27.5705 \\
 \hline
 70.48 \\
 23.49 \\
 \hline
 149 \\
 466 \\
 \hline
 614 \\
 81' 34''
 \end{array}$$

$$\begin{array}{r}
 R. A. \quad Dec. \\
 4 \quad 15 \quad 00 \quad +27 \quad 08 \quad 36 \\
 15 \quad 12 \quad 125 \quad 37 \quad 09 \\
 23 \quad 57 \quad 27 \quad 12 \quad 47 \\
 \hline
 53 \quad 69 \quad 119 \quad 57 \quad 92 \\
 4 \quad 18 \quad 03 \quad +26 \quad 39 \quad 31 \\
 \hline
 - \quad 51 \quad - \quad 11 \quad 34 \\
 4 \quad 17 \quad 12 \quad +26 \quad 28 \quad 00
 \end{array}$$

$$\text{Center } \left\{ \begin{array}{l} A: 4^h 17^m 10^s \\ D: +26^\circ 28' 00'' \end{array} \right.$$

$$\begin{array}{r}
 2.8 \quad +500x \quad = 44.94 \quad +4.31 \quad -10102 \\
 +3918 + 7335 = +11253 - 1214 + 10039 + 63 = +10102 = 0 \\
 +3290 + 7419 = +10709 - 712 + 10037 + 64 = +10101 = -1 \\
 -3439 + 14653 = +11214 - 1238 + 9976 + 126 = +10102 = 0 \\
 187668 + 9383 = -864 \quad +81 \quad 218.6166
 \end{array}$$

$$\begin{array}{r}
 \gamma - \gamma \quad +1704 \quad +467.7 \quad +5.34 \quad -12 \quad -12618 \\
 -1737 + 13128 = +11791 - 685 + 12476 + 143 = +12619 - 1 = +12618 = 0 \\
 +3911 + 7928 = +11839 + 697 = +12536 + 84 = +12620 - 1 = +12619 = 1 \\
 -2679 + 13785 = +11106 + 1369 = +12475 + 146 = +12621 - 3 = +12618 = 0 \\
 192520 + 9626 \quad +876 \quad +102 \quad -2 = 190104
 \end{array}$$

$$\begin{array}{r}
 \text{Tables } a = 0.0 \quad b = 0.0 \quad a+b = 0.0 \quad b+a = 0.0 \\
 \text{Obs } a = -5043 \quad b = -5053 \quad +0.0 \quad b+a = -1.7
 \end{array}$$

	ξ	η	$\Delta\xi$	-3.3ξ	-7
1	-3.72	+5.22	-7	+12	+1
2	-3.81	-6.59	-7	+11	0
3	+11.69	+5.76	+7	-38	0
η	+0.62	-2.95	0	-2	<u>-9</u>

	$\Delta\eta$	$-\eta$	-1.7ξ	-3
+	3	-5	-2	+3
-	9	+7	-2	+3
+	29	-6	+18	-16
0	+3		-1	<u>-1</u>

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Standard Coordinates - Reference Stars.

6

Cape No. 627 mag 5.0				Cape No. 628 mag 7.8				Cape No. 656 mag 6.6			
C	4	14	12.12	4	14	24.99	4	23	09.14		
L			14						19		
B			12						17		
mean	4	14	12.13	4	14	24.99	4	23	09.17		
Pre		+	4783		+	47.40		+	48.09		
α	4	14	59.96	4	15	12.39	4	23	57.27		
A	4	17	10	4	17	10	4	17	10		
$\alpha-A$	-2		1004	-1		57.61		+	6	47.27	
$\tan(\delta-A)$		-	130.04		-	117.61			+	407.21	
log		2.11	408m		2.07	045m			2.60	982	
log S		9.94	932		9.95	506			9.94	906	
Σ		0.57	064m		0.53	275m			1.06	612	
Σ_0		-3.72	08		-3.41	00			+11.64	45	
Σ_1		-	4		-	4			+	45	
Σ		14.27	88		14.58	96			29.64	90	
Σ		14.67	06		14.91	86			29.30	51	
$\Sigma-S$		+3.91	8		+3.29	0			-3.43	9	
C	+27°	06'	41.3	+25	35	13.2	+27	10	00.0		
L			40.9						00.1		
B			40.9						00.2		
mean	+27	06	41.0	+25	35	13.2	+27	11	00.1		
Pre		+	1548		+	1554		+	146.5		
S	+27	08	35.8	+25	37	08.6	+27	12	46.6		
D	+26	28	00	+26	28	00	+26	28	00		
S-D	+	40	25.8	-	50	51.4	+	44	46.6		
$\tan(\delta-D)$		+24	35.9		-30	51.6		+	26	86.8	
log		3.38	668		3.48	452m			3.42	924	
log		0.71	783		0.81	567m			0.76	039	
$\tan$		9.70	98		9.68	08			9.71	10	
Σ^2		1.14	13		1.06	55			2.13	22	
η_1		7.90	45		7.79	97			8.89	66	
η_0	+5.22	19		-6.54	1.4		+5.75	96			
η_1	+	80		+	63		+	788			
η	27.22	99		15.46	49		27.83	84			
η	27.05	62		15.85	60		27.57	05			
$\eta-\eta_1$	-1.73	7		+3.91	1		-2.67	9			

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Standard Coordinates - Reference Star

6

Cape No.	627	mg	50	Cape No.	628	mg	78	Cape No.	656	mg	66
C	4	14	12.12	4	14	2499	4	23	0914		
L			14							19	
E			12							17	
mean	4	14	12.13	4	14	2499	4	23	09.17		
Proc		+	4783		+	4740		+	4809		
α	4	14	59.96	4	15	1239	4	23	5727		
A	4	17	10	4	17	10	4	17	10		
$\alpha-A$		-2	1004		-1	57.61		+	6	4727	
$\mu(\alpha-A)$			-130.04			-117.61			+	407.21	
log			2.11408m			2.07045m			2.60982		
μ			9.94932			9.95506			9.94906		
Σ			0.57064m			0.53275m			1.06612		
Σ_0			-3.7208			-3.4100			+11.6445		
Σ_1			-			-			+	45	
Σ			14.2788			14.5896			29.6490		
Σ			14.6706			14.9186			29.3051		
$\Sigma-\Sigma$			+3918			+3290			-3489		

C	+27°	06'	41.3	+25	35	13.2	+27	10	00.0
L			40.9						00.1
E			40.9						00.2
mean	+27	06	41.0	+25	35	13.2	+27	11	00.1
Proc	+	1	548	+	1	554	+	1	46.5
δ	+27	08	35.8	+25	37	08.6	+27	12	46.6
μ	-26	28	00	-26	28	00	-26	28	00
$\delta-\mu$	+	40	25.8	-	50	51.4	+	47	46.6
$\mu(\delta-\mu)$		+24	35.9		-30	51.6		+26	86.8
log	3.38	668		3.48	452m		3.42	924	
μ	0.71	783		0.81	567m		0.76	039	
μ	9.70	98		9.68	08		9.71	10	
Σ	1.14	13		1.06	55		2.13	22	
μ	79	045		77	997		88	966	
μ	+5.2	219		-6.5	414		+5.7	596	
μ	+	80		+	63		+	788	
μ	27.2	299		15.4	649		27.8	384	
μ	27.0	562		15.8	560		27.5	705	
$\mu-\mu$	-17	37		+39	11		-26	79	

4
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Moon's Center

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	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	20.0000	+1.2320	1.5178	3.5980	-52
2	20.1919	+1.4239	2.0275	3.5975	-57
3	20.6421	+1.8741	3.5123	3.5965	-269 $\frac{1}{2}$ wt
4	20.6654	+1.8974	3.6001	3.6001	-31
5	20.5132	+1.7452	3.0457	3.6037	+5
6	20.0000	+1.2320	1.5178	3.5983	-49
7	19.0000	+0.2320	0.0538	3.5999	-33
8	18.7680	0.0000	0.0000	3.5990	-42
9	18.0200	-0.7680	0.5898	3.5896	-136

$$R^2 = 3.6032$$

	y	$y - y_0$	$(y - y_0)^2$	
1	17.8107	-1.4423	2.0802	140 ✓
2	18.0000	-1.2530	1.5700	131 ✓
3	19.0000	-0.2530	0.0640	98 ✓
4	19.2530	0.0000	0.0000	90 ✓
5	20.0000	+0.7470	0.5580	67 ✓
6	20.6954	+1.4424	2.0805	40 ✓
7	21.1361	+1.8831	3.5461	7 ✓
8	21.1501	+1.8971	3.5990	0 ✓
9	20.9850	+1.7320	2.9998	336 ✓

Range 164

Approx. center

$$x = 20.0 \quad y = 17.8107$$

$$\frac{20.6954}{38.5061}$$

$$y_0 = 19.2530$$

$$y - \text{max} = 21.1501$$

$$R = 1.8971$$

$$x - \text{max} = 20.6654$$

$$x_0 = 18.7683$$

$$\text{Center} \begin{cases} x_0 = 18.7680 \\ y_0 = 19.2530 \end{cases}$$

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Moon's Center

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	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	20.0000	+1.2320	1.5178	3.5980	-52
2	20.1919	+1.4239	2.0223	3.5975	-57
3	20.6421	+1.8741	3.5123	3.5963	-269 $\frac{1}{2}$ mil
4	20.6654	+1.8974	3.6001	3.6001	-31
5	20.5132	+1.7452	3.0457	3.6037	+5
6	20.0000	+1.2320	1.5178	3.5983	-49
7	19.0000	+0.2320	0.0538	3.5999	-33
8	18.7680	0.0000	0.0000	3.5990	-42
9	18.0200	-0.7680	0.5898	3.5896	-136

$$R^2 = 3.6032$$

	y	$y - y_0$	$(y - y_0)^2$	
1	17.8107	-1.4423	2.0802	140
2	18.0000	-1.2530	1.5700	131
3	19.0000	-0.2530	0.0640	98
4	19.2530	0.0000	0.0000	90
5	20.0000	+0.7470	0.5580	67
6	20.6954	+1.4424	2.0805	48
7	21.1361	+1.8831	3.5461	7
8	21.1501	+1.8971	3.5990	0
9	20.9850	+1.7320	2.9998	336

Range 165

Apfhan center

$$x = 20.0 \quad y = 17.8107$$

$$\frac{20.6954}{38.5061}$$

$$y_0 = 19.2530$$

$$y_{\text{mean}} = 21.1501$$

$$R = 1.8971$$

$$x_{\text{mean}} = 20.6654$$

$$x_0 = 18.7683$$

$$\text{Center } \left\{ \begin{array}{l} x_0 = 18.7680 \\ y_0 = 19.2530 \end{array} \right.$$

Formation of normals

1	- 1.77	- 64.0	+ 75.0
2	- 1.77	- 81.0	+ 71.3
3	- 0.12	- 126.8	+ 15.6
4	+ 0.00	- 58.9	- 0.0
5	+ 1.31	+ 8.7	+ 3.7
6	+ 1.77	- 60.3	- 70.5
7	+ 0.43	- 7.6	- 62.0
8	+ 0.00	- 0.0	- 79.8
9	- 1.42	+ 104.8	- 236.5
	- 1.57	- 285.1	- 283.2

-a	-b	+15'	+ ΔC
- 12	+ 7	+ 10"	
- 14	+ 6	+ 7"	
- 19	+ 1	- 3"	
- 19	- 0	- 4"	
- 17	- 4	- 6"	
- 12	- 6	- 3"	
- 2	- 9	+ 4"	
- 0	- 10	+ 5"	
+ 8	- 9	+ 14"	

4303

Innovis Center - Conditional Equations

	0	C	0-C	Corr
1	+1.23 - 1.44 = -52	-29 + 28 = -1	-51	-41
2	+1.42 - 1.25 = -57	-34 + 24 = -10	-47	-40
3	+1.87 - 0.25 = -269	-45 + 5 = -40	-229	-232
4	+1.90 + 0.00 = -31	-45 - 0 = -45	+14	+10
5	+1.75 + 0.75 = +5	-42 - 5 = -47	+52	+46
6	+1.23 + 1.44 = -49	-29 - 28 = -57	+8	+5
7	+0.23 + 1.88 = -23	-5 - 37 = -42	+9	+13
8	0.00 + 1.90 = -42	-0 - 37 = -37	-5	0
9	-0.77 + 1.75 = -136	+18 - 34 = -16	-120	-106
			+83	-337
			Average = 49	

Normal Equations

$$\begin{aligned}
 +13.23 - 1.57 &= -285 & +8.86 \\
 -1.57 + 16.45 &= -283 & +4.78 \\
 +1.57 - 0.19 &= -34 & +1.05 \\
 +16.26 &= -317 & +5.83 & b = -19.5 + 0.36 \\
 +13.23 &= -285 - 31 = -316 & a = -23.9 + 0.70
 \end{aligned}$$

Arc measured = 16.7° Average (0-C) = -28.1

$$\frac{r_0}{h} = 2.05'$$

$$-\frac{28.1}{2.05} = -1.39 \quad \Delta a = -1.7$$

$$-2RC = +0.76 \quad +15$$

$$\text{Corr} = 0.2$$

$$\Delta \theta = +0.27 \quad \Delta \delta = +0.1$$

$$\Delta R = -1.5$$

$$\Delta a = +0.5^{+10}_{-2} \quad \Delta \alpha = +0.02$$

4303

Proxima Centauri - Conditional Equations

8

	a	b	c	$0-c$
1	+1.23 - 1.44 =	-5.2	-29 + 28 = -1	-5.1
2	+1.42 - 1.25 =	-5.7	-34 + 24 = -10	-4.7
3	+1.87 - 0.25 =	-2.69	-45 + 5 = -40	-2.29 (-11)
4	+1.90 + 0.00 =	-3.1	-45 - 0 = -45	+1.4
5	+1.75 - 0.75 =	+5	-42 - 5 = -47	+5.2
6	+1.23 + 1.44 =	-4.9	-29 - 28 = -57	+8
7	+0.23 + 1.88 =	-2.3	-5 - 37 = -42	+9
8	0.00 + 1.90 =	-4.2	-0 - 37 = -37	-5
9	-0.77 + 1.75 =	-1.36	+18 - 34 = -16	-1.20
				+ 8.3 = 33.7
				Average: 4.9

Normal Equations

$$+1323 - 157 = -285$$

$$-157 + 1645 = -283$$

$$+157 - 019 = -34$$

$$+1626 - 317$$

$$b = -195$$

$$+1323 - 285 = 311 - 316$$

$$a = -239$$

4303 Moon's linear Position (1918.0)

$$X_1 = 18.7680 \quad Y_1 = 19.2530$$

$$\Delta a = -12 \quad \Delta b = -10$$

$$18.7668$$

$$19.2520$$

From plate constants $x = 18.6166 \quad y = 19.0504$

$$z = +0.6166$$

$$\log z = 9.79000$$

$$\log \sin \delta = 9.95335$$

$$\log \cos \delta = 8.50724$$

$$-(\alpha - A) = 1.32941$$

$$\alpha - A = +21.35$$

$$A = 4 \ 17 \ 10$$

$$\alpha_0 = 4 \ 17 \ 31.35$$

$$\text{Rea} = +4.61$$

$$\alpha = 4 \ 17 \ 35.96$$

$$\eta = -2.9496$$

$$\log \tan \delta = 9.6970$$

$$\log z^2 = 9.5800$$

$$7.0534$$

$$6.3304$$

$$\eta_1 = +2$$

$$\eta_0 = -2.9498$$

$$\log \eta_0 = 0.46979$$

$$7.33115$$

$$\log \delta - D = 3.13864$$

$$S - D = -22' 56.1$$

$$D = +26 \ 28 \ 00$$

$$S_0 = +26 \ 05 \ 03.9$$

$$\text{Rea} = +18.7$$

$$S = +26 \ 05 \ 22.6$$

4303 Quasar's Mean Position (1913.0)

9

$$X_1 = 18.7680 \quad Y_1 = 19.2530$$

$$\Delta = -12 \quad \Delta = -10$$

$$18.7668$$

$$19.2520$$

From plate constants $x = 18.6166 \quad y = 19.0504$

$$z = +0.6166$$

$$\eta = -2.9496$$

$$\log z = 9.79000$$

$$\log \eta = 9.95335$$

$$8.50724$$

$$\log \tan \delta = 9.6970$$

$$\log \eta = 9.5800$$

$$7.0534$$

$$6.3304$$

$$(x - A) = 1.32941$$

$$\eta_1 = +2$$

$$A - H = +21.35$$

$$\eta_0 = -2.9498$$

$$H = 4 \quad 17 \quad 10$$

$$\log \eta_0 = 0.46979$$

$$7.33115$$

$$X_0 = 4 \quad 17 \quad 31.35$$

$$Red = +461$$

$$66 - D = 3.13864$$

$$x = 4 \quad 17 \quad 35.96$$

$$S - D = -22' 56.1$$

$$D = +26 \quad 28 \quad 00$$

$$S = +26 \quad 05 \quad 03.9$$

$$Red = +18.7$$

$$S = +26 \quad 05 \quad 22.6$$

Red. to abh-place.

$$f = +2.76$$

$$g = 22^m 15.6$$

$$H = 2 \quad 21.3$$

$$\log \delta = 13001$$

$$h = 12979$$

$$i = 06970 +$$

$$\begin{array}{r} 4^h \quad 05^m \quad 36.58 \\ \quad \quad 31.78 \\ \hline \quad \quad 14.60 \end{array} \quad \begin{array}{r} + 26 \quad 15 \quad 36.6 \\ \quad \quad \quad 16.9 \\ \hline \quad \quad \quad 19.7 \end{array}$$

$$\begin{array}{r} 4 \quad 17 \quad 59.32 \\ \quad \quad 54.93 \\ \hline \quad \quad 14.39 \end{array} \quad \begin{array}{r} + 17 \quad 20 \quad 40.8 \\ \quad \quad \quad 21.3 \\ \hline \quad \quad \quad 19.5 \end{array}$$

$$\begin{array}{r} 4 \quad 51 \quad 24.44 \\ \quad \quad 19.54 \\ \hline \quad \quad 14.90 \end{array} \quad \begin{array}{r} + 33 \quad 01 \quad 59.9 \\ \quad \quad \quad 45.4 \\ \hline \quad \quad \quad 14.5 \end{array}$$

4303

Red. ad. Coccyzoph.

10

$$S = +26^{\circ} 05'$$

$$H + \alpha \quad 6^{\text{h}} \quad 38.8 = 99^{\circ} 42'$$

$$H \quad 2 \quad 21.3$$

$$\alpha \quad 4 \quad 17.5$$

$$\delta \quad 22 \quad 15.6$$

$$g + \alpha \quad 2 \quad 33.1 = 38^{\circ} 16'$$

$$\log \cos S \quad 9.9533$$

$$i \quad 0.6970$$

$$(i) \quad 0.6503$$

$$g \cos(G + \alpha) \quad 9.5950$$

$$g \quad 1.3001$$

$$\sin \quad 9.7919$$

$$\tan S \quad 9.6898$$

$$8.8239$$

$$g' \quad 1.1951$$

$$g \quad 9.6057$$

$$h \quad +2.76$$

$$g \quad +0.40$$

$$h \quad +1.45$$

$$+4.61 \checkmark$$

$$\sin S \quad 9.6431$$

$$\cos(H + \alpha) \quad 9.2266m$$

$$h \quad 1.2979$$

$$\sin \quad 7.9938$$

$$\sec S \quad 0.0467$$

$$8.8239$$

$$h' \quad 0.1676$$

$$h \quad 0.1623$$

$$g' \quad +15.67$$

$$h' \quad -1.47$$

$$(i) \quad +4.47$$

$$+18.67 \checkmark$$

4303

Red. ad. Circum. aph.

10

$$S = +26^{\circ} 05'$$

$$H+X \quad 6 \quad 38.8 = 99^{\circ} 42'$$

$$H \quad 2 \quad 21.3$$

$$X \quad 4 \quad 17.5$$

$$S \quad 22 \quad 15.6$$

$$S+X \quad 2 \quad 33.1 = 38^{\circ} 16'$$

$$\log \cos S \quad 9.9533$$

$$i \quad 0.6970$$

$$(i) \quad 0.6503$$

$$\cos(G+X) \quad 9.8950$$

$$S \quad 1.3041$$

$$\sin \quad 9.7919$$

$$\tan S \quad 9.6898$$

$$8.8279$$

$$S' \quad 1.1951$$

$$S \quad 9.6057$$

$$S \quad +2.76$$

$$S \quad +0.40$$

$$S \quad +1.45$$

$$\hline +4.61$$

$$\log \cos S \quad 9.6431$$

$$\cos(H+X) \quad 9.22667$$

$$S \quad 1.2979$$

$$\sin \quad 9.9938$$

$$\tan S \quad 0.0467$$

$$8.8239$$

$$S' \quad 0.1676$$

$$S \quad 0.1623$$

$$S' \quad +15.67$$

$$S \quad -1.47$$

$$(i) \quad +7.47$$

$$\hline +78.67$$

4303

Lunar parallax.

11

$$\begin{array}{rcl}
 \alpha' & = & 4^h 17^m 35.96 \\
 \theta & = & 4 \quad 55 \quad 35.2 \\
 \delta - \alpha & = & + 37 \quad 59.24 \\
 & = & + 9^\circ 30' \\
 & + & 4 \\
 & 4 \quad 9 \quad 26
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 \hline
 0.00591 \\
 9.96318
 \end{array}$$

$$\begin{array}{rcl}
 \gamma & = & 42 \quad 34 \quad 26.5 \\
 & & 26 \quad 05 \quad 22.6 \\
 & & 16 \quad 29 \quad 04
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 8.21143 \\
 9.45292 \\
 \hline
 0.16971 \\
 7.66046
 \end{array}$$

$$\delta - \delta' = +15 \quad 43.8$$

$$\delta = +26 \quad 21 \quad 06.4$$

$$\text{Amplitude } \delta = +26 \quad 21 \quad 03.3$$

$$\begin{array}{rcl}
 0 - c & + & 3.1 \\
 \text{Curv. of Plate} & & 0.0 \\
 \text{Dev} & + & 0.1
 \end{array}$$

$$\begin{array}{rcl}
 \delta & = & +26 \quad 21 \quad 06.5 \\
 0 - c & + & 3.2
 \end{array}$$

$$S = +26^\circ 05' 22.6$$

$$\pi = 55' 56.38$$

$$\begin{array}{r}
 9.86913 \\
 8.21143 \\
 9.21761 \\
 \hline
 0.04764 \\
 7.34581
 \end{array}$$

$$\alpha - \alpha' = +7' 37.34$$

$$= + 30.549$$

$$\alpha = 4 \quad 18 \quad 06.45$$

$$\alpha = 4 \quad 18 \quad 05.73$$

$$\begin{array}{rcl}
 & & +0.72 \\
 \text{Curv} & & -0.03 \\
 \text{Dev} & & +0.02
 \end{array}$$

$$\begin{array}{rcl}
 \alpha & 4 \quad 18 \quad 06.47 \\
 0 - c & + & 0.72
 \end{array}$$

+303

Lenses parallel

11

$$\begin{array}{rcl}
 \alpha & = & 4^{\circ} 17' 35.96 \\
 \delta & = & 4^{\circ} 55' 35.2 \\
 \alpha - \delta & = & + 37' 59.24 \\
 & + & 9^{\circ} 30' \\
 & + & 4 \\
 & = & 9^{\circ} 26'
 \end{array}$$

$$\begin{array}{r}
 9.95727 \\
 0.00000 \\
 \hline
 0.00591 \\
 9.96318
 \end{array}$$

$$\begin{array}{rcl}
 \gamma & = & 42^{\circ} 34' 26.5 \\
 & & 26^{\circ} 05' 22.6 \\
 & & 16^{\circ} 29' 09
 \end{array}$$

$$\begin{array}{r}
 9.82640 \\
 8.21143 \\
 9.41292 \\
 \hline
 0.16971 \\
 7.66046
 \end{array}$$

$$\delta - \delta' = +15' 43.8$$

$$\delta = +26^{\circ} 21' 06.4$$

$$\text{Curvature } \delta = +26^{\circ} 21' 03.3$$

$$\begin{array}{rcl}
 \alpha - \delta & & + 3.1 \\
 \text{Curv. of Plate} & & 0.0 \\
 \text{Sum} & & + 3.1
 \end{array}$$

$$\begin{array}{rcl}
 \delta & = & +26^{\circ} 21' 06.5 \\
 \alpha - \delta & & + 3.2
 \end{array}$$

$$\delta = +26^{\circ} 05' 22.6$$

$$\pi = 55' 56.38$$

$$\begin{array}{r}
 9.86912 \\
 8.21143 \\
 9.21761 \\
 \hline
 0.04764 \\
 7.34581
 \end{array}$$

$$\alpha - \delta = +7' 37.34$$

$$+ 30.549$$

$$\alpha = 4^{\circ} 18' 06.45$$

$$\alpha = 4^{\circ} 18' 05.73$$

$$\begin{array}{rcl}
 \text{Curv} & & +0.72 \\
 \text{Sum} & & -0.03 \\
 & & +0.02
 \end{array}$$

$$\begin{array}{rcl}
 \alpha & = & 4^{\circ} 18' 06.47 \\
 \alpha - \delta & & +0.72
 \end{array}$$

4
1
12.2
27.2

2
12.5
27.5

3
26.1
27.1

4304 Stars - Measures

1915 Feb. 18.

12

α	δ
✓ 16219	20039
122 1490005	1135849
272 03	4349
32	35
<u>27.1317</u>	<u>11314</u>

α	δ
15800	18286
771017	1635040
22	4040
85	80
<u>12.1928</u>	<u>1942</u>

α	δ
2 9179	13880
125 8180	1315650
159 8450	50
<u>15.9270</u>	<u>9272</u>

α	δ
15360	18760
973739	1438782
35	85282
67	59
<u>12.4373</u>	<u>4375</u>

α	δ
3 19308	17728
268 1288284	1413632
275 84	32
88	38
<u>27.6412</u>	<u>6401</u>

α	δ
17048	18017
1533541	969495
40	00
50	05
<u>26.8291</u>	<u>8311</u>

Grades 3.

4304 Stars - measures

1915 Feb 18

12

$\checkmark$	α	$\checkmark$
10219	20039	
122 1490005	1131849	
03	4349	
32	31	
<u>27.1317</u>	<u>1314</u>	

α	α
15800	15286
771017	1635040
22	4040
85	80
<u>121928</u>	<u>1942</u>

$\checkmark$	α	$\checkmark$
917980	13880	
125 8180	1315650	
119 8450	50	
<u>159270</u>	<u>9273</u>	

α	α
15360	18760
973739	1438752
35	85
67	59
<u>124373</u>	<u>4375</u>

$\checkmark$	α	$\checkmark$
19308	17728	
1258284	1413632	
84	32	
88	38	
<u>27.6412</u>	<u>6401</u>	

α	α
17048	18017
1533544	969495
40	60
50	05
<u>26.8285</u>	<u>8311</u>

Error = 3.



4304

Moon - Measures

1915 Feb. 18.

a

y

z

a

z

N

1 18354
 19.0 16760
 18.3 16853
 56
18.1595

14139
 5739
 3939
 33
1605

2

19.6

19.0

3

19.7

19.6

max

in

x

4

19.7

20.0

5

19.3

21.0

6

19.0

21.3

15829
 13400
 8900
 20
212431

15853
 823949
 38
 48
2893

17786
 1431595
 04
 71
19.6522

16710
 1459105
 10
 20
19.7890

17863
 1553832
 40
 75
19.7672

17783
 1055562
 51
 92
19.2767

15718
 9194
 9901
 20
6521

15790
 788080
 8080
 79
7908

15810
 8150
 4842
 18
7669

16911
 1416870
 8070
 11
2738

4304

Moon - Measures

1915 Feb 18,

13

a

y

z

a

z

1 18354
 190 16760
 183 6553
 56
181575

14139
 5739
 3939
 33
1605

E

19.6

19.0

3

19.7

19.6

19.5

19.4

4

19.7

19.0

5

19.3

19.0

6

19.0

19.3

19.0

19.0

19.0

19.0

19.0

19.0

19.0

19.0

19.0

17786
 1431595
 04
 71
19.6522

16710
 1419105
 10
 20
19.7590

17863
 1553832
 40
 75
19.7672

17783
 1055562
 51
 92
19.2767

15718
 919401
 99
 20
6521

15790
 788080
 80
 79
7908

15810
 815042
 48
 18
7669

16911
 1416870
 80
 11
2788

15829
 13400
 8900
 20
212431

15853
 823949
 38
 48
2293

4304

Moon Measures

1915 Feb. 18.

 α η ν α δ ν

7	19884	18989
180	1388176	1495255
21.6	85	52
	75	69
	<u>21.5998</u>	<u>.5972</u>

8	19895	18972
17.8	1387870	1497069
21.6	70	69
max	82	68
ν	<u>21.6012</u>	<u>.5990</u>

9	18945	19911
17.0	1516050	1367878
21.9	61	77
	47	97
	<u>21.3785</u>	<u>.3775</u>

4304

Moon - Measures

1915 Feb. 18.

d

4

v

d

v

7 19884
 180 13881.76
 21.6 85.76

75
21.5998

18989
 14952.52

69
15972

8 19895
 178 13878.70
 21.6 70
 mean 82

21.6012
21.6012

18972
 14970.69
 68

5990
5990

9 18945
 170 15160.50
 21.4 61

47
21.3785

19911
 13678.78
 77
 97

3771
3771

4
E
C
P
Z
A
H
7
h
h
T

4304 Times etc
Exp. to stars 1913 Nov. 14 5^h 28^m - 5^h 40^m
known 5 33 32.0 - 5 33 32.2
clock fast 0 30.4

H. Sid T. 5 33 01.7 $\Theta - K = +1^{\circ} 23'$
N. long 4 44 31.05
G. Sid T. 10 17 32.75
Sid T. in Nov. 15 31 55.87
Interval 18 45 37.38
Red 3 04.31
G. M. T. 18 42 33.07

From Allen. R A Dec.
known 19^h 4^m 20^s 13.03 +26° 26' 38" 4
inter. in m = 2325.1 6074
" -17.449 - 1 46.0
Tabular place 4 19 32.46 +26 24 52.4

moon's age 16 days.
- ~~parallel~~ 55 57.09
- ~~semidian~~ 15 76.2
R 926.9
Amplitude 14.0
Inclination (3) 0.3
R 929.9
R 1.9934
a R 955
(+a) R 1.8979
R2 3.6020

934 = 14.5
928 = 14.0

a = -503.0
+24.
479.

Real Constants

Tables a = -0.3 e = -0.8 a-e = +0.5 t+a = -0.8
Obs. a = -503.0 -501.4 a-e = -1.6 t+a = -1.7

0-e = -502.7 - 500.6 - 0.9

4304 Times etc
Exp. station 1912 Nov. 14 5^h 28^m - 5^h 40^m
Moon 5 33 32.0 - 5 33 32.2
clock fast 0 304

H. sid. T. 5 33 01.7 @ - K: +1^m 23
Ref. 4 44 31.0
G.S. T. 10 17 32.75
Sid. T. in 2nd 15 31 55.37
Interval 18 45 37.38
Ref. 3 04.31
Eq. in T. 18 42 33.07

From Cebu. RA March
Moon 19^h 4^m 20^s 1 32.03 + 26 26 38.4
Inter. in 2 32.51 6074
- 40.57 - 1 46.0
Tabular place 4 19 32.46 + 26 24 52.4

Moon's age 16 days.
~~parallel~~ 55 57.09
Meridian 15 76.2
R 916.2
Amplitude 140
Irradiation (3) - 0.3
R 929.9
R 19934
a R - 955
1-a/R 18979
R 30020

944 14.5
916 14.0

a = 5030

179

4304 Plato Constant

Moon

x	12.1935	12.4374	26.8301	$X_0 = 17.8900$
Σ	14.2788	14.5896	29.6490	$\frac{1}{2}a = +4$
$x-3$	-2.0853	-2.1522	-2.8189	17.8904

y	27.1316	15.9271	27.6406	$Y_0 = 19.7000$
η	27.2299	15.4649	27.8384	$\frac{1}{2}b = +21$
$y-\eta$	-983	+4622	-1978	19.7021

$x-3$	$+500x$	-48.84	+3x	+16043
-2.0853	+6097	= -1.4756	+1324	= -16080
-2.1522	+6219	= -1.5303	+777	= -16080
-2.8189	+13415	= -1.4774	+1349	= -16123
17.8904	+8945	-960	+54	= 202986

$y-\eta$	+500y	+50.51	+1.44	-13236
-983	+13566	= +12583	+616	= +13199
+4622	+7964	= +12586	+628	= +13214
-1978	+13820	= +11842	+1355	= +13197
19.7021	+9851	+903	+28	= 19.4567

moon's mean Position (1913.0)

$$\begin{aligned} \Sigma &= +22986 \\ \log 3 &= 0.36146 \\ \log 8 &= 9.95316 \\ &850724 \end{aligned}$$

$$(\alpha - A) 1.90106$$

$$\alpha - A + 1 \quad 19.63$$

$$A = 4 \quad 17 \quad 10$$

$$q_1 = 4 \quad 18 \quad 29.63$$

$$Red = + \quad 4.61$$

$$x' = 4 \quad 18 \quad 34.24$$

$$\begin{aligned} \eta &= -2.5433 \\ \log \tan \epsilon &= 9.6907 \\ &0.7229 \end{aligned}$$

$$\eta_1 = 7.4670$$

$$\eta_2 = +29$$

$$\eta_3 = -2.5462$$

$$\log \eta_1 = 0.40589$$

$$7.33115$$

$$(\delta - D) = 3.07474$$

$$\delta - D = -19 \quad 47.8$$

$$D = +26 \quad 28 \quad 00$$

$$\delta_0 = +26 \quad 08 \quad 12.2$$

$$Red = + \quad 18.7$$

$$\delta' = +26 \quad 08 \quad 30.9$$

4304

Plate Transmittance

Moon

X	12.1935	12.4374	26.8301
Y	14.2788	14.5896	29.6490
Z	-2.0853	-2.1522	-2.8189

X ₀	17.8900
Y ₀	+4
Z ₀	17.8904

Y	27.1316	15.9271	27.6406
Z	37.2299	15.4649	27.8384
Y-Z	-983	+4622	-1978

Y ₀	19.7000
Z ₀	+21
Y-Z	19.7021

X-Z	13.2788	-48.89	+37
-2.0853 + 6.097	-1.4756	-13.24	-1.6054
-2.1522 + 6.219	-1.3307	-7.77	-1.6054
-2.8189 + 6.3415	-1.4774	-13.49	-1.6123
7.8904 + 8.945	-9.66	+74	

+16.043

= 20.2986

Y-Z	11.2024	+10.5	+1.44	-132.16
-983 + 135.66	-1215.3	+616	+131.99	+37
-4622 + 7964	+12186	+628	+13214	+22
-1978 + 13520	+11542	+1315	+13197	+39
9.7021 + 9.551	+9.03	+28		

+132.37

+132.36

+132.36

= 19.4567

moon mean Position (1913.0)

α = +2 29 86

η = -2 54 33

log 3 = 0.3 61 46

log 10.5 = 9.6 907

log 8 = 9.9 53 16

0.7 229

8.50 724

η = 7.4 670

α - A = 1.90 106

η = +29

α - A = 1.90 106

η = -2 54 02

α - A = 1.90 106

η = 0.40 589

α - A = 1.90 106

η = 7.3 3115

α - A = 1.90 106

η = 3.0 7474

α - A = 1.90 106

η = -19 475

α - A = 1.90 106

η = +26 28 00

α - A = 1.90 106

η = 126 08 123

α - A = 1.90 106

η = +187

α - A = 1.90 106

η = +26 08 304

α - A = 1.90 106

η = +187

α - A = 1.90 106

η = +26 08 304

α - A = 1.90 106

η = +187

α - A = 1.90 106

η = +26 08 304

α - A = 1.90 106

η = +187

α - A = 1.90 106

η = +26 08 304

1
2
3
4
5
6
7
8
9

1
2
3
4
5
6
7
8
9

4304

mwon Center

	x	$x - x_0$	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$O - C$
1	19.0000	+1.1100	1.2321	3.6037	+17
2	19.6522	+1.7622	3.1053	3.5953	-67
+3	19.7899	+1.8999	3.6096	3.6096	+76
4	19.7620	+1.8700	(3.4969)	3.5869	-151 $\frac{1}{2}$ wt.
5	19.2752	+1.3852	1.9188	3.6088	+68
6	19.0000	+1.1100	1.2321	3.6074	+54
7	18.0000	+0.1100	0.0121	3.6164	+144
8	17.8900	0.0000	0.0000	3.6104	+84
9	17.0000	-0.8900	0.7921	3.6085	+65
					3.6020

	x	$y - y_0$	$(y - y_0)^2$	
1	18.1600	-1.5400	2.3716	144 ✓
2	19.0000	-0.7000	0.4900	68 ✓
3	19.7000	0.0000	0.0000	90 ✓
4	20.0000	+0.3000	(0.0900)	81 ✓
5	21.0000	+1.3000	1.6900	57 ✓
6	21.2412	+1.5412	2.3753	13 36
7	21.5985	+1.8985	3.6043	3 ✓
8	21.6001	+1.9001	3.6104	0 ✓
9	21.3782	+1.6782	2.8164	328 332
				Range 176

Approx. Center

$$x = 19.0 \quad y = 18.1600$$

$$\frac{212412}{394012}$$

$$y = 19.7006$$

$$y_{\text{max}} = 21.6001$$

$$R = 1.9000$$

$$x_{\text{max}} = 19.7899$$

$$x = 17.8900$$

$$\begin{cases} x_0 = 17.8900 \\ y_0 = 19.7000 \end{cases}$$

4304

Minimum Center

	x	$x - X_0$	$(x - X_0)^2$	$(x - X_0) + (y - Y_0)$	$C - C$
1	19 0000	+1.1100	1.2321	3.6037	+17
2	19.6122	+1.7622	3.1053	3.5953	-67
+3	19.7899	+1.8999	3.6096	3.6096	+76
4	19.7670	+1.8700	3.4969	3.5869	-151
5	19.2752	+1.3852	1.9188	3.6088	+68
6	19.0000	+1.1100	1.2321	3.6074	+54
7	18.0000	+0.1100	0.0121	3.6164	+144
8	17.8900	0.0000	0.0000	3.6104	+84
9	17.0000	-0.8900	0.7921	3.6085	+65
					26020

	y	$y - Y_0$	$(y - Y_0)^2$	
1	18.1600	-1.5400	2.3716	144
2	19.0000	-0.7000	0.4900	68
3	19.7000	0.0000	0.0000	90
4	20.0000	+0.3000	0.0900	81
5	21.0000	+1.3000	1.6900	57
6	21.2412	+1.5412	2.3753	13
7	21.5985	+1.8985	3.6043	3
8	21.6001	+1.9001	3.6104	0
9	21.3782	+1.6782	2.8164	328
				Range 176

Approx. Center

$$x = 19.0 \quad y = 18.1600$$

$$21.2412$$

$$394012$$

$$y = 19.7006$$

$$y_{\text{max}} = 21.6001$$

$$R = 1.9000$$

$$x_{\text{max}} = 19.7899$$

$$x = 17.8900$$

$$\sum X_0 = 17.8900$$

Formation of Normals.

1	- 1.71	+ 18.9	- 26.2
2	- 1.23	- 117.9	+ 46.9
3	+ 0.00	+ 144.5	+ 0.0
4	+ 0.14	- 70.6	- 11.3
5	+ 1.81	+ 94.5	+ 88.4
6	+ 1.71	+ 60.0	+ 83.2
7	+ 0.21	+ 15.8	+ 273.5
8	+ 0.00	+ 0.0	+ 159.5
9	- 1.50	- 57.8	+ 109.1
	- 0.57	+ 87.4	+ 723.1

-a	-b	+15 +ΔC
- 11	+ 9	+ 13 ^v
- 18	+ 4	+ 1 ^v
- 19	- 0	- 4 ^v
- 19	- 2	- 6 ^v
- 14	- 8	- 7 ^v
- 11	- 9	- 5 ^v
- 1	- 11	+ 3 ^v
- 0	- 11	+ 4 ^v
+ 9	- 10	+ 14 ^v

4304

Moon's Center - Conditional Equations.

18

	O	C	O-C	Corr
1	$+1.11 - 1.54 = +17$	$+10 - 66 = -56$	$+73$	$+86''$
2	$+1.76 - 0.70 = -67$	$+16 - 30 = -14$	-53	$-52''$
3	$+1.90 + 0.00 = +76$	$+17 + 0 = +17$	$+59$	$+55''$
4 ^{int.}	$+1.87 + 0.30 = -151$	$+17 + 13 = +30$	-181	$-187''$
5	$+1.39 + 1.30 = +68$	$+12 + 56 = +68$	0	$-7''$
6	$+1.14 + 1.54 = +54$	$+10 + 66 = +76$	-22	$-27''$
7	$+0.11 + 1.90 = +144$	$+1 + 67 = +68$	$+62$	$+65''$
8	$+0.00 + 1.90 = +184$	$+0 + 82 = +82$	$+2$	$+6''$
9	$-0.89 + 1.68 = +65$	$-8 + 72 = +64$	$+1$	$+15''$
			$+197 - 166$	
			Average = 43	

Normal Equations.

$$\begin{aligned}
 & \begin{array}{rcl}
 a & b \\
 +12.78 - 0.57 & = & +87 \\
 -0.57 + 16.98 & = & +723
 \end{array} & \begin{array}{r}
 +8.36 \\
 +6.38
 \end{array} \\
 & \begin{array}{rcl}
 +0.57 - 0.03 & = & +4 \\
 +16.98 & = & +727
 \end{array} & \begin{array}{r}
 +0.38 \\
 +6.761 = +429
 \end{array} & +0.40 \\
 & +12.78 = +87 + 25 = +112 & a = +89 & +0.67
 \end{aligned}$$

Arc measured = 176° Average (O-C) = +3.4

$$\begin{aligned}
 \frac{RC}{n} &= 27 & + \frac{3.4}{27} &= +0.126 & \Delta a &= +0.2 \\
 -2RC &= +0.76 + 15 & & & \text{Corr} &= -0.2 \\
 \Delta b &= +0.30 + 6 & \Delta \delta &= +0.2 & \Delta R &= +0.4 \\
 \Delta a &= +0.57 + 10 & \Delta \alpha &= +0.02 & &
 \end{aligned}$$

4304

Miron's Center - Conditional Equations

	O	C	O-C
1	$+1.11 - 1.54 = +17$	$+10 - 66 = -56$	$+73$
2	$+1.76 - 0.70 = -67$	$+16 - 20 = -14$	-53
3	$+1.90 + 0.00 = +76$	$+17 + 0 = +17$	$+59$
4 ^{int}	$+1.87 + 0.30 = -151$	$-17 + 13 = +20$	$-151 (-90)$
5	$+1.39 + 1.30 = +68$	$+12 + 56 = +68$	0
6	$+1.18 + 1.54 = +254$	$+10 + 16 = +76$	-22
7	$+0.11 + 1.90 = +144$	$+1 + 64 = +65$	$+79$
8	$+0.00 + 1.90 = +190$	$+0 + 82 = +82$	$+108$
9	$-0.89 + 1.68 = +765$	$-8 + 72 = +64$	$+711$

+197 = +66

Average = +3

Normal Equation

$$+12.78 - 0.57 = +87$$

$$-0.57 + 16.982 = +723$$

$$+0.57 - 0.03 = +4$$

$$+16.915 = +727$$

$$b = +429$$

$$+12.78 = +87 + 25 = +112$$

$$a = +8.9$$

4304

Lunar Parallax.

19

$$\begin{aligned}
 \alpha' &= 4 \quad 18 \quad 34.24 \\
 \delta' &= 5 \quad 33 \quad 01.7 \\
 \alpha - \alpha' &+ 1 \quad 14 \quad 27.46 \\
 &= + 18^\circ \quad 36' \quad 52''
 \end{aligned}$$

$$+ \quad \quad \quad 7 \quad 23$$

$$+ 18 \quad 29 \quad 29$$

$$\begin{aligned}
 &9.95727 \\
 &0.00000 \\
 &0.02302 \\
 \hline
 &9.98029
 \end{aligned}$$

$$\delta - 43 \quad 42 \quad 00$$

$$26 \quad 08 \quad 31$$

$$17 \quad 33 \quad 29$$

$$\begin{aligned}
 &9.82640 \\
 &8.21152 \\
 &9.47953 \\
 &0.16060 \\
 \hline
 &7.67805
 \end{aligned}$$

$$\delta - \delta' = 16 \quad 22.8$$

$$\delta = +26 \quad 24 \quad 53.7$$

$$\text{Ann Eff. } \delta = +26 \quad 24 \quad 52.4$$

$$\begin{aligned}
 \text{O-C:} &+ 1.3 \\
 \text{Corr. of Plate} &0.0 \\
 &+ 0.2
 \end{aligned}$$

$$\delta = +26 \quad 24 \quad 53.9$$

$$\text{O-C} \quad + 1.5$$

$$\delta' = +26 \quad 08 \quad 30.9$$

$$\text{IT} = 55' \quad 57''.09$$

$$\begin{aligned}
 &9.46913 \\
 &8.21152 \\
 &9.50406 \\
 &0.04788 \\
 \hline
 &7.63259
 \end{aligned}$$

$$\alpha - \alpha' = 714' \quad 45''.14$$

$$= + 59.301$$

$$\alpha \quad 4 \quad 19 \quad 33.25$$

$$\alpha \quad 4 \quad 19 \quad 32.46$$

$$+ 0.79$$

$$\text{Corr} \quad - 0.03$$

$$\text{Irr} \quad + 0.02$$

$$\alpha \quad 4 \quad 19 \quad 33.27$$

$$\text{O-C} \quad + 0.81$$

4304

Lunar Parallax

19

$$\begin{array}{r}
 9 \quad 4 \quad 18 \quad 34.24 \\
 0 \quad 5 \quad 33 \quad 01.7 \\
 6-9 \quad 11 \quad 14 \quad 27.46 \\
 + 18 \quad 36 \quad 52 \\
 \hline
 \end{array}$$

$$+ \quad \quad \quad 7 \quad 23$$

$$7 \quad 18 \quad 29 \quad 29$$

$$\begin{array}{r}
 99.5727 \\
 0.00000 \\
 0.02302 \\
 \hline
 99.8029
 \end{array}$$

$$8 \quad 43 \quad 42 \quad 00$$

$$26 \quad 08 \quad 31$$

$$17 \quad 33 \quad 29$$

$$\begin{array}{r}
 982640 \\
 821152 \\
 947953 \\
 016060 \\
 \hline
 767805
 \end{array}$$

$$8-8' = 16 \quad 228$$

$$S = +26 \quad 24 \quad 53.7$$

$$\text{Ans Eff } S = +26 \quad 24 \quad 52.4$$

$$\begin{array}{r}
 0-C: \quad 1.3 \\
 \text{Corr. of Plate} \quad 0.0 \\
 + 0.2
 \end{array}$$

$$S. + 26 \quad 24 \quad 53.9$$

$$0-C \quad + 1.5$$

$$S' = +26 \quad 08 \quad 30.9$$

$$T = 55' 57''.09$$

$$\begin{array}{r}
 946713 \\
 521152 \\
 950406 \\
 \hline
 004788 \\
 7.63259
 \end{array}$$

$$\alpha - \alpha' = 714' \quad 45''.14$$

$$= +59.01$$

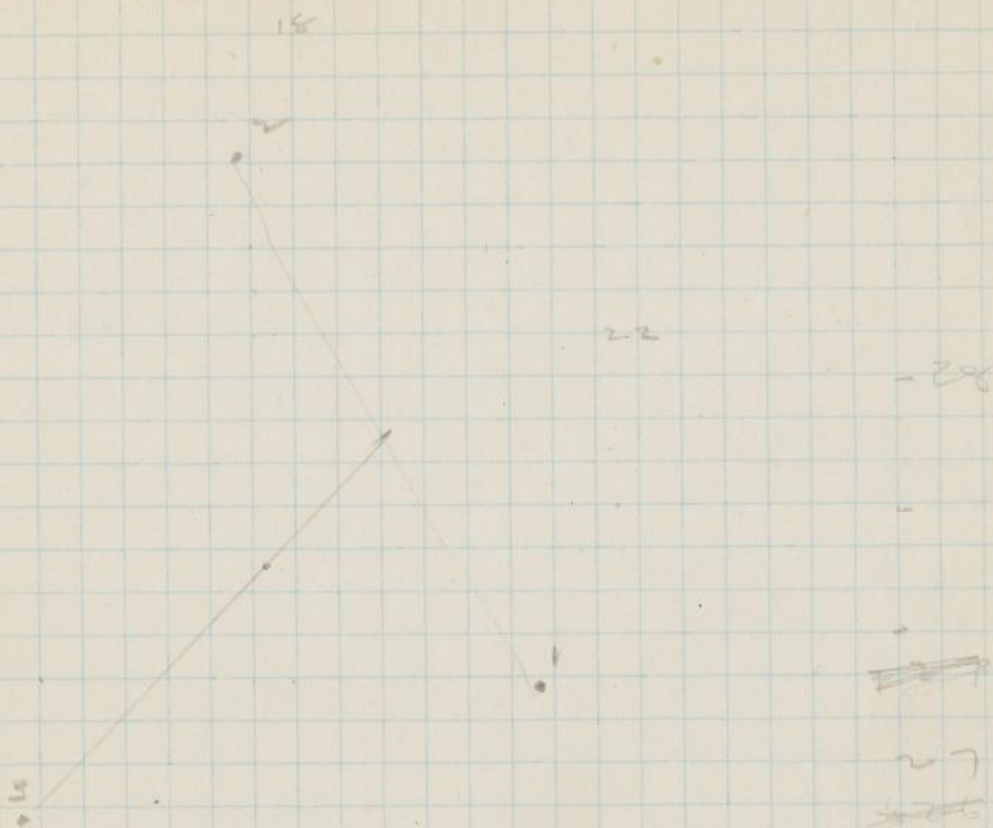
$$\alpha \quad 4 \quad 19 \quad 3325$$

$$\alpha \quad 4 \quad 19 \quad 3246$$

$$\begin{array}{r}
 40.79 \\
 \text{Corr} \quad -0.03 \\
 \text{Inv} \quad +6.02
 \end{array}$$

$$\alpha \quad 4 \quad 19 \quad 33.27$$

$$0-C \quad + 0.81$$



4309

Stars - Measures.

1915 Feb. 23

W

1 10359.55
124 50
139 10210

13.4855

1 2286
1 2147
4943

9860

1 4977
8860
5566
70

12.3887

1 8496
1 4582
8180
72

3905

2 18768
19.2 17273.72
26.2 80
48
26.1490

1 7053
8529.22
20
40
1482

1 9161
1 12080.1
11
40
19.2063

1 6231
1 4151
5043
19
2081

3 18059
244 9.21206
28 10
43
9.8836

1 6900
1 571319
16
80
8888

1 9345
1 2649
3742
30
24.3308

1 6560
1 3240
2830
30
3317

4 17010
31.4
243

Density 3.
1 7010
1 021920
20
19
24.3204

1 5552
1 1572
6980
32
31.3974

Turned thro' 90°

31.3976

4309

Stars - Measures

1915 Feb 23

22

$$\begin{array}{r}
 1.055955 \\
 124 \quad 50 \\
 139 \quad 10210 \\
 \hline
 139855
 \end{array}$$

$$\begin{array}{r}
 13286 \\
 12147 \\
 4943 \\
 \hline
 9860
 \end{array}$$

$$\begin{array}{r}
 14977 \\
 886026 \\
 5546 \\
 70 \\
 \hline
 123887
 \end{array}$$

$$\begin{array}{r}
 18496 \\
 1458250 \\
 8150 \\
 72 \\
 \hline
 3905
 \end{array}$$

$$\begin{array}{r}
 18768 \\
 192 \quad 1727372 \\
 262 \quad 80 \\
 48 \\
 \hline
 261490
 \end{array}$$

$$\begin{array}{r}
 17053 \\
 852922 \\
 20 \\
 40 \\
 \hline
 1482
 \end{array}$$

$$\begin{array}{r}
 19161 \\
 1120801 \\
 11 \\
 40 \\
 \hline
 192063
 \end{array}$$

$$\begin{array}{r}
 16231 \\
 17151 \\
 5043 \\
 19 \\
 \hline
 2081
 \end{array}$$

$$\begin{array}{r}
 18059 \\
 247 \quad 921206 \\
 58 \quad 1006 \\
 43 \\
 \hline
 98836
 \end{array}$$

$$\begin{array}{r}
 16900 \\
 1571219 \\
 16 \\
 80 \\
 \hline
 6888
 \end{array}$$

$$\begin{array}{r}
 19345 \\
 1264742 \\
 3742 \\
 30 \\
 \hline
 243308
 \end{array}$$

$$\begin{array}{r}
 16560 \\
 13240 \\
 2830 \\
 30 \\
 \hline
 3317
 \end{array}$$

$$\begin{array}{r}
 17010 \\
 314 \\
 243 \\
 \hline
 17010
 \end{array}$$

$$\begin{array}{r}
 17010 \\
 1021920 \\
 20 \\
 19 \\
 \hline
 243204
 \end{array}$$

$$\begin{array}{r}
 15552 \\
 1157290 \\
 6940 \\
 32 \\
 \hline
 313974
 \end{array}$$

Temperature 70°

$$\begin{array}{r}
 313976
 \end{array}$$

4309

Conooid Measures

1915 Feb. 23

21

$$\begin{array}{r} 1 \\ 186 \\ 180 \end{array}$$

$$\begin{array}{r} 18700 \\ 16460 \\ 5756 \\ 80 \\ \hline 18.7763 \end{array}$$

$$\begin{array}{r} 19758 \\ 12000 \\ 9991 \\ 38 \\ \hline 7746 \end{array}$$

$$\begin{array}{r} 2 \\ 190 \quad 16210 \quad 17695 \\ 183 \quad 13120 \quad 1073933 \\ 15 \quad 10 \quad 3833 \\ 00 \quad 90 \\ \hline 18.3092 \quad .3046 \end{array}$$

$$\begin{array}{r} 16210 \\ 1312010 \\ 15 \\ 00 \\ \hline 18. \end{array}$$

$$\begin{array}{r} 3 \\ 193 \\ 190 \end{array}$$

$$\begin{array}{r} 17280 \\ 954141 \\ 29 \\ 60 \\ \hline 19.2273 \end{array}$$

$$\begin{array}{r} 19431 \\ 1713220 \\ 22 \\ 12 \\ \hline 2302 \end{array}$$

$$\begin{array}{r} 4 \\ 193 \\ 193 \end{array}$$

$$\begin{array}{r} 16249 \\ 875039 \\ 40 \\ 29 \\ \hline 19.2509 \end{array}$$

$$\begin{array}{r} 15466 \\ 12962 \\ 6063 \\ 50 \\ \hline 2500 \end{array}$$

$$\begin{array}{r} 5 \\ 191 \\ 200 \end{array}$$

$$\begin{array}{r} 16230 \\ 715650 \\ 59 \\ 10 \\ \hline 19.0943 \end{array}$$

$$\begin{array}{r} 15485 \\ 1455139 \\ 4039 \\ 75 \\ \hline 0941 \end{array}$$

$$\begin{array}{r} 6 \\ 190 \quad 19531 \quad 15121 \\ 202 \quad 1755968 \quad 700584 \\ 80 \quad 8284 \\ 11 \quad 10 \\ \hline 20.1958 \quad 20.1878 \end{array}$$

Remeasure
20.1900

20.1937

4309

Moon's Measures

1915 Feb. 23

21

d

4

v

d

x

v

18700

19758

16460

12000

57

9991

80

38

18.77637746

16210

13100

15

00

18

17280

19431

954141

1713220

29

22

60

12

19.22732302

16249

15466

875029

12962

40

6063

29

50

19.25092500

16230

15485

715650

1455139

59

4039

10

75

19.09430941

1

186

180

2

190 16210

17695

183 13120

1073933

15

38

00

90

1830933046

3

143

190

4

143

193

map

v

5

141

200

6

190

202

19531

15121

1755968

700584

80

82

11

10

20.195820.1878

4307

Moon Measures.

1915 Feb. 23

2 14311
18.0 13980.1
21.1 009.1

954653
3853
9256

21.0318.0290

8 17405
17.4 15950.57
21.1 457
max 85
in 21.1451
8

15775
718190
8990
59
1426

9 17419
17.0 16310.99
21.1 989
90

16768
786049
52
56

21.1110.1097

10
16.6
21.0

very oblique
intersection

18880
1524040
31
53
166366

17410
1099095
91
82
6400

4307

Moon Measures

1915 Feb. 23

	a	b
2	14311	9146
180	13980	3853
21.1	0091	9256

21.03180290

8	17405	15775
174	11920	718190
211	45	8990
204	85	59
2	21.1451	1426

9	17419	16768
170	16310	786049
211	987	52
	90	56

21.11101097

10
166
210

very of higher
interaction

18880	17410
1524040	1099095
31	91
53	82
<u>166362</u>	<u>6400</u>

4309 Times etc.
 app to stars 1913 Nov. 14 $8^h 00^m$ $-8^h 12^m$
 " " moon $8 06$ $28.6 - 8 06$ 28.8
 clock fast $0 30.4$

H. Sid T. $8 05$ 58.3 $\theta - \alpha = + 3^h 40.5$
 H long $4 44$ 31.05
 G Sid T. $12 50$ 29.35
 Sid T. in moon $15 31$ 55.37
 Interval $21 18$ 33.98
 Red. 3 29.46
 S. M. T. $21 15$ 04.52

From Mount. Allen R. A. Decl.
 Moon 21^h $4^h 24^m 52.81$ $+26^\circ 38' 28.3$
 Motion in 1^h 2.3377 5.760
 " " 15.0753 $+ 35.24$ $+ 1 26.8$
 Tabular place $4 25 28.05$ $+26 39 55.1$

Moon's age 16 days.
 parallax $56' 00'' 08$
 semidiameter $15 17.0$
 R $9 17.0$
 Augmentation $+10.2$
 Irradiation (3) -0.3
 R $9 26.9$
 R 1.9869
 aR $- 9.55$
 (1+a)R 1.8914
 R2 $3 57 74$

934 = 10.6
 917 = 10.2

a = -5048
 +24
 -4808

4309	Time	etc.			
Sup. T. Star	1913 Nov. 14	8 ^h 00 ^m		- 8 ^h 12 ^m	
moon		8 06	28.6	- 8 06	28.8
clock fast		0	30.4		
H. Sid. T.		8 05	58.3	0 - 2 - 3	40.5
along		4 44	31.05		
G. Sid. T.		12 50	29.35		
Sid. T. in moon		15 21	55.37		
Intermed.		41 18	33.98		
Rad.		3	29.46		
G. in T		21 15	04.52		

From Mount. Wilson	R. A.	Decl.			
Moon 21 ^m	4 24	5 28.1	+ 26 38'	28.3	
Mercury 2 33.77			5.760		
15.0753		+ 35.24		T 1	26.8
Tabular place	4 25	28.05	+ 26 39	55.1	

Moon's age 16 days

934 - 10.6	parallax	56' 00.08
9.7 - 10.2	duration	15 17.0
	R	9 17.0
	Amplitude	+ 10.2
	Inclination (3)	- 0.3
	R	9 26.9
	R	1.9869
a - 1048	AR	- 9.55
4008	(1+AR)	18914
	R2	35774

4309

Plate Center

R.A.

Decl.

X	Y	R.A.	Decl.
12.3896	13.9858	(4) 23 57	+27 12 47
19.2072	26.1486	(3) 27 04	+25 30 01
24.3312	9.8827	(1) 19 52	-25 33 00
3 55.93	3 50.02	69 11.3	17 45 48
18.64	16.67	4 23 38	+25 55 16
-1.5	-2.2	- 20	+41 25
64	5.33	4 23 18	+26 36 41
31	4.65		
203	24.85"	Center	A = 4 ^h 23 ^m 20 ^s
	= 41' 25"		D = +26° 36' 40"

x-3	+5004	-51.94	+4.8x	-9721
+4193	+6195	= +10388	-726	= +9662 + 59 = +9721 = 0
+1381	+9604	= +10985	-1357	= +9628 + 92 = +9720 = -1
-2649	+12166	= +10117	-513	= +9604 + 117 = +9721 = 0
17.3584	+8679	-999	+83	= 17.1626

y-7	+5004	+56.4x	+4.14	-9297
+1548	+6993	= +8541	+699	= +9240 + 57 = +9297 = 0
-4967	+13074	= +8107	+1083	= +9190 + 107 = +9297 = 0
+2942	+4941	= +7883	+1372	= +9255 + 41 = +9296 = -1
19.2517	+9626	+979	+79	= 19.3904

Tables a = -2.5	c = -1.6	a - c = -0.9	b + a = -3.3
obs a = -504.8	c = -504.1	a - c = -0.7	b + a = -4.5
-2.3 ✓	-2.5 ✓		-1.2

4 30 9

Plate Center

x

y

R A

Decl

1 2 3 8 9 6

1 3 9 8 5 8

4 23 57

+ 27 12 47

1 9 2 0 7 2

2 6 1 4 8 6

27 00

+ 25 30 01

2 4 3 3 1 2

9 8 8 2 7

19 52

25 35 00

5 5 9 3

5 0 0 2

69 11 3

17 45 48

1 8 6 4

1 6 6 7

4 23 38

+ 25 55 16

6 7

5 3 3

4 23 18

+ 24 30 41

20"

24 85"

41' 25"

Center } A = 4 23 20
 { D = + 26° 36' 40"

2 - 3 + 10 4

- 51 74

+ 2.81

- 97 21

+ 41 93 + 61 95 - + 103 88 - 726 + 96 62 + 59 - 197 21 = 0

+ 13 81 - 96 09 - + 104 85 - 1557 + 96 28 + 92 - 197 20 = -1

- 26 49 + 121 66 - + 101 17 - 513 + 96 04 1.17 - 197 21 = 0

17 35 8 + 136 79 = 999 + 83 = 171 626

y - 77 + 100 4

+ 26 41

+ 714

- 92 97

+ 15 48 + 69 95 - + 85 71 + 69 95 + 92 40 + 57 - 92 97 = 0

- 49 67 - 130 74 - + 81 07 + 108 3 - + 91 90 + 107 - 92 97 = 0

+ 29 42 + 49 41 - + 78 83 + 137 2 + 92 55 + 41 - 92 96 = -1

19 25 17 + 96 26 = 979 + 79 = 19 39 04

Tables 2: - 2.5

63 - 1.6

2 - 2.2 = 0.9

b + a = 3.3

also a = 504 8

2 - 504 1

2 - 2.2 = 0.7

b + a = 4.5

ξ	η	$\Delta \xi$	-4.57	$+1.54$	-23.0
1	+1.07	+4.69	+36	-5 = +31	+7 = +24
2	+6.53	-12.93	+33	-29 = +4	+19 = +23
3	-6.03	-8.79	-16	+27 = +11	+12 = +23
M	-0.89	-2.61	0	+7	+7

$\Delta \eta$	-2.64	$+1.23$	$+8$
+3	-12 =	-9 + 1 =	-8
-49	+32 =	-17 + 8 =	-9
-21	+21 =	+0 - 7 =	-7
0	+17	-1	+17

4209 Standard Coordinates

Cape No. 656 mag 6.6

Cape No. 664 mag 7.3

Cape No. 640 mag 8.3

C 4 23 09 14

4^h 26^m 16^s 9

4 29 04.73

L 19

83

78

E 17

79

72

Mean 4 23 09 17

4 26 16 80

4 19 04.74

P.M.C. + 48.09

+ 47.38

+ 47.46

q 4 23 57 26

4 27 04.18

4 19 52.20

A 4 23 20

4 23 20

4 23 20

A-A + 37.26

+ 3 44.18

- 3 27.80

R.A. (A) + 37.26

+ 224.17

- 207.79

log. 2.57124

2.35058

2.31763m

cos 994906

9.95728

9.95531

E. 0.02754

0.81510

0.78018m

E₀ + 1.0655

+ 6.5328

- 6.0281

E₁ + 36

+ 33

- 16

E 19.0691

24.5361

119703

E 19.2072

243312

123896

E-3 + 1381

- 2049

+ 4193

C + 27 10 00.0

+ 24 58 17.9

+ 25 31 08.6

L 00.1

16.4

09.8

E 00.2

17.4

08.5

Mean + 27 11 00.1

+ 24 58 17.9

+ 25 31 08.7

P.M.C. + 1 46.5

+ 1 43.2

+ 1 51.7

S + 27 12 46.6

+ 25 00 01.1

+ 25 33 00.4

D + 26 36 40

+ 26 36 40

+ 26 36 40

S-D + 36 06.6

- 1 36 38.9

- 1 03 39.6

R.A. (D) + 216.67

- 580.04

- 382.00

log. 3.33580

3.76346m

3.58206m

E₀ 0.66695

1.09461m

0.91321m

E₁ 9.7111

9.6688

9.6795

E 0.0551

1.6302

1.5604

E 6.8196

8.3524

8.2933

E₀ + 4.6446

- 12.4340

- 8.1886

E₁ + 7

+ 225

+ 196

E 26.6453

9.5885

13.8310

E 26.1486

9.8827

13.9858

E-3 - 4967

+ 2942

+ 1548

C + 27 10 00.0

+ 24 58 17.9

+ 25 31 08.6

L 00.1

16.4

09.8

E 00.2

17.4

08.5

Mean + 27 11 00.1

+ 24 58 17.9

+ 25 31 08.7

P.M.C. + 1 46.5

+ 1 43.2

+ 1 51.7

S + 27 12 46.6

+ 25 00 01.1

+ 25 33 00.4

D + 26 36 40

+ 26 36 40

+ 26 36 40

S-D + 36 06.6

- 1 36 38.9

- 1 03 39.6

R.A. (D) + 216.67

- 580.04

- 382.00

log. 3.33580

3.76346m

3.58206m

E₀ 0.66695

1.09461m

0.91321m

E₁ 9.7111

9.6688

9.6795

E 0.0551

1.6302

1.5604

E 6.8196

8.3524

8.2933

E₀ + 4.6446

- 12.4340

- 8.1886

E₁ + 7

+ 225

+ 196

E 26.6453

9.5885

13.8310

E 26.1486

9.8827

13.9858

E-3 - 4967

+ 2942

+ 1548

4209 Standard Observations

Cape No. 656 mag 6.1

Cape No. 664 mag 7.2

Cape No. 40 mag 8.2

C 4 23 09.14
 L 19
 E 17
 mean + 23 09.17
 Prec + 48.09
 S + 23 57.26
 D + 23 20
 S-D - + 37.26
 trans. D - + 37.26
 log 1.57124
 log 994906
 log 0.02754
 z_0 +1.0655
 z_1 + 3.6
 z_2 19.0691
 z_3 19.2072
 z_4 +1.381

4^h 26^m 16.99
 83
 79
 4 26 16.90
 + 47.38
 4 27 04.18
 4 27 20
 + 3 44.18
 + 224.17
 2.35058
 9.95728
 0.81510
 +6.5328
 + 33
 24.5361
 243312
 -2049

4 29 04.73
 78
 72
 4 19 04.74
 +47.46
 4 19 52.20
 7 23 20
 - 3 27.80
 +207.79
 2.317634
 9.95531
 0.780184
 -6.0281
 - 16
 119703
 123896
 +4193

C +27 10 00.0
 L 00.1
 E 00.2
 mean +27 11 00.1
 Prec + 1 46.5
 S +27 12 46.6
 D +26 36 40
 S-D +36 06.6
 trans. D +2 46.7
 log 3.33580
 log 0.66695
 z_0
 z_1 9.7111
 z_2 00551
 z_3 68196
 z_4 +4.6446
 z_5 + 7
 z_6 26.6453
 z_7 26.1480
 z_8 -4.967

+24 58 17.9
 164
 174
 +24 58 17.9
 + 1 43.2
 +25 00 01.1
 +26 36 40
 -1 36 38.9
 -58004
 3.763464
 1.094614
 9.6688
 16302
 8.3524
 -12.4340
 + 225
 9.5885
 9.8027
 +2942

+25 31 08.6
 098
 085
 +25 31 08.7
 + 1 51.7
 +25 33 00.4
 -26 36 40
 -1 03 39.6
 -38200
 3.582064
 0.913214
 9.6795
 15604
 82933
 -8.1086
 + 196
 13.8310
 13.9458
 +1548

4309

Moon's Center

26

	X	$x - x_0$	Δx	$(x - x_0)^2$	$(x - x_0)^2 + (y - y_0)^2$	$0 - c$
1	18.7754	+1.4194	-4	2.0136	3.5758	-16
2	19.0000	+1.6440	-3	2.7017	3.5909	+135
3	19.2288	+1.8728	-1	3.5070	3.5695	-79
4	19.2504	+1.8944	0	3.5887	3.5887	+113
5	19.0942	+1.7382	+2	3.0220	3.5844	+70
6	19.0000	+1.6440	+3	2.7037	3.5905	+131
7	18.0000	+0.6440	+5	0.4154	3.5845	+71
8	17.3560	0.0000	+6	0.0000	3.5853	+79
9	17.0000	-0.3560	+5	0.1264	3.5867	+93
10	16.6383	-0.7177	+5	0.5144	3.5766	-8
3.5774						

	Y	$y - y_0$	Δy	$(y - y_0)^2$	
1	18.0000	-1.2500	+1	1.5622	132
2	18.3069	-0.9431	+1	0.8892	120
3	19.0000	-0.2500	0	0.0625	82
4	19.2500	0.0000	0	0.0000	90
5	20.0000	+0.7500	-1	0.5624	67
6	20.1918	+0.9418	-1	0.8868	60
7	21.0304	+1.7804	-2	3.1691	20
8	21.1438	+1.8938	-2	3.5853	0
9	21.1104	+1.8604	-2	3.4603	349
10	21.0000	+1.7500	-2	3.0622	338
Range 154					

Approx Center

$$X = 19.0 \quad Y = 18.3069$$

$$\underline{20.1918}$$

$$384.987$$

$$Y_1 = 19.2494$$

$$y - \text{max} = 21.1438$$

$$R = 18944$$

$$x - \text{max} = 19.2504$$

$$x_0 = 17.3560$$

$$\text{Center} \begin{cases} x_0 = 17.3560 \\ y_0 = 19.2500 \end{cases}$$

4309

Known Center

26

	X	$x - X_0$	Δx	$(x - X_0)^2$	$(x - X_0)^2 - (y - Y_0)^2$	$0 - c$
1	18.7754	+1.4194	-4	2.0136	3.5758	-1.6
2	19.0000	+1.6440	-3	2.7017	3.5909	+1.35
3	19.2288	+1.8728	-1	3.5070	3.5695	-7.9
4	19.2504	+1.8944	0	3.5887	3.5887	+1.13
5	19.0942	+1.7382	+2	3.0220	3.5844	+7.0
6	19.0000	+1.6440	+3	2.7037	3.5905	+1.31
7	18.0000	+0.6440	+5	0.4154	3.5875	+7.1
8	17.3560	0.0000	+6	0.0000	3.5853	+7.9
9	17.0000	-0.3560	+5	0.1264	3.5867	+9.3
10	16.6383	-0.7177	+5	0.5144	3.5766	-8
					3.5774	

	Y	$y - Y_0$	Δy	$(y - Y_0)^2$	
1	18.0000	-1.2500	+1	1.5622	1.32
2	18.3069	-0.9431	+1	0.8892	1.20
3	19.0000	-0.2500	0	0.0625	8.2
4	19.2500	0.0000	0	0.0000	9.0
5	20.0000	+0.7500	-1	0.5624	6.7
6	20.1918	+0.9418	-1	0.8868	6.0
7	21.0304	+1.7804	-2	3.1691	3.0
8	21.1438	+1.8938	-2	3.5853	0°
9	21.1104	+1.8604	-2	3.4603	3.49
10	21.0000	+1.7500	-2	3.0622	3.38
					Range 15.4

Approx Center

X =	19.0	Y =	18.3069
			<u>20.1918</u>
			38.4987
		Y =	19.2494
			21.1438
		R =	1.8944
			19.2504
		X =	17.3560

Center } $X = 17.3560$
 $Y = 19.2500$

Formation of Normals

	ab	an	bn
1	- 1.77	- 22.7	+ 20.0
2	- 1.54	+ 22.5	- 127.0
3	- 0.12	- 36.9	+ 4.9
4	+ 0.00	+ 213.5	+ 0.0
5	+ 1.30	+ 121.8	+ 52.5
6	+ 1.54	+ 214.5	+ 123.0
7	+ 1.14	+ 45.4	+ 126.2
8	+ 0.00	+ 0.0	+ 149.3
9	- 0.67	- 33.5	+ 173.0
10	- 1.26	+ 58	- 14.0
	- 1.38	+ 729.2	+ 507.9

-a	-b	+15	+ΔC
- 17	+ 9	+ 7	✓
- 20	+ 6	+ 1	✓
- 22	+ 2	- 5	✓
- 23	- 0	- 8	✓
- 21	- 5	- 11	✓
- 20	- 7	- 12	✓
- 8	- 12	- 5	✓
- 0	- 13	+ 2	✓
+ 4	- 13	+ 6	✓
+ 9	- 12	+ 12	✓

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Mars's Centric Conditional Equations

27

	a	b	0	c	0-c	Corr
1	+1.42	-1.25	= -16	+69 - 42 = +27	-43	-36 ^v
2	+1.64	-0.94	= +135	+79 - 31 = +48	+87	+88 ^v
3	+1.87	-0.25	= -7.9	+90 - 8 = +82	-161	-166 ^v
4	+1.89	+0.00	= +113	+91 - 0 = +91	+22	+14 ^v
5	+1.74	+0.75	= +70	+84 + 25 = +109	-39	-50 ^v
6	+1.64	+0.94	= +131	+79 + 31 = +110	+21	+9 ^v
7	+0.64	+1.78	= +71	+31 + 68 = +99	-20	-25 ^v
8	+0.00	+1.89	= +79	+0 + 63 = +63	+16	+18 ^v
9	-0.36	+1.86	= +93	-17 + 62 = +45	+48	+54 ^v
10	-0.72	+1.75	= -8	-35 + 59 = +24	-32	-20 ^v

+194 - 214

Average: 41

Normal Equations

$$\begin{aligned}
 +15.96 - 1.38 &= +729 & +9.76 \\
 -1.38 + 17.19 &= +508 & +6.53 \\
 +1.38 - 0.12 &= +63 & +0.84 \\
 +17.07 &= +571 & +7.37 \quad b = +33.5 \quad +0.43 \\
 +15.96 &= 729 + 46 = +775 & a = +48.5 \quad +0.65
 \end{aligned}$$

Arc measured: 154° Average: -2.0

$$\frac{pc}{n} = 19$$

$$\frac{-2}{.19} = -10.5$$

$$\begin{aligned}
 \Delta R &= -0.1 \\
 \text{Corr} &= -0.2 \\
 \Delta R &= +0.1
 \end{aligned}$$

$$-2RC = +0.76 + 15$$

+7

$$\begin{aligned}
 \Delta b &= +0.33 & \Delta \delta &= +0.2 \\
 \Delta a &= +0.59 & \Delta \alpha &= +0.02
 \end{aligned}$$

4309

Provisional Conditional Equations

27

	a	b	0	c	0-c
1	+1.92	-1.25	= -16	+69 - 42 = +27	-43
2	+1.64	-0.94	= +135	+79 - 31 = +48	+87
3	+1.87	-0.25	= -79	-90 - 8 = -98	-161 (-80)
4	+1.89	+0.00	= +113	+91 - 0 = +91	+23
5	+1.74	+0.75	= +70	+84 + 25 = +109	-39
6	+1.64	+0.94	= +131	+79 + 31 = +110	+21
7	+0.64	+1.78	= +71	+31 + 68 = +99	-20
8	+0.00	+1.89	= +79	+0 + 63 = +63	+16
9	-0.26	+1.86	= +93	-17 + 62 = +45	+48
10	-0.72	+1.75	= -8	-31 + 59 = +28	-32

+194 - 214

Average 41

Normal Equations

$$+15.96 - 138 = +729$$

$$-138 + 17.19 = +508$$

$$+138 - 0.12 = +63$$

$$+17.07 = +71$$

$$+15.96: 729 + 46 = +775$$

$$b = +33.5$$

$$a = +48.5$$

+309 Moon's Mean Position (1913.0)

$$\begin{array}{rcl}
 X_0 & = & 17.3560 \quad Y_0 = 19.2500 \\
 a & = & +24 \quad b = +17 \\
 \hline
 & & 17.3584 \quad 19.2517
 \end{array}$$

From Plate Constants $\chi = 17.1626 \quad Y = 19.3904$

$$\begin{array}{rcl}
 z & = & -0.8374 \\
 \log z & = & 9.92293m \\
 \cos \delta & = & 9.95265 \\
 & & 8.50724
 \end{array}$$

$$(X-A) \quad 146309m$$

$$X-A \quad -29.04$$

$$A = 4 \quad 23 \quad 20$$

$$X_0 = 4 \quad 22 \quad 50.96$$

$$Red = +4.63$$

$$\alpha' = 4 \quad 22 \quad 55.59$$

$$\eta = -2.6096$$

$$\begin{array}{rcl}
 \log \tan \delta & = & 9.6882 \\
 & & 9.8459 \\
 & & \underline{7.0534} \\
 & & 6.5875
 \end{array}$$

$$\eta_0 = +4$$

$$\eta_0 = -2.6100$$

$$\begin{array}{rcl}
 \log \eta_0 & = & 0.41664m \\
 & & 7.33115
 \end{array}$$

$$3.08549m$$

$$\delta - D = -20 \quad 17.6$$

$$D = +26 \quad 36 \quad 40$$

$$\delta_0 = +26 \quad 16 \quad 22.4$$

$$Red = +18.2$$

$$\delta' = +26 \quad 16 \quad 40.6$$

7309 Arrows Mission Position (913.0)

$$\begin{array}{r}
 X_0 = 17.3560 \quad Y_0 = 19.2500 \\
 a = +24 \quad b = +17 \\
 \hline
 17.3584 \quad 19.2517
 \end{array}$$

From Plate Constants $x = 17.1626 \quad y = 19.3904$

$$\begin{array}{r}
 z = -0.8374 \\
 \log z = 9.92293m \\
 \cos z = 9.95265 \\
 \quad \quad 9.50724
 \end{array}$$

$$(x-A) = 14.6304m$$

$$x-A = -29.04$$

$$A = 4 \quad 23 \quad 20$$

$$X_0 = 4 \quad 22 \quad 50.96$$

$$Red = + \quad 4.63$$

$$X' = 4 \quad 22 \quad 55.59$$

$$\eta = -26.096$$

$$\begin{array}{r}
 \log \tan S = 9.6582 \\
 \quad \quad 9.8459 \\
 \quad \quad 7.0534 \\
 \hline
 6.5875
 \end{array}$$

$$\eta_0 = + \quad 4$$

$$\eta_0 = -26.100$$

$$\begin{array}{r}
 \log \eta_0 = 0.41664m \\
 \quad \quad 7.33115
 \end{array}$$

$$3.08549m$$

$$S-D = - \quad 20 \quad 17.6$$

$$D = +26 \quad 36 \quad 40$$

$$\delta_3 = +26 \quad 16 \quad 22.4$$

$$Red = + \quad 1.82$$

$$S = +26 \quad 16 \quad 40.6$$

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Red. ad locum aff.

27

$$\begin{array}{rcl}
 H + \alpha & 6 & 43.6 = 100^\circ 54' \\
 H & 2 & 20.8 \\
 \alpha & 4 & 22.8 \\
 \delta & 22 & 15.7 \\
 \delta + \alpha & 2 & 38.5 = 39^\circ 38'
 \end{array}$$

$$\begin{array}{rcl}
 2 \cos(H + \alpha) & 9.8866 \\
 \dots 8 & 1.3003 \\
 \dots \sin \dots & 9.8047 \\
 \dots \tan \delta & 9.6934 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 \delta & 1.1869 \\
 \delta & 96223
 \end{array}$$

$$\begin{array}{rcl}
 + & +276 \\
 \delta & +042 \\
 \delta & +1.45 \\
 h & +463
 \end{array}$$

$$S_0 = +26 \quad 16 \quad 22$$

$$\begin{array}{rcl}
 \log \cos S & 9.9526 \\
 i & \underline{0.6959} \\
 (i) & 0.6485
 \end{array}$$

$$\begin{array}{rcl}
 2 \sin S & 9.6461 \\
 \dots \cos(H + \alpha) & 9.2767 \quad m \\
 \dots h & 1.2979 \\
 \dots \sin \dots & 9.9921 \\
 \dots \sec S & 0.0474 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 h' & 0.2207 \quad m \\
 h & 0.1613
 \end{array}$$

$$\begin{array}{rcl}
 \delta' & +15.38 \\
 h' & -1.66 \\
 (i) & +44.5 \\
 & +1817
 \end{array}$$

4309

Red. ad locum aff.

29

$$\begin{array}{rcl}
 17+x & 6 & 73.6 = 100^\circ 54' \\
 17 & 2 & 20.8 \\
 9 & 4 & 22.8 \\
 9 & 22 & 15.7 \\
 9 \text{ TA} & 2 & 38.5 = 39^\circ 38'
 \end{array}$$

$$\begin{array}{rcl}
 L \cos(6+x) & 9.8866 \\
 8 & 13003 \\
 \text{sum} & 9.8047 \\
 1 \text{ TA} & 9.6934 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 8 & 11869 \\
 8 & 96223
 \end{array}$$

$$\begin{array}{rcl}
 + & 276 \\
 \times & 042 \\
 \hline
 & 1145 \\
 - & 463 \\
 \hline
 & 682
 \end{array}$$

$$S = 726 \quad 16 \quad 22$$

$$\begin{array}{rcl}
 \log \cos S & 9.9526 \\
 i & 0.6959 \\
 \hline
 (6) & 0.6485
 \end{array}$$

$$\begin{array}{rcl}
 L \sin S & 9.6461 \\
 \cos(17+x) & 9.2767 \text{ m} \\
 \text{to} & 1.2979 \\
 \text{sum} & 9.9921 \\
 \text{LAC S} & 0.0474 \\
 & 8.8239
 \end{array}$$

$$\begin{array}{rcl}
 h' & 0.2207 \\
 h & 0.1613
 \end{array}$$

$$\begin{array}{rcl}
 8' & +1538 \\
 h' & -1.66 \\
 (6) & +445 \\
 \hline
 & +1817
 \end{array}$$

+309 Lunar Parallax

$$\begin{array}{rcl}
 \alpha' & 4^h & 22^m 55^s 59 \\
 \theta & 8 & 05 \quad 58.3 \\
 \alpha - \alpha' & +3 & 43 \quad 02.7 \\
 & + & 55^0 \quad 45' \quad 40''
 \end{array}$$

$$19 \quad 10$$

$$+ \quad 55 \quad 26 \quad 30$$

$$9.95727$$

$$999999$$

$$024623$$

$$0.20349$$

$$\gamma = 57 \quad 57 \quad 26$$

$$26 \quad 16 \quad 41$$

$$31 \quad 40 \quad 45$$

$$982640$$

$$821190$$

$$972029$$

$$007178$$

$$7.83037$$

$$S - S' = +23 \quad 15.7$$

$$S = +26 \quad 39 \quad 56.3$$

$$\text{Amplified } S = +26 \quad 39 \quad 55.1$$

$$O - C = +1.2$$

$$\text{Cur. of Plate} \quad +1.07$$

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

$$\text{Dur} \quad +0.2$$

$$S = +26 \quad 39 \quad 56.5$$

$$O - C \quad +1.4$$

$$S' = +26^0 \quad 16' \quad 40''.6$$

$$TT \quad 56' \quad 00''.08$$

$$986913$$

$$821190$$

$$991735$$

$$004884$$

$$804722$$

$$\alpha - \alpha' = +38 \quad 19.63$$

$$= +2^m \quad 33^s.31$$

$$\alpha \quad 4 \quad 25 \quad 28.90$$

$$\alpha \quad 4 \quad 25 \quad 28.05$$

$$+0.85$$

$$\text{Cur} \quad -0.035$$

$$\text{Dur} \quad +0.02$$

$$\alpha \quad 4 \quad 25 \quad 28.92$$

$$O - C \quad +0.87$$

4309 Linear Parallax

$$\begin{array}{r}
 \alpha' + 22^{\circ} 55' 59'' \\
 \theta' \quad 8 \quad 05'' \quad 58.3 \\
 \alpha - \alpha' + 3 \quad 43 \quad 02.7 \\
 + \quad 55^{\circ} \quad 45' \quad 40''
 \end{array}$$

$$19 \quad 10$$

$$- \quad 55 \quad 26 \quad 30$$

$$995727$$

$$999999$$

$$024623$$

$$020349$$

$$y = 57 \quad 57 \quad 26$$

$$26 \quad 16 \quad 41$$

$$31 \quad 40 \quad 45$$

$$982640$$

$$821190$$

$$972029$$

$$007178$$

$$783037$$

$$S - S' = +23 \quad 157$$

$$S = +26 \quad 39 \quad 56.3$$

$$\text{Assumed } S = +26 \quad 39 \quad 55.1$$

$$\alpha - \alpha' = +12$$

$$\text{Cur of plate} +0.9$$

$$\text{Dist. from ref} 0.0$$

$$\text{Dist} +0.2$$

$$S = +26 \quad 39 \quad 56.5$$

$$\alpha - \alpha' +1.4$$

$$S' = +26^{\circ} 16' 40.6$$

$$TT \quad 56' \quad 00'' 08$$

$$9186913$$

$$821190$$

$$991735$$

$$004884$$

$$804722$$

$$\alpha - \alpha' = +38 \quad 19.63$$

$$+2 \quad 33.31$$

$$\alpha \quad 4 \quad 25 \quad 28.90$$

$$\alpha \quad 4 \quad 25 \quad 28.05$$

$$+0.85$$

$$\text{Cur} = 0.02$$

$$\text{Dist} = 0.02$$

$$\alpha \quad 4 \quad 25 \quad 28.92$$

$$\alpha - \alpha' +0.87$$

