

KG

11366

v.1050

Neptune.



1
10
25

9
22
10.1

Neptune 11995

Star Measures

1st image
 1 1872 ✓ 1713
 2 1764 2700
 13
 22
 1113 222

1st image
 1 18992 18185 18754 18760
 10.7 12022 15158 16949 10578
 25.2 1418 56 49 78
 92 85 54 8760
 10.6974 10.6972 25.1805 25.1818

2nd image
 18940 16943 18202 18380
 18250 17622 16422 10154
 50 22 22 54
 40 6943 02 8380
 11.0690 11.0679 25.1780 25.1774

3 19330 18500 17350 17956
 225 14765 13250 16594 8700
 10.1 63 58 98 00
 30 00 50 7956
 22.4766 22.4754 10.0754 10.0744

18527 18493 15595 7110 05
 10014 17012 97 00
 16 10 35 74
 22.8527 22.8518 10.0739 10.0731
 22.8512 22.8518

Mean(1)

10.8829 25.1794

" 3

22.6637 10.0742

" 4

24.4789 27.3241

3

14.7817 18.5664

Star Measures

1 1st image 2nd image
 21 18738 17782
 18 17614.5 17782
 18 17614.5 17782
 21 18738 17782
 21 18738 17782

1st image

1 18992 18185 18754 18760
 10.7 12022 15158 16949 10578
 25.2 1418 56 49 78
 92 85 54 8760
 10.6974 10.6972 25.1805 25.1878

2nd image

18940 18943 18202 18380
 18250 7622 16422 10154
 50 22 22 54
 1 90 6943 02 8380
 11.0690 11.0679 25.1780 25.1774

2 17850 18500 17350 17956
 225 17760 17750 16594 8700
 10.1 63 57 98 00
 2 4730 110 50 7956
 22.4766 22.4754 10.0754 10.0744
 17612 177290 16335 16374
 18527.5 18493 15595 7110.5
 10.014.5 17112 97 00
 16 110 35 74
 22.8527 22.8518 10.0739 10.0731
 22.8512 22.8518

Star 1187

(X) d. 1st image

$\frac{4}{24.3}$
 $\frac{27.6}{16887}$ 18646 18680 16422
 1394344 11586 15433 19665
 45 8186 33 5962
 87 24.7146 80 22
 24.2933 24.2940 27.3247 27.3240

1st d. 2nd image

16890 18646 18017 16768
 10250 115287 14790 10012
 4648 87 8085 12
 90 146 17 68
 24.6642 24.6641 27.3232 27.3244

3709 3701
 X Y

$(1) 24.7062$ $(1) 27.3243$
 $(2) 24.3351$ $(2) 27.3238$
Mean 24.5206 27.3241

(1176) 1st image

18506 18264
 12552 1422824
 4850 20
 06 64
 14.5956 14.5960

2nd image

18498 18260
 882825 1794041
 22 42
 98 8260
 14.9673 14.9681

Mean 14.9817

17808 16384
 12142 1206463
 4245 6263
 08 84
 18.5666 18.5679

18406 18770
 12765 1442122
 65 23
 06 70
 18.5659 18.5652

18.5664

Neptune 11995

Star Measures

2

3	16760	16086	16324	18204
234	10837	10006	10012	146046
166	25	0	12	02
	60	1000	26	01
	225733	225717	160308	160313
238	16777	17367	16452	17600
	708426	7067	10652	1570
	81		52	02
	20	7367	53	02
	229683	229700	160307	160300

Neptune.

16496	17502	17210	16222
965658	14340	1159801	11820 ²³⁻
9660	40	04	30
96	02	10	6222
206838	206838	145609	145603
16373	16642	16550	16544
1579901	7212 ¹⁵⁻	1095753	12140
03	18	49	40
73	6642	50	44
210572	210573	145597	145596

X
Mean 20.8705

4
14.5601

Neptune

Star Measures

2

3	16760	14086	16326	18208
22.4	10827	12036	10018	14040
16.6	25	30	17	18
	60	60.86	26	01
	<u>225923</u>	<u>225947</u>	<u>164308</u>	<u>184305</u>
229	16777	17367	16953	19402
	70846	17067	10652	15702
	58		52	02
	30	7367	53	02
	<u>229693</u>	<u>229700</u>	<u>164301</u>	<u>184306</u>

Neptune

16496	17502	17210	16222
965658	14340	1159801	1182025
9660	40	04	30
96	02	10	6222
<u>206838</u>	<u>206838</u>	<u>145609</u>	<u>145603</u>
16873	16642	16550	16544
1579901	7282	1095758	12140
03	18	49	40
73	6642	50	44
<u>210512</u>	<u>210573</u>	<u>145597</u>	<u>145596</u>

1
3
4
2

$$\begin{array}{r}
 11995 \\
 \textcircled{3} \quad 22.6627 \quad 10.0742 \\
 \underline{22} \quad \underline{18} \\
 - .6627 \quad + 7.9258 \\
 \quad \quad \quad 3 \quad \quad \quad 466.5 \\
 \hline
 2054.37 \quad 3697.38720
 \end{array}$$

$$\begin{array}{r}
 R.A. \quad 8 \quad 26 \quad 48.51 \\
 \quad \quad \quad - \quad \quad \quad 20.54 \\
 \hline
 \quad \quad \quad 8 \quad 26 \quad 27.97
 \end{array}$$

$$\begin{array}{r}
 Decl. \quad +18 \quad 22 \quad 44.7 \\
 \quad \quad \quad + \quad -1 \quad \quad \quad 1 \quad 37.4 \\
 \hline
 \quad \quad \quad +19 \quad 24 \quad 22.1
 \end{array}$$

Plate Constants:

$$\begin{array}{l}
 X-3 \quad +500X \quad -174 \quad +6.8X -11682 \\
 1 + .6596 + 5441 = 1203.7 - 428 = 11609 + 73 = 11682 \\
 3 + .0358 + 11331 = 11700 - 671 = 11529 + 53 = 11682 \\
 4 - .0258 + 12239 = 11981 - 465 = 11516 + 166 = 11682 \\
 2 + .4508 + 7391 = 11899 - 346 = 11583 + 100 = 11683 \\
 208.705 + 10435 = \quad \quad \quad -248 \quad +142 = 207352
 \end{array}$$

$$\begin{array}{l}
 Y-\eta \quad +500Y \quad +159X \quad +6.9Y -5478 \\
 -7459 + 12590 = 5131 + 173 = 5304 + 174 = 5478 \\
 +0011 + 5037 = 5048 + 360 = 5408 + 70 = 5478 \\
 -8761 + 13662 = 4901 + 389 = 5290 + 188 = 5478 \\
 -4169 + 9284 = 5115 + 235 = 5350 + 128 = 5478 \\
 14.5601 + 7280 = \quad \quad \quad +332 \quad +100 = 147835
 \end{array}$$

$$\begin{array}{r}
 \textcircled{2} \quad 22.6627 \\
 \underline{22} \\
 - \quad 6627 \\
 \quad \quad 31 \\
 \hline
 205437
 \end{array}
 \qquad
 \begin{array}{r}
 10.0742 \\
 \underline{18} \\
 + \quad 79258 \\
 \quad \quad 466.5 \\
 \hline
 3697.38770
 \end{array}$$

$$\begin{array}{r}
 \text{RA} \quad 8 \quad 26 \quad 48.51 \\
 \underline{\quad \quad 20.54} \\
 8 \quad 26 \quad 2797
 \end{array}$$

$$\begin{array}{r}
 \text{Decl} \quad +18 \quad 22 \quad 44.7 \\
 \underline{\quad \quad 32.6} \\
 +15 \quad 24 \quad 22.1
 \end{array}$$

Plate Constants.

$$\begin{array}{l}
 X-3 \quad +500X \quad -174 \quad +6.8X -11482 \\
 +6596 +5441 = 12037 -428 = 11609 +73 = 11682 \\
 +1358 +11331 = 11700 -171 = 11529 +53 = 11682 \\
 +0258 +12289 = 11981 -465 = 11516 +166 = 11682 \\
 +4508 +7391 = 11899 -314 = 11585 +100 = 11685 \\
 208705 +10435 = \quad \quad -248 = \quad \quad +142 = 207352
 \end{array}$$

$$\begin{array}{l}
 Y-7 \quad +500Y \quad +159X \quad +6.9X -54 \\
 -7459 +12590 = 5131 +173 = 5304 +174 = 5478 \\
 +0051 +5037 = 5048 +360 = 5408 +70 = 5478 \\
 -8761 +13662 = 4901 +389 = 5290 +188 = 5478 \\
 -4169 +9284 = 5115 +235 = 5350 +128 = 5478 \\
 145601 +7280 = \quad \quad +332 \quad \quad +100 = 147835
 \end{array}$$

age 1176 mag 8.7

C	08	21	19.63
g			19.59
z			19.60
m	8	21	19.61
Puc			55.34
x	8	22	14.95
A	8	26	27.97
x-h	-	04	13.02
sn			-253.01
log	2.40	314m	
log ϵ	9.97	427	
ϵ_0	0.88	465m	

S ₀	-7.6674
S ₁	-17
S	14.3309
X	14.7817
X-S	+4.508

C	+19	34	55.9
g			56.0
z			55.4
m	19	34	55.8
Puc	-	3	06.0
S	19	31	49.8
D	19	24	22.1
S-D	+	07	27.7
tan			+447.7
ϵ_0	2.65	099	
	9.98	214	
log $\tan \delta$	9.54	99	
ϵ_0^2	1.76	93	
ϵ_1	8.37	26	

η_0	+0.9597
η_1	0.0236
η	189833
y	18.5664
y-y	-4169

11995

Standard Coordinates

5

Cape No.	1172	mg	72	Cape No.	1184	mg	55	Cape No.	1187	mg	56
C	08	19	01.58	08	25	53.68	83	26	55.61		
q			1.56			53.69			64		
z			1.56			69			60		
mean	08	19	01.57	08	25	53.69	8	26	55.62		
Prec			+ 55.70			+ 54.83			+ 55.64		
x	8	19	57.27	8	26	48.51	8	27	51.23		
A	8	26	27.97	8	26	27.97	8	26	27.97		
x-A	-	6	30.70			+ 20.54			+ 1 23.26		
tan "			-390.65			+ 20.54			+ 83.26		
log "			2.59178			1.31260			1.92044		
log cos			9.97180			9.97726			9.97094		
log S			1.07082			9.79714			0.39862		

S ₀	-	11.47	11		+ 0.6268		+ 2.5040
S ₁	-		56		+ 0.0001		+ 0.0007
3		10.2233			22.6269		24.5047
X		10.8829			22.6637		24.4789
X-S		+ .6596			+ .0368		+ .0258

C	+20	28	34.9	+18	25	56.7	20	46	51.4
q			34.8			56.7			51.5
z			35.0			57.1			51.3
mean	+20	28	34.9	+18	25	56.8	20	46	51.4
Prec		-3	03.4		-3	12.7		-3	13.0
S	20	25	31.5	+18	22	44.7	20	43	38.4
D	19	24	22.1	19	24	22.1	19	24	22.1
S-D	+1	01	09.4	-1	01	37.4	+1	19	16.3
tan "			+3669.8			-3697.8			+4757.1
log "			3.56465			3.56795			3.67734
log n ₀			0.89580			0.89910			1.00849
log tan δ			9.5710			9.5215			9.5780
" S ²			21416			9.5943			07972
" n ₁			8.7660			6.1692			7.4286

n ₀	+7.8670		-7.9270		+10.1975
n ₁	+0.0583		+0.0001		+0.0027
n	25.9253		10.0731		28.2002
q	25.1794		10.0742		27.3241
z	24.59		10.0511		27.61

Standard Coordinates

5

Cape No.	1182	log 72	Cape No.	1184	log 55	Cape No.	1187	log 62			
C	08	19	10	15	8	08	25	53.68	8	26	55.67
q				1.56				53.69			64
E				1.56				69			60
Mean	08	19	0	1	57	08	25	53.69	8	26	55.62
Prec				+	570			54.82		+	55.61
x	8	19	57	27		8	26	48.51	8	27	51.23
A	8	26	27	97		8	26	27.97	8	26	27.97
x-A	-	6	30	70				20.54	-	1	23.26
diff				-390.65				20.54			+83.26
log				259	178			1.31260			292044
log cos				997	180			9.97726			9.97094
log S				1070	82			9.79714			0.39862

S ₀	-	11	77	11				+	0.6268			+	2.5040
S ₁	-			56				+	0.0001			+	0.0007
S		10	22	33				22	63	69		24	5047
X		10	88	29				22	66	37		24	4789
X-S		+		6596				+	0368			+	0258

C	+20	28	34	9				+18	25	56	7	20	42	51	84
q				34	8					56	7			51	5
E				35	0					57	1			51	3
Mean	+20	28	34	9				+18	25	56	8	20	46	51	4
Prec				-3	034					12	1		-3	13	0
S	20	25	31	5				+18	22	44	7	20	43	38	4
D	19	24	22	1				19	24	22	1	19	24	22	1
S-D	+1	01	09	4				-1	01	37	4	+1	19	16	3
tan				+366	9.8					-369	7.8			+475	7.1
log				3.56	465					3.56	795			3.67	734
log				0.89	580					0.89	910			1.00	849
log				9.57	10					9.57	215			9.57	80
S ²				214	16					9.57	43			079	72
"				8.76	60					6.16	92			742	86

n ₀	+7.86	71						-7.92	70			+	10.19	75	
n ₁	+0.05	83						+	0.00	01		+	0.00	27	
n	25	92	53					10	07	31		28	20	02	
y	25	17	94					11	17	42		27	32	41	
z								+	0.05	44				87	61

Neptune 11995 Mean Position.

6

From Plate Courtauld

$$\begin{array}{r} 20.7352 \\ 22 \\ \hline S - 1.2648 \end{array}$$

$$\begin{array}{r} 14.7835 \\ 18 \\ \hline \eta - 3.2165 \end{array}$$

$$\begin{array}{l} \log S \quad 0.10202m \\ \log \cos \delta \quad 9.97570 \\ \quad \quad 8.50724 \\ \log \sin(\alpha - A) \quad 1.61908m \end{array}$$

$$\sin(\alpha - A) \quad -41.60$$

$$\alpha - A \quad = 41.60$$

$$A \quad 8 \quad 26 \quad 27.97$$

$$\alpha \quad 8 \quad 25 \quad 46.37$$

$$\text{Red} \quad +5.82$$

$$\alpha' \quad 8 \quad 25 \quad 52.19$$

$$\begin{array}{l} \log \tan \delta \quad 9.5365 \\ \log S_1^2 \quad 0.2040 \\ \quad \quad 7.0534 \\ \log \eta_1 \quad 6.7939 \end{array}$$

$$\eta_1 \quad +0.0006$$

$$\eta_0 \quad -3.2171$$

$$\log \eta_0 \quad 0.50746m$$

$$7.33115$$

$$\log \tan(\delta - D) \quad 3.17631m$$

$$\tan(\delta - D) \quad -1500.7$$

$$(\delta - D) \quad -25.00.7$$

$$\delta + 19 \quad 24 \quad 22.1$$

$$\delta_0 + 18 \quad 59 \quad 21.4$$

$$\text{Red} \quad -17.7$$

$$\delta + 18 \quad 59 \quad 03.7$$

Parallax

$$SMT = 18'' 2''$$

$$\phi' = 42^\circ 11'$$

$$\text{Harrace } M.T. = 13'' 18''$$

$$\text{Meridian passage } 13^\circ 50'$$

$$t = -36'' \quad \pi = 0'' 29$$

$$\text{Parallax in R.A.} = \pi \cos \phi' \sin t = -0.12\pi = -0'' 034 = -0'' 002$$

$$\text{Dec} = \text{approximately } \pi \sin(\phi' - \delta) = 0'' 29 \sin 23^\circ = -0'' 1$$

Position corrected for parallax

$$\alpha = 8^\circ 25' 52''.19$$

$$\delta = +18^\circ 53' 3''.8$$

Neptune 11995 Mean Position.

6

From Plate Courtauld

$$\begin{array}{r} 20.7352 \\ 22 \\ \hline 2 - 1.2648 \end{array}$$

$$\begin{array}{r} 14.7835 \\ 18 \\ \hline \eta - 3.2165 \end{array}$$

$$\begin{array}{l} \log s \quad 0.10202m \\ \log \mu s_0 \quad 9.97570 \\ \quad 8.50724 \\ \log \sin(x-A) \quad 1.61908m \end{array}$$

$$\begin{array}{l} \log \tan \delta \quad 9.5365 \\ \log s_0^2 \quad 0.2040 \\ \quad 7.0534 \\ \log \mu \quad 6.7939 \end{array}$$

$$\sin(x-A) \quad -41.60$$

$$\begin{array}{l} \eta_1 + 0.0006 \\ \eta_0 - 3.2171 \end{array}$$

$$x-A \quad -41.60$$

$$A \quad 8 \quad 26 \quad 27.97$$

$$x_0 \quad 8 \quad 25 \quad 46.37$$

$$\text{Red} \quad +5.82$$

$$x' \quad 8 \quad 25 \quad 52.19$$

$$\begin{array}{l} \log \eta_0 \quad 0.50746m \\ \quad 7.33115 \\ \log \tan(\delta-E) \quad 3.17631m \end{array}$$

$$\tan(\delta-E) \quad -15.00.7$$

$$(\delta-E) \quad -25 \quad 00.7$$

$$\delta + 19 \quad 24 \quad 22.1$$

$$\delta_0 + 18 \quad 59 \quad 21.4$$

$$\text{Red} \quad -17.7$$

$$\delta' + 18 \quad 59 \quad 03.7$$

Parallax

$$\mu' = 42'' \text{ yr}^{-1}$$

$$\text{SMT} = 18'' \text{ yr}^{-1}$$

$$\text{Humboldt } \mu_T = 15'' \text{ yr}^{-1}$$

$$\text{Mendenhall } \mu_T = 15'' \text{ yr}^{-1}$$

$$t = -36 \text{ m} \quad \pi = 0'' \text{ yr}^{-1}$$

$$\text{Parallax } \mu = \mu_T \sin \theta = -0.12 \text{ yr}^{-1} = -0''.024 = -0''.002$$

$$\mu = \mu_T \sin \theta = 14-51 = 0''.14 \text{ yr}^{-1} = -0''.1$$

Position correction for parallax

$$\alpha = 8^\circ 25' 52''.19$$

$$\delta = +18^\circ 53' 3''.8$$

$$\begin{array}{r}
 11 \quad 8 \quad 18 \quad 39.206 \\
 \underline{\quad\quad\quad} \\
 33.377 \\
 + 5.829 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 8 \quad 27 \quad 57.109 \\
 \underline{\quad\quad\quad} \\
 51.235 \\
 + 5.874 \\
 \hline
 \end{array}$$

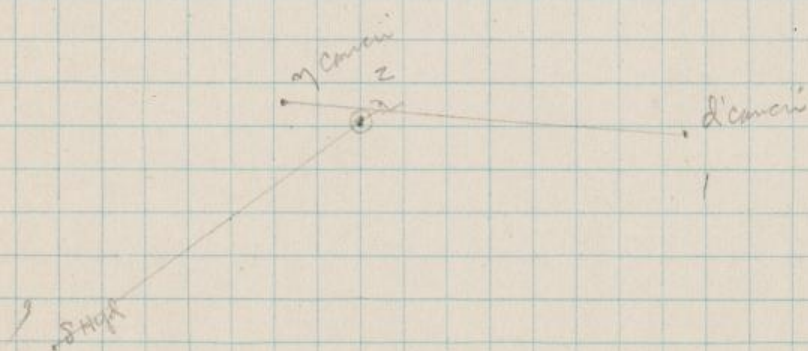
$$\begin{array}{r}
 8 \quad 33 \quad 18.006 \\
 \underline{\quad\quad\quad} \\
 12.642 \\
 + 5.864 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 + 18 \quad 35 \quad 52.95 \\
 \underline{\quad\quad\quad} \\
 36 \quad 9.73 \\
 - \quad 16.78 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 20 \quad 43 \quad 19.93 \\
 \underline{\quad\quad\quad} \\
 20 \quad 43 \quad 38.24 \\
 - \quad 18.31 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 57 \quad 59 \quad 34.41 \\
 \underline{\quad\quad\quad} \\
 50.75 \\
 - \quad 16.34 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 18.31 \\
 16.78 \\
 \hline
 1.53
 \end{array}$$



+ 34

+ 39

+ 24

+ 190

+ 14

$$\begin{array}{r}
 12'canon \\
 + 9
 \end{array}$$

+ 4

- 1

35 33 31 29 27 25 23 21 19 17 15 13 11

8h

Upsilon 11995

Reduction to App. Place

7

H + α	7	59.4	119° 57'	δ_0	+18° 59.4
H	23	33.6			
α	08	25.8			
G	23	35.6			
G + α	8	01.4	120° 21'	(11)	

log cos δ_0	9.9757
log δ_0	0.0084m
	9.9841m

log cos G + α	9.7035m
g	1.4252
" sin G + α	9.9360
tan δ_0	9.5366
	8.8239

log sin δ_0	9.5124
cos H + α	9.6970m
h	1.3106
sin H + α	9.9382
sec δ_0	0.0243
	8.8239

g'	1.1287m
g	9.7217

h'	0.5200m
h	0.0970

z	+4.047
g	+0.527
h	+1.250
Red.	+5.824

g'	-13.450m
h'	-3.312m
l'	-0.964
Red.	-17.726

Position from Almanac.

1916 Dec 28, 18^h 25^m GMT = J. D. 242 1226.751

From Ann Eph. 1916 for this time

Tab α	=	8 ^h 25 ^m 52 ^s .35	δ	=	+18° 59' 04".1
Obs α		8 25 52.19	δ		+18 59 03.8
α		-0 ^s .16			+0".3

Upsilon 11995

Reduction to App Place

7.

H+x	7	59.4	119° 57'	δ_0	+18" 59.4
H	23	33.6			
λ	08	25.8			
G	23	35.6			
G+x	28	01.4	120° 21'	(1)	

log cos G+x	9.7035
g	1.4252
" sin G+x	9.9360
tan δ_0	9.5366
	8.8239

g'	1.1287
g	9.7217

g	+4.017
g	+0.527
h	+0.258
Red	+5.824

log sin δ_0	9.5124
cos H+x	9.6970
h	1.3106
sin H+x	9.9382
sec δ_0	10.243
	8.8239

h'	0.5200
h	0.0970

g'	-113.450
h'	+3.312
i	-0.964
Red.	-17.726

Position from Almanac.

1916 Dec 18 11:20 UT = J.D. 2421226.751
From Ann Eph. 1916 for this time

True α	8h 25m 52s.35	δ	+18° 59' 04" 1
As α	8 25 52.19	δ	+18 59 03.8
α	-0.16		-0.3

1
11.
242
16
183
23
79

Kepler 12010

Star Measures

1	18688	18460	17145	18096
11.4	1471217	12420	878185	1644142
24.8	22	20	89	4342
	11.9971	60	45	96
	<u>11.9960</u>		<u>24.8360</u>	<u>24.8346</u>
	17692	18460	17535	18380
	10398	1576059	920097	16710
	98	58	94	10
	92	60	35	8380
	<u>11.7294</u>	<u>11.7299</u>	<u>24.8338</u>	<u>24.8330</u>
2	16239	18850	16672	18129
16.3	13106	17972	14333	10468
18.2	06	72	2328	68
	39	6650	72	29
	<u>15.3133</u>	<u>15.3122</u>	<u>18.2344</u>	<u>18.2339</u>
	16240	18850	18650	18400
	9754	1532324	1632226	10725
	5052	25	30	25
	40	8850	50	00
	<u>15.6488</u>	<u>15.6474</u>	<u>18.2324</u>	<u>18.2325</u>
3	16408	18790	16752	19055
23.3	14227	10968	912832	16684
19.7	27	68	36	84
	08	90	52	55
	<u>23.2181</u>	<u>23.2178</u>	<u>9.7620</u>	<u>9.7629</u>
	16410	18792	16742	18110
	10848	14360	910106	15740
	48	60	11	40
	10	92	42	8110
	<u>23.5562</u>	<u>23.5568</u>	<u>9.7626</u>	<u>9.7630</u>

Upsilon 12010

Star Measures

	18688	18460
1	1471217	12420
2	22	20
	113971	60
	<u>113960</u>	

17145	18896
-878185	164414
89	43
45	96
<u>24.8360</u>	<u>24.8346</u>

17692	18460
10398	1576059
98	58
92	60
<u>117294</u>	<u>117299</u>

17535	18380
920097	16710
94	10
35	8380
<u>24.8338</u>	<u>24.8330</u>

16239	18850
13106	17972
06	72
34	6650
<u>15.3133</u>	<u>15.3122</u>

16672	18129
14333	10468
2328	68
72	29
<u>18.2344</u>	<u>18.2339</u>

16240	18850
9754	1532324
5052	25
40	8850
<u>15.6488</u>	<u>15.6474</u>

18650	18400
1632226	10725
30	25
50	00
<u>18.2324</u>	<u>18.2325</u>

16408	18790
14227	10968
27	68
08	90
<u>23.2181</u>	<u>23.2178</u>

16752	19055
912832	16684
36	84
52	55
<u>9.7620</u>	<u>9.7629</u>

16410	18792
10848	14360
48	60
70	92
<u>23.5562</u>	<u>23.5568</u>

16742	18110
910106	15740
11	40
42	8110
<u>9.7636</u>	<u>9.7635</u>

Neptune 12010

Star Measures

4	1 7 6 6 1	1 8 0 2 2	1 6 6 1 2	1 8 4 5 7
24.9	7 8 2 9 3 0	1 7 8 4 2 4 7	1 6 4 2 6	8 6 3 5
27.0	3 1	5 2	2 6	3 5
	6 1	2 2	1 2	5 7
	<u>24.9 8 3 1</u>	<u>249 8 2 5</u>	<u>27.0 1 8 6</u>	<u>27.0 1 7 8</u>
	1 7 1 2 8	1 9 7 5 3	1 6 3 7 1	1 8 1 4 3
	1 3 9 5 0	1 2 9 2 0 2 5	1 6 1 8 1 8 4	8 3 3 2
	5 0	3 0	8 7	3 2
	2 8	1 7 5 3	7 1	8 1 4 3
	<u>25.3 1 7 8</u>	<u>253 1 7 2</u>	<u>27.0 1 9 7</u>	<u>27.0 1 8 9</u>

Neptune

1 6 0 4 0	1 7 5 2 4	1 8 3 9 9	1 7 7 5 0
1 5 5 4 0	8 0 3 2	1 5 0 4 3 3 8	1 1 1 0 3
4 0	3 2	1 5 0 3 3	0 3
4 0	2 4	9 9	7 7 5 0
<u>21.0 5 0 0</u>	<u>21.0 5 0 8</u>	<u>14.3 3 6 1</u>	<u>14.3 3 5 3</u>
1 6 0 4 2	1 7 5 2 8	1 7 4 0 3	1 7 0 8 7
1 2 1 7 8 7 5	1 1 1 8 0 8 5	1 4 0 5 7 5 3	1 0 4 4 8 4 3
7 2	9 0	4 9	3 8
4 2	2 8	0 3	8 7
<u>21.3 8 6 7</u>	<u>21.3 6 5 7</u>	<u>14.3 3 5 0</u>	<u>14.3 3 5 6</u>

	X	y
Mean (1)	11.56 3 1	24.83 4 4
(2)	15.48 0 4	18.23 3 3
(3)	23.38 7 2	9.76 2 9
(4)	25.15 0 1	27.01 8 8
Neptune	21.21 8 3	14.33 5 5

Neptune 12010

Star Measures

4	1 7 6 6 1	1 8 0 2 2	1 6 6 1 2	1 8 4 5 7
24.9	7 8 2 9 3 0	1 7 8 4 2 4 7	1 6 4 2 6	8 6 3 5
27.0	3 1	5 2	2 6	3 5
	6 1	2 2	1 2	1 8 7
	<u>2 4 9 8 3 1</u>	<u>2 4 9 8 2 5</u>	<u>2 7 0 1 8 6</u>	<u>2 7 0 1 7 8</u>
	1 7 1 2 8	1 0 7 5 3	1 6 3 7 1	1 8 1 4 3
	1 3 9 5 0	1 2 9 2 0 2 5	1 6 1 8 1 8 4	8 3 3 2
	5 0	3 0	8 7	3 2
	2 8	7 7 5 3	7 0	8 1 4 3
	<u>2 5 3 1 7 8</u>	<u>2 5 3 1 7 3</u>	<u>2 7 0 1 9 8</u>	<u>2 7 0 1 8 9</u>

Neptune

1 6 0 4 0	1 7 5 2 4	1 8 3 9 9	1 7 7 5 0
1 5 5 4 0	8 0 3 2	1 5 0 4 3 3 8	1 1 1 0 3
4 0	3 2	1 5 0 3 3	0 3
4 0	2 4	9 9	7 7 5 0
<u>2 1 0 5 0 0</u>	<u>2 1 0 5 0 8</u>	<u>1 4 3 3 6 1</u>	<u>1 4 3 3 5 3</u>
1 6 0 4 2	1 7 5 2 8	1 7 4 0 3	1 7 0 8 7
1 2 1 7 8 7 5	1 1 1 8 0 8 5	1 4 0 5 7 5 3	1 0 4 4 8 4
7 2	9 0	4 9	3 8
4 2	2 8	0 3	8 7
<u>2 1 3 8 6 7</u>	<u>2 1 3 6 5 7</u>	<u>1 4 3 3 5 0</u>	<u>1 4 3 3 5 6</u>

21 21 8 3

14 33 5 5

Equations

Cont 19000

Cont 1500

		Cont 19000	Cont 1500
142	$20.04a + 43.05b + 2c =$	$+415$	$+124$
304	$45.52a + 36.78b + 2c =$	$+826$	$+474$
104	$36.71a + 51.85b + 2c =$	$+209$	$+203$
200	$35.67a + 27.99b + 2c =$	$+532$	$+396$

$21.50a - 6.27b$	$= -89$	$+349$
$-2.16a + 23.86b$	$= -323$	-193
$+2.16a - 0.63b$	$= -9$	$+35$
$23.23b$	$= -332$	-158
$b =$	-14.29	$a = -6.80$
$-0.57a + 6.27b =$	-80	$= 57$
$20.97a$	$= -174$	$+298$
$a =$	-8.30	$d2 + 14.22$

Check $a - c = -1.7$ $b - d = 0.0$

Neptune 12010 Plate Constants.

Star	1	2	3	34	Neptune
X	11.5631	157.4504	23.3472	25.1501	21.2183
Y	10.2233	14.3309	22.6269	24.5047	.
X-S	+ 13398	+ 11495	+ 7603	+ 6464	
+ vix	+ 5782	+ 7740	+ 11694	+ 12575	+ 10604
Sum	+ 19180	+ 19235	+ 19297	+ 19029	22.2792
av	+ 96	+ 128	+ 194	+ 204	+ 176
by	+ 350	+ 260	+ 139	+ 386	+ 205
Sum	19631	19623	+ 19630	+ 19624	22.3173
int	+ 4	- 4	+ 3	- 3	20.3546
1907					

u	24.8344	18.2333	9.7629	27.0188	14.3355
v	25.9253	18.9833	10.0731	28.2002	
u-v	- 10909	- 7500	- 3102	- 11814	
u-v	+ 12417	+ 9117	+ 4881	+ 13509	+ 7168
Sum	+ 1508	+ 1617	+ 1779	+ 1695	14.0523
av	+ 189	+ 128	+ 166	+ 184	+ 197
by	- 164	- 220	- 332	- 358	- 302
Sum	+ 1513	+ 1521	+ 1513	+ 1521	15.0368
Sum	- 4	+ 4	- 4	+ 4	- 1517
15-17					14.8804

Neptune 12010 Planet Constants

Star	1	2	3	4	5	6
X	11.5631	107.4504	23.3172	20.1001	21.218	
E	10.2233	14.3309	22.6269	24.3007		
1-5	+ 13398	+ 11495	+ 7603	+ 6454		
mx	+ 5782	+ 7740	+ 11694	+ 11237	+ 1060	
	+ 19180	+ 19235	+ 19297	+ 19029	22.279	
	96	+ 128	+ 194	+ 207	+ 176	
	350	+ 200	+ 139	+ 356	+ 205	
	19631	14623	+ 19630	+ 19624	22.3173	
	+ 4	- 4	+ 3	- 3	20.3546	

y	24.8344	18.2333	9.7629	27.0188	14.3355	
η	25.9252	18.9622	10.0731	28.2002		
	- 10909	- 7500	- 3102	- 11814		
	+ 12417	+ 9117	- 4151	+ 13509	+ 7168	
	+ 1508	+ 1617	+ 1779	+ 1695		
my	+ 189	+ 1207	+ 106	- 184	+ 144	
dx	- 104	- 220	- 332	- 358	- 31	
my	+ 1513	+ 1521	+ 1513	+ 1521	14.318	
my	- 4	- 4	- 4	- 4	14.16	

2
L
G

Ref time 12010

ϵ 20. 3546
-1. 6454

log ϵ 0. 21627^u
log ϵ_0 9. 97568
corr 8. 50724

log $\epsilon - A$ 1. 73335^m
corr $\epsilon - A$ -54.312^s

$\epsilon - A$ -54.12

A 8^h 26^m 27^s. 97

α_0 8^h 25^m 33^s. 88

Red. +5.87

ϵ 8^h 25^m 39^s. 72^s

Parallax 00

ϵ 8^h 25^m 39^s. 72

ϵ 8^h 25^m 39^s. 86

$\epsilon - C$ -0.14

Mean Place

η 14.8807
- ~~3.9361~~
-3.1199

log ϵ 9. 5345
log ϵ^2 0. 4325
7. 0534
log ϵ_1 7. 0204

η_1 + 10
 η_0 - 3. 8209

log η_0 0. 49428^m
7. 33115^s

log $\epsilon - D$ 3. 26313^m

$\epsilon - D$ -1455^s. 9^s

D + 19° 24' 22".1

- 24' 15".9

δ_0 + 19° 00' 06".2

- 17.7

Red

δ + 18° 59' 48".6

Parallax +0.1

δ + 18° 57' 48".6

$\delta \epsilon$ + 18° 57' 48".3

$\epsilon - C$ +0".3

up turn 12010

δ 20 20.46
 -1. 6454

γ 8 -0 21627

γ 5 9 9331

γ 8 50724

γ 1 73334

γ 5 54112

γ 1

γ 54112

δ 20 20.97

δ 20 33.88

δ 5 57

δ 20 39.92

00

Parallax

δ 20 39.72

δ 20 39.86

δ 20 ± 0.14

mean Plane

γ 14.8807

~~3.1199~~

γ 3.1199

γ 5 9 5245

γ 5 0 4325

γ 7 0 534

γ 7 0 204

γ 10

γ 3 1209

γ 0 49428

γ 7 33115

γ 3 26203

γ 10055.9

δ + 19 20 22.1

δ - 24 15.9

δ + 19 00 06.2

δ 17.7

δ + 18 59 48.5

Parallax 40.1

δ + 18 59 48.6

δ + 18 59 48.3

δ ± 0.3

reference 12010

Reduction to app place

Date = 1916 Dec 30.8 GMT

Geo 12° 0' 18"
 C 30° 3' 53"
 a 8126° 25'
 H 307° 31'
 H₀ 117° 56'

S = 18° 50' 15"

γ = 14.81

C₀ 1.4260
 m₀ 264.70

h₀ 1.3102
 h 264.40

40.06
 136

+ 45° 07' 45" 070
 + 0.525
 + 1.272
 = 5° 868

g in (G-H) = -134.63
 h in (H-H₀) = 3.08
 L + 1.28

S - J₀ = 17° 85'Parallax: C₀Date = J.D. 2421225.807 = 1916 Dec 30.19^h 25^m GMT

Parallax 0".29

4 44
 = for 30d 124° 41' - Harvard
 13° 44'
 124° 41' - Harvard
 13° 44'
 124° 41' - Harvard
 13° 44'

Parallax in R.A. = 0".05 = 0".00

Dec = 0".29 sin 24° (approx) = -0".1

Planet's apparent place

Dec 30 8 20- 44.74 + 16 59 304.6
 0.69 - 4.93 + 17.5
 8 20- 39.86 + 16 59 48.3

Infrared 12010

Reduction to eff plane

Date = 1916 Dec 30 8 GMT

C₁₀₀ 12 0 13C₁ 30 3 53C₂ 812 6 42 51H₁ 30 7 31H₂ 12 7 46

S = 110 54 5

Z = 1 31

C₁₀₀C₁C₂

1.2260

26.796

105

105

105

105

105

C₁₀₀ 1.3102C₁ 20 15C₁₀₀ (C₁₀₀) = -13 43C₁ (H₁) = 9 08C₂ = 0 43

S = 10 7 55

T + 4250704 45 070
 C₁₀₀ (C₁₀₀) = 0 525
 C₁ (H₁) = 1 272
 C₂ = 5 867

Parallax C₁₀₀

Date = T D 2421221 507 = 1916 Dec 30 19 20 GMT

Parallax 0 24

Parallax = P.A. = 0 05 = 0 00

Dir = 0 24 in 20 11 12 = 0 1

Planet's displacement plane

Dec 30 8 20 44.74 + 16 29 30 8
 C₁ - 4 93 13 5
 C₂ - 39.84 + 16 29 45 3

