

KG
11366
v.567

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$$\begin{array}{r} 11/847077 \\ 77 \\ \hline 77 \end{array}$$

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Points to be examined in connection with Dr. Peters' "Corrections to Harvard Zones."

Vol. I.

Page. Stars No. Zone. Column. instead of. read.

V X V	3.	14.	1.	Decl.	2'	3'	
V X V	6.	116.	2.	A.R.	36.70	32.70	
V X V	7.	108.	2.	hier.	0.25	-0.25	(the star is also ± 3.128)
V X V	8.	3.	2.	2 ^d min.	8.7	3.7	
X.	9.	22.	2.	Decl.	34.8	35.2	Original record has hier. read, 5' 37" instead of 5' 35" hier. read correct but correction should be +0.9
X.	11.	79.	3.	"	27.8	26.2	
X V	11.	79.	3.	d.			
V X.	12.	115.	4.	d.	insert	2.0	
V X.	12.	115.	4.	Decl.		1.0	
V X.	19.	17.	4.	d.	1.5	0.5	
V X.	19.	"	"	Decl.	47.5	48.5	
X.	28.	45.	7.	d.			
V X V	31.	47.	6.	Decl.	49.8	50.8	
V X.	39.	4.	8.	d.			
X.	"	"	8.	Decl.	32.3	22.3	
H X.	44.	154.	9.	2 ^d min.	dc. 50.7	49.7	
"	"	"	"	hier. v.	50.65	49.65	
X.	49.	40.	11.	d. R. c.	insert	2.4	
X.	"	"	"	Decl.	"	2.6	
H X.	52.	92.	10.	A.R.	probably 100. too small, and the star = ± 63.111		
D X.	60.	74.	13.	1 st min	tc. 3.7	2.7 (2)	
V X V	"	81.	"	A.R.	30.71	37.71	
H X A.R.	73.	69.	16.	hier. R.	6'	3' (if not 6' in ± 14	
hier. right. V X V	77.	149.	14.	Decl.	15.6	5.6 (if hier. right)	
V X.	77.	166.	14.	d.			
V X.	77.	166.	14.	Decl.	44.6	38.6	
X.	77.	169.	14.	d.			
H X A.R.	84.	113.					} these are perhaps one and the same star and identical with Lamont 7755: 41° 57' 12" S. 8'
H X "	84.	114.					
H X "	"	121.					} are these not the same star, with error in A.R. of 4 ^s in one of them (Comp. also "Durchmusterung")
H X "	"	122.					
V X V	85.	113.	15	Decl.	0.0	del.	
(A.R.) X A.R.	86.	169.					} are these stars different. There seems to be an error of 4 ^s in one of them.
(in R. A.) "	"	170.					
V X.	89.	190.	17.	d.			
X.	90.	73.	18.	d.			
Look up again. X	"	74.	"	d.			
X.	"	75.	"	d.			
X	"	(76 to 90)	"	d.			
X.	95.	91.	"	d.			
X.	"	"	"	Decl.	Sign	-	
Record not (blank?) X	"	91.	"	Decl.			

Note. For signification of marks and abbreviations employed in following examination, see page 60. 5

✓ Cor. should be + 0.1 Decl. 22, should be $0^{\circ} 5' 37".1$

✓ " " " + 0.9 Decl. should be - 6.1

~~Decl. " " " 191 3.6 Dr. P. appears apparently wrong in his correction~~

~~Cor. " " " - 2.2 " " " " " " " "~~

~~Decl. " " " 46.8~~

Cor. " " " - 0.02 A.R. should be $25^{\circ} 1'$

" " " - 0.8 instead of - 0.7 Decl. $22".2$ instead of $32".3$

To be looked up in original records. (50.7 in original records)

Insert - $2".8$ Dr. P. apparently wrong in inserting - $2".4$

Decl. = $2".2$ A.R. to be looked up in original records. (Annuals correct by records)

Time of Transit apparently wrong. (1st min 3.7 by records but a star off against it.)

To be examined. Dr. P. suggests $3' 26"$ instead of $6' 26"$

Decl. incorrect if hier. read. is right.

✓ Cor. should be - $11".5$ instead of - $11".6$ — Decl. also wrong. (Decl. 38.5)

✓ " " " - 2.7 " " - 2.4 " should be 38.3

✓ " " " - 11.3 " " - 11.1 — " " " (Decl. 32.7)

Observations on neither star complete — Dr. P. thinks they may be identical

(with error of 40 in A.R. in one)

(There is also an error in Decl. of 170. Zone 15. — should read 19' instead of 9)

✓ Cor. should be - $8".6$ instead of - $8".5$ Decl. should be $6' 28".4$

✓ " " " - $7".8$ " " - 6.7 " " " $6' 10".2$

" " " - 7.1 " " - 3.0 " " " $0' 1".9$

✓ " " " - 7.7 " " - 5.8 " " " $4' 48".3$

" s. " " changed. — see waste sheet.

✓ " " " - 7.6 instead of - $6".0$ Decl. should be $-0^{\circ} 0' 6".6$

Prints to be examined &c.

Vol. 1.

Page. Star no. Line. Column. instead of. read.

X Univ. "certain" 101. 88. 21. Decl. 20. 99 19 59.7 (2 if Univ. right.
 U x Q x R 104. 154. 20. A. R. correct by -4.8. The star is identical
 with preceding

X 111 96. 22. Univ.
 X " " Decl. 29.2 30.2 (2 if Univ. right.
 V x Q x R 113. 140. 22. Decl. 41 3'

~~127.~~
 23^m by Record X V 116. 85. 25 1st wire 22^m 23^m (?)
 See notes. D 120. 147. 25 M. W. 26.25 26.80 (2 perhaps error of print
 " " U 122. 31-32 Read these two lines as follows (see page 48.
 V 132. 33. 28 M. W. 50.15 52.15
 V Q x R. 133. 40. 28. Decl. 10' 20' ~~15~~

V 135. 89+90 28 "

V 136. 103. 29. 2^d wire 58.0 58.8 (2)

V X 137. 103. 28. 2.
 See notes. X " " Decl. 14' 13'
 V 139. 149. 28. Univ. 6' 4" 6' 4" (2)

V V 141. 11. 32. Decl. 13.8 del.

V V " 45. 30. " 24.9 34.9 (2 if Univ. right.

See notes. D 142. 70. 32 M. W. } 59.90 59.95 (2)

" " D " " " A. R. } 59.50 59.55 (2)

" " H " 75. " " 2
 V " 82 1/2 30. " 35.94

D Q x R 143. 62. " Univ.

See notes. D " " Decl.

V " 66 1/2 " " 6' 7' (2 if Univ. right.

U Q x R 144. 96. 32. 2^d wire.

See notes. U " " M. W.

- ✓ Prof. P.'s suggestion correct - possibly, also, micr. read should be examined.
 " P. thinks this star should be corrected by 4.0 in A.R. - identical with # 153 -
- ✓ Prof. P. questions micr. read. { micr. read should be + 1' 30"
 This makes Dec. +0° 1' 27.2"
 " " suggests 3' instead of 4'
~~Cor. for L' at end of zone should be - 2~~ ✓
 Prof. P. says the minute should be 23 instead of 22 - (to be ex.)
 Apparently error of 1' is one more.
 Prof. P. suggests considerable correction.
 Mean wire wrong. Ex. Records read 1' 23 4.2 } 52.1 } 1' 23 5.15
 Decl. should read 20' instead of 10' - Prof. P. says this star is the same as L 83.66 but the diff. merits examination.
- ✓ Prof. P. ~~cor~~ says insert 11' (apparently, correctly) - did any doubt lead to the omission?
- ✓ 2nd wire apparently wrong. Records say 58.8 } mean 58.90
 ✓ Cor. should be -9.0 instead of -9.6 - Same^{cor.} for L 29.
 ✓ Micr. read. apparently wrong. (Records say 6' 47")
 13.8 inserted apparently with no good reason.
 Decl. should be corrected if micr. reading is right. ^{micr. R. right.}
- in. w. & A. R. apparently wrong.
 Prof. P. says "perhaps to be cor. by 4" and the star = preceding.
- ✓ Should be 35.94 - first wire apparently lost.
 Prof. P. says reading should be 9' instead of 8' - (Ex.)
 " " " Decl. " " " " " (see L 34.18)
- ✓ Should be 7' instead of 6' if micr. read. is correct. (micr. right)
 Prof. P. thinks 2^d wire should read 60.0 instead of 59.0
 " " " in. w. " " 59.95 " " 58.95

Vol. 1.

Page. Stars to. Lower. Column. instead of. read.

V.	144.	103.	30.	1 st w.		
√√	149.	192.	30.	Decl.	26.8	24.8 ^{1/2} if mic. not 32' in - instead of 30
√ QXR.	149.	193.	30.	"	1'	0'
√.	153.	1.	33.	"		
√.	155.	46.	33.	"		
See notes, P	155.	79.	31.	"		

N QXR, 156. 124.

QXR. See notes, N 156. 127.

√√	159.	141.	31.	"	57.7	del.
√√	161.	218.	31.	"	11'	1'

45^m by Records N 164. 5. 34. Q.R.46^m " " N 164. 6. 34. "45^m " " V " 7. " "

√√	167.	59.	"	Decl.	19'	9'
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√.	169.	105.	35.	"		
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N QXR, 170. 170.171

N QXR, 171. 162. 34. " 10'

9' (35 is correct, and
the star = 33.12)

V " 171. 163. Diff. Decl.

V √	171.	169.	34.	"		
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See notes, P 173 216. " insert 19' 26.8

√√	"	220.	34.	"	0.3	60.3
----	---	------	-----	---	-----	------

√.	"	220.	35.	cl.		
----	---	------	-----	-----	--	--

√√	177.	11.	36.	Decl.	(Diff. should be - 2.8 instead - 1.5)	
----	------	-----	-----	-------	---------------------------------------	--

√.	"	12.	37.	"		
----	---	-----	-----	---	--	--

- ✓ Prof. P. suggests 43.1 instead of 41.1 (43.1 by R)
- micr. right Decl. to be corrected if micr. wire is not $32'$ instead of $30'$
Minute should probably be 0 instead of 1 .
- micr. " ✓ Prof. P. inquires if Dec. should not be $3''$ instead of $4''$ / this corr. makes
Diff. 0 .
- " " ✓ Why not insert $-0^{\circ} 0' 38.1$ in Decl. col. (Insert $-0^{\circ} 0' 34.1$)
Decl. in $\mathbb{L} 31$. differs by about $10''$ from that of $\mathbb{L} 33$. - Prof. P. calls it $30''$
and correction so indicates. (Record reads as fol. $6 \ 35.2$)
"Durck. here has a star $(+0.1038)$ 8° less in A.R. "
" " $+0.1043$ has 4° less in A.R. (is chron. reading right?) "
✓ Why is Decl. in $\mathbb{L} 31$. inserted. (Del.)
✓ Should not Decl. be $1'$ instead of $11''$? Decl. should be $1'$
" " read $44''$ instead of $45''$ - star same as preceding.
" A.R. should be $45''$ instead of $46''$ - same as $\mathbb{L} 30.44$ "
" " " apparently be $45''$ instead of $46''$ "
Decl. " " " $9'$ " " $19'$ ($9'$ correct)
✓ " Should be 3.5 instead of 13.5 "
Prof. P. thinks these two stars identical with an error of $4''$ in μ .
" Probably an error in reading off one of the zones. "
Prof. P. corrects by $+49.5$ instead of -10.5 . Catalogue
asks if these are two different stars.
micr. right ✓ " Apparently should read $14'$ instead of $44'$ - reads examined.
Is there any objection to filling in Declination? "
✓ Cor. should be -13.4 instead of -13.6 . Minute in
 $\mathbb{L} 31$ also wrong. (Decl. should be $+0^{\circ} 16' 60.3''$ $+0^{\circ} 16' 58.6''$ 234 235)
✓ Decl. should be 19.9 instead of 20.9 . Diff. also to be corr.
micr. readings ✓ (" Decl. should apparently be 8.3 instead of 7.3 $2''$)
correct, "Diff." should be -0.9 instead of $+0.1$ This, however, makes a diff. of $1''$ with $\mathbb{L} 36$. and
merits examination.

Vol. 1.

Page. Star's No. Long. Column. instead of. read.

VV	177.	28.	36.	Decl.	10'	20'
VV	178.	81.	37.	A. R.	42.09	41.99
N.	191	8.	39.	Decl.	27.3	28.3
VV	193.	62.	38.	"	0.7	60.7
V.	195.	101.	"	"		
VV	198.	200 $\frac{1}{2}$	"	A. R.	insert	11 ^m 57 ^s 45
V.	"	210	"	"		
V.	212.	163.	40.	"		
N QXR.	220.	324.	"	2 ^d min.		

N QXR 228. 56.

V.	228.	58.	43.	A. R.		
V.	"	59.	"	"		
N QXR	232.	63.	44.	1 st min.		
See notes P	234.	130.	"	A. R.	20 ^m	21 ^m
N.	235.	102.	"	Unicr.		
P QXR.	"	127.	—	Decl.	Remarks.	
V.	237.	147.	45.	d.		
Vx.	"	150.	"	"	0.3	-0.3
VV	238.	215.	44.	1 st min.	32.8	42.8
VV	"	221.	"	A. R.	3 ^m	10 ^m
VV	243.	15.	46.	Decl.	10'	20'

- 41.99 correct - "Diff." ✓ Diff. should be $-1''.9$ instead of $+0''.1$
 should be $-1''.2$ ✓ Prof. P. suggests a cor. - First wire also lost. (Ex.)
 Correction only ✓
 should be changed ✓ Cor. should be -63.7 instead of -62.7 This makes
 the resulting Decl. in 43.9 correct.
~~Should be 41 instead of 34~~
 Insert ✓ " " not $+0^\circ 1' 7''.5$ be inserted". Prob. typ. omission.
 $+0^\circ 1' 7''.5$ ✓ Apparently $11^m 5^s 8.5$ should be inserted.
 4.93 correct ✓ " " A. R. should be 4.93 instead of 4.88 . Examine
 20.74 " ✓ " " " " " 20.74 " " 30.69 "
 13.2 by records ✓ " Should not 2^d wire be 15.2 instead of 13.2 ? Prof. P. sug-
 gests that this star is Dm. $+0.^\circ 21.07$ and the star pre-
 ceding, Dm. 21.06 .
 Prof. P. says. "Argelander & Lamont here have a star $6''$
 more in A. R. and of the same Decl.; for 1853.0
 Arg. Bonn. obs. VII $+0.^\circ 22.49$; $10^m 11.39$; $+0^\circ 2' 11''.0$
 Lamont. 1847 ~~~~~ 10 11.43. 2 14.5
 51.98 right, ✓ This should probably be 51.98 instead of 31.98 as Prof. P. suggests
 17.82 ✓ " " " " 17.82 " " 17.92 "
 Then seems to be a dis- ✓
 crepancy but the me- ✓
 ans for us light. ✓ " Should 1st wire be 18.8 instead of 19.8 "
 ✓ The minute should undoubtedly be 21 instead of 20.
 41" by Records. ✓ "wire should probably be 51 instead of 41 ."
 (Some discrepancy ✓
 somewhere) Prof. P. says "read Arg. $+0. 25.17$ for 1853.0: $3' 22''.7$
 already correct. " " suggests -0.2 instead of $+11.2$ whereas it
 is already -0.2
 ✓ Cor. should be -0.4 Decl. should be $+0^\circ 4' 42''.6$
 42.8 by Records. ✓ 1st wire should evidently be 42.8
 10. " " Evidently 10^m instead of 3^m
 20' " " " " " $10'$

Vol. 1.

Page. Star's No. Some. Column. instead of. read.

✓✓	248.	174.	47	A. R.	10.38	9.38
✓✓	258.	157	"	1 st mir	5.4	del.
N AXR	265.	76.	49.	micr.	7'	5' (°)
"	"	"	"	Decl.	7'	5'
✓✓	266.	102.	"	A. R.		
✓✓	267.	91.	"	Decl.	insert	+0.° of'
✓✓	270.	5.	52.	1 st or.	2.2	21.2
N AXR	273.	46.	—	Remarks.	252 prob. correct.	
✓✓	275.	107.	51.	Decl.	8'	2'
✓✓	277.	144.	51.	"	insert	- sign
See notes. P	278.	23.	53.	2 nd + m. w.	17.5	14.5 (°)
✓✓	279.	36	54	micr.	7'	1'
✓✓	280	73.	"	m. w.	46.60	41.90 (°)
✓✓	283.	120.	53.	Decl.	insert	13'
✓✓	291.	65.	55.	"	0'	10'
✓✓	"	71.	"	"	10 17.4	9 42.6
✓X.	"	"	56.	"	16.7	43.3
✓✓	292.	115.	55.	A. R.	48 ^m	41 ^m
X.	293	96	56	Decl.	1.1	0.1
" of waste sheet	X. 296.	5	58	A. R.	3.98	42.8
See notes,	"	41-45	57.58	The last decimal figures are incorrect.		
"	✓ 297	32	58	Decl.	32.4	15.6
X.	298	47	"	A. R.	35.40	37.40
X.	299	73	"	Decl.	—	17' 56."9
N AXR	300	104	"	A. R.	The minute 20 ^m instead of 21 ^m	
✓X	301.	92	"	d	11.0	11.9

9.38 by Rec. 9.38 seems to be correct. - better examine however.
5^m seems to be inserted for no good reason.

Discrepancy by
Original Records.

One Zone reads 5'

"

Prof. P. inserts 5' upon authority of Lamont 3997.

24th by Rec. ✓

"Minute should apparently be 24 instead of 20."
Examine.

21.2 by Rec.

Suggestion apparently correct.

Annals has a note "Diff. of Decl. unexplained."

2' by Rec.

Examine.

"

14.5 would be indicated by the other zone.

1' by Rec.

Other zone has 1'.

Should be 41.9

This would make "Diff." - 0.49 instead of +0.16

Apparently 13' should be inserted.

Should be 10' ✓

Probably failed to correct by 10' in final result.

" " " " " " " " " " " "

Decl. should be

0° 9' 43.3 ($\frac{2}{58}$)

Minute should also be 9 instead of 10.

41st by Rec.

Minute should be 41. ✓

✓ d should be -1.9 instead of -2.9. This makes
the Decl. correct.

42.2 correct ✓

Prof. P. probably intends 4.28 which is correct. ✓
Requires further examination.

" " " " " " " " " " " "

✓ Prof. P. probably intends star #48 which requires this cor.

✓ 17' 56."9 is correct for #58 but Prof. P. probably intends
to say 17' 72."7 for #57 according to his usual custom.
Requires examination.

more correctly - 12."0 (Decl. +0° 15' 56."0 Diff. - 0."2)

Vol. 1.

Page. Star's No. Long. Column. instead of. read.

VV	303.	33.	59	Decl.	7'	4'
VV	307.	102.	"	"	6'	4'
VV	310.	24	61	A.R.	1.90	del.
VV	"	"	62.	"	insert.	1.60
VV	311.	25	61	Decl.	better	9' 60".9

Vol. 2.

See notes D	2	27	64	1 st m.	0.0	46.2(2)
VV	"	36	63	2 ^d m.	19.8	14.8
VV	"	43	"	1 st m.	17.4	47.4
VV	3	9	"	Decl.	20'	26'
Max R	6.	130.	64.	1 st m.	30.4	31.4
VX.	7	92	63.	d	0.1	0.6
VV	"	97	"	Decl.	28'	29'
VV	"	121	"	"	26'	24' (if mic. right)
VV	8	137.	64	1 st m.	33	23
V.	"	149	63	"	30	31.
P	9	156.	"	Decl.	19' 25".8	20' 23".8
See notes D	"	"	64	"	38.0	22.0
D	"	"	—	Diff.	+7.8	+1.8
"	"	162.	64.	Decl.	9.8	59.8
X.	"	(166-169)	63.	hier.	sign	+
VV	12	18.	65	1 st m.	you	you
See notes. D	"	31.	66	"	5.9	1.9
VV	13. (Nos. 1, 31, 35, 41, 43, & 45)	"	hier.	—	—	+sign.
"	"	32	65.	Decl.	29'	28' (since 66 is right)
VV	14.	60.	66.	m. m.	insert.	24.30

should be 4' 4" probably correct. Examine. Lower.

" " 4' " " " " "

Apparently suggested with good reason.

" " " " " "

This assumes the correction to be correct - Correction should properly be - 4" instead of - 4.4" ^{Decl. to ± 62 should be} $0^{\circ} 9' 58.9''$ Diff. + 2".0

Requires examination.

14.8 by Rec.

" "

" "

" "

Probably should be 314.

✓ More correctly +0.5 (Decl. 0 29 30.5)

Probably suggestion correct.

Requires examination.

" "

minute 32.

" "

" "

✓ Prof. P. probably means ± 64 . (Pg. 64 should be +
8 in apparently correct. Requires examination.

" "

Original sign apparently wrong.

Examine.

✓ " Records west 24.3 in Sec. 11. and 24.30 in west.

Vol. 2.

Page. Star's No. Hour. Column. instead of. read.

V V	14	75.	65.	A. R.	8.61	48.61
X	15.	52.	V Is the minute 37' or 38'?			
V V	"	65.	65.	Decl.	26'	36'
U.	"	72.	"	"	53.0	48.0 ^(u)
See notes, P	116	114.	"	A. R.	22 ^m	23 ^m
Also see notes, P	117	134.	"	Decl.	better	36' 69.2
V X	22.	(24-45)	68	K.		
V X.	23	9.	67	Decl.	9.4	8.4
See notes X	"	23.	"	"	28'	29' (The star is diam. 725)
V.	"	(44-45)	Lower 68 correct (i.e. 69. Nov. 46 + 47)			
V V	26.	125.	67.	A. R.	12 ^m	13 ^m
V V	"	126.	"	"	16 ^m	14 ^m
X	32.	47.	None go agrees with 67. Nov. 45. and also with the observation of Argelander in Bonn Obs. VI.			
V V	38	35	72	2 ^d r. m. w.	13.7	17.7
V V	"	"	"	A. R.	13.79	17.79 (The star = 138.118)
V V	41.	51	71.	Decl.	2.2	62.2
V V	"	53.	"	micr.	9'	0' (The star is 67.137)
See notes X	"	57.	Which minute is the correct one?			
X	43.	100.	72.	micr.	1'	0' (or is 71 wrong?)
V V	"	108.	71.	Decl.	30'	40'
V V	44.	143.	"	A. R.	54.45	54.05
X	45.	139.	72.	d		
u q x R.	46	12.	73.	1 st r. w.	13.6	12.6
u a x R.	47.	14.	74.	micr.	7'	6' (u)
u a x R.	49.	53.	-	Remarks. 71-72 Nov. 126. agrees better with 73.		

Vol. 2.

Page. Star's No. Hour. Column. instead of. read.

See notes. D

52.	29.	Query.	D. these A.R.'s belong to two different stars?		
VV 53.	13.	75.	Decl.	26'	28' (V if line is right)
X 9XR 53.	43.	"	"	25'	27' (since 76 is cor.)
X 9XR.	"	44.	"	29'	28'
N 9XR 54.	80	76	1 st wire	18.2	19.2
X 9XR 55.	50	75.	Decl.	21'	20'
X 9XR	"	65	"	25'	24' prob.
Prof. P's correction right & unaccept. give 76 as correct. X	"	70	"	26' 36".6	25' 16".6
VV	"	76	"	16.1	36.1
X 9XR.	"	80	75	"	21' 20'
also see notes X 57	103	"	"	25'	24'
N 9XR.	"	104.	"	micr.	9' 8' (V)
X 9XR.	"	114	"	Decl.	26' 25'
X 9XR.	"	124	76	"	22 23 (or is 75. this time right)
V 9XR 58	154	75.	A.R.	41"	42"
X.	"	160.	"	2 ^d w.	1.9 9.9
VV 59	162.	"	Decl.	29'	19'
X 9XR 65	90	This star is not found in the atlas.			
VV 68	38	79	A.R.	insert	3 ^m
X 9XR 69	23	"	Decl.	39'	38'
VV 70	58	"	A.R.	insert	13 ^m
VV 73	40	81	Decl.	30'	40'
X. 75	88	82	"	33'	34' (V if the lat. is as usual in right)
VV 76	102	"	1 st w.	38 ^m	33 ^m
VV 77	113	81	Decl.	30'	40'

Vol. 2.

Page. Star No. Long. Column. instead of. read.

VV 77.	130.	81	Decl.	33'	32'
NaxR 78.	136.	82	2 ^d m.	20.8	19.8 prob.
" "	"	"	m. w.	20.30	" "
X 19.38 from Rec.	"	"	A. R.	19.88	19.38 m. error prob. 18.88
VV 79.	145.	81.	hier.	37"	74" (?)
X. "	159.	"	Decl.	29'	30' prob.
VV 83.	27.	83	"	29'	19'
VV "	31	"	"	30'	20'
VV 85.	69	"	"	37'	27'
P. "	79	"	hier.	0' 34" 2	-0' 34" prob.
P. "	"	"	Decl.	20' 24.5	19' 9.7
					Thus the star becomes identical with δ 28.48.
VV "	83	"	"	19.6	9.6
VV "	90	"	"	36'	26'
NaxR. 87.	116	"	"	25'	21' more prob.
NaxR. 88	147	"	1 st m.	57.7	56.7
X. 89	170.	-	Decl.	Differs by 1' from δ 28. No. 142.	
					Perhaps 28' 37"
VV 90	187	84	1 st m.	42 ^m	43 ^m
V. 91	185	83	Decl.	inert	0° 21'
See notes V "	188	"	"	29'	19'
NaxR. 92	11	85	One of the mins is erroneous.		
X. 93	6	86	Decl.	28.0	32.0
VV "	11	85	"	34'	33'
XaxR "	20	"	"	Is the Decl. in 2 right. Argelander has the star +0.448: 35 ^m 57.89: 38' 28"	

✓ Dr. P's suggestion correct, but cor. for $\Sigma 82$ is better
 $+5.4$ instead of $+5.5$ } This makes Dec. for $\Sigma 82$, $59^{\circ}4'$ +
 Diff. $-2^{\circ}13'$
 Examine. There seems to be some doubt about
 Univ. read of $\Sigma 82$. It is characterized as very bad and seems
 to have been 3.51 altered to 3.31 - possibly the reverse.

7th by Rec.

("0' 50" cor.") minute would then be 30.1

Cor. for $\Sigma 84$ however, should be -5.1 instead of -5.3

" " " " " " " " -6.9 " " -7.6

" " " " " " " " -8.3 right.

(+0.34 by R.) Prob. not of much value as ink line is drawn through original^{obs.}
 Cannot obtain $19^{\circ}9'7''$ any way from this obs.

Suggestion probably correct. - Cor. however to zone 84 should
 be -6.9 instead of -7.6

Does not Dr. P. intend 24° ? Use clue however in Rec.

Univ. Read
 correct by Rec.

Leav's however differ slightly - ~~at~~ a diff. of some $3''$
 in A.R. As it stands, minute should ~~be~~ be 19 instead of 29 .

43rd by Rec.

Cor. however, should be -7.0 instead of -7.3 ^{Dec. in Zone 84 should also be $32^{\circ}0'$}

" " " " " " " " -6.6 " " -6.7

The ^{Univ. read,} ~~Dec.~~ in $\Sigma 85$ was altered to 4.20 from other figures & is followed by (7)

Cor. ^{however} should be " $+0.2$ " " " 0.0 This makes Dec. $31^{\circ}8'$

Some alterations have been made in notes but of the record now undoubtedly ^{stands at} 23

Vol. 2.

Page. Stars No. Low. Column. instead of. read.

on opp. page. See remarks	AXR X 93	28.	85	Decl.	34'	35' (1/2)
See opp. page, X	"	33.	"	"	24.8	4.8
" " " X	95.	83	"	"	38'	36' (1/2 if lower right.)
" " " X	97	112.	-	Remarks	£87	£85.2
✓✓ 98.	153.	86	minor	-	This line should be raised - belonging to No. 152.	
See opp. page, min. right.	"	167	to the minute in bright. Due. has 1 min. less.			
See notes. A	"	175.	86	2 ^d m.	46.5	42.5 (1/2)
✓✓ 99	153.	85	minor.	-	The star seems = + £157.39	
✓✓ "	166	86	Decl.	2.8	122.8 (according to remarks)	
✓✓ "	174.	"	"	2.8	62.8 better 62.9	
AXR	100	195	85.	2 ^d m.	59.1	58.1 (1/2)
X.	105	12	87	minor.	37.	27 (1/2)
X.	"	18	"	"	47	37 (1/2)
✓✓ 107.	51+68	-	Remarks	£91.	£88.2	
AXR	108.	117.	88	2 ^d m.	15.1	13.1
✓✓ 109.	99	87	Decl.	29'.	24'	
X.	115	(Correction for £85 + £45)				
✓✓ 109.	128.	87	Decl.	29'	19'	
X.	111.	180.	"	"	21'	20' (1/2 if the later bright.)
AXR	112.	182.	88	2 ^d m.	44.5	43.5
✓✓ 117.	14.	89.	Decl.	33'	32'	
✓✓ 121	96.	"	"	3.5	13.5 (perhaps minor, 6 instead of 16)	
AXR	123.	168	90	minor.	1.40	0.10 (1/2)
See notes. X	124.	214	} query: Are these A.R. exactly alike, or is there an error of print?			
AXR	"	215				
" " X	"	212	-	Remarks	£92	£90.2

Mag. however, to $\Sigma 85$ is put down as 12 and to $\Sigma 86$ as 10.

Dec. most correctly, $0^{\circ} 37' 4.7''$

Cor. however, should be -25.3 instead of -25.2

hirc. rad. altered from 7' to 9' This makes Dec. correct.

Records do not say which zone is right but 11th mag. is put down with $\Sigma 86$ whereas it ^{is 9th mag. with $\Sigma 85$}

Records so indicate.

Minute by hirc. rad. is right, ~~Dec. range~~ adopted give preference to $\Sigma 86$.

Prof. P. probably means 41.5. This would make the mean as indicated - Requires examination.

Examine. "8, 10 certain" 7.23 was altered in notes from ^{7.53} 7.23 and in $\Sigma 86$ more properly - 7.1 instead of - 7.2. Cor. in $\Sigma 85$ right.

axR but $\Sigma 88$
marked as "cert."

37" "cert."

$\Sigma 88$ "cert."

15.1 by Rec.

24' prob. cor. - Correction is right.

✓ 3^h should be inserted in one place + 2 changed to 3 in another.

0. 30 "cert."

This would make the minute 20.

Dec. $\Sigma 89$, 19.6

Cor. however for $\Sigma 89$ is -1.4 instead of -1.3 . Cor.

3-7 "cert."

for $\Sigma 90$ right.

$\Sigma 90$ correct.

Vol. 2.

Page. Star's No. Low Column. instead of. read.

See notes	✓ 125.	215.	89	Decl.	42'	32'
	✓✓ 126.	243.	90.	1 st m.	20 ^m	28 ^m
	✓✓ "	244	89.	"	24 ^m	29 ^m
Zone go right	✓✓ 127	229.	90	Decl.	9.3	69.3
	✓✓ 133	80	91	"	40'	30'
	✓✓ 134	121	"	m. w.	17.30	13.30
	✓✓ "	"	"	A. R.	16.84	12.84
See notes	P 135.	135	92	hier.	-	+
	✓✓ 137	171.	-	Remarks	£94	£92.
	✓✓ 138	218	91	1 st m.	38 ^m	39 ^m
	✓✓ 139.	217.	-	Remarks	£94	£92.
	✓✓ 146.	72.	93.	A. R.	29.00	20.00
xaxR.	148.	104.	94.	2 ^d m.	43.3	53.3
See opp. page	✓✓ 149.	119.	93.	Decl.	31.'	32' if the later zone right
	✓✓ 150	140	"	A. R.	22.37	32.37
	✓✓ 154	9	96.	"	3.41	13.41
axR	155	38	95.	Decl.	28'	26'
	✓✓ "	"	-	Remark	£98.	£96.?
~ axR.	156.	75	95	2 ^d m.	31.8	51.8
	✓✓ "	80	96	m. w.	insert	30.10
	✓✓ "	"	"	A. R.	"	29.62
axR:	157	47	95.	Decl.	29'	27'
	✓✓ "	63	"	"	23'	22'
"	"	75	"	"	28'	29' (v)
axR.	"	76.	"	"	27'	25'
✓✓	"	90	96.	hier.	17"	47"

Probably correct. - Correction. However, to $\Sigma 89$ should be - 3.7 instead of - 3.6 - Cor. to $\Sigma 90$ correct.

Requires examination.

This makes ^{Diff.} correction - 56.9

Cor. However, to $\Sigma 91$ should be + 2.1 instead of + 2.0

" " " $\Sigma 92$ " " - 0.3 " - 0.4

Probably correct. A.R. should be 12.84

Undoubtedly suggestion correct.

This would make the minute for $\Sigma 92$, 28 and the Diff. = - 59.6
(Examine.)

By Records, the minor R. for $\Sigma 93$ seems to be 1 59 instead of 0 59

" $\Sigma 96$ cent." would be 26' if $\Sigma 95$ is discarded entirely.

"7' 28 cent" According to remarks 27' is correct - This will change d. in $\Sigma 95$ to - 0.1 instead of - 0.4

By Rec. $\Sigma 96$ reads 8 20 instead of 9 20 ^{should be 28,} so that minute

"5.58 cent"
47 by Rec.

Vol. 2.

Page. Star's No. Low. Column. instead of. read.

✓✓	158.	96.	95.	A.R.	insert	35 m
✓✓	"	115	"	"	45 m	46 m / 2. if minor cor.
axR.	159	91	"	Decl.	28'	26'
X.	"	92.	"	"	28'	26' / 5th star is log + 0.2043
✓✓	"	95.	"	"	insert	0° 27'
X.	"	109	"	"	28'	26' / 5th remark belongs to 109, not 110
X.	161	161	96	"	28.2	25.6
"	"	"	"	"	"	"
See opp. page.	✓	"	165.	95	"	22' 28'

✓✓	163	182	—	Remarks	£98.	£96 prob.		
✓✓	"	205	—	"	"	"		
✓✓	"	206	—	"	"	"		
✓✓	"	209	—	"	"	"		
See opp. page.	✓	"	203	95	Decl.	18'	28'	
✓✓	"	205	"	"	31'	30'		
X.	"	209	"	"	28'	26'		
See opp. page.	✓✓	166	21	97	2 ^d w.	2.7	7.7	
✓✓	169	74+79	—	Remarks	£100	£98 prob.		
✓✓	171	105	97	Decl.	insert	0° 28'		
"	"	175	7	"	Remarks	£102.	£100 prob.	
"	"	X.	17	100	Decl.	29.7	39.7	
"	"	✓✓	177	50	99	"	24'	34'
"	"	✓✓	"	51	"	"	28'	38'
N axR.	180	143	"	1 st w.	44.0	40.0 (v)		

46 by R.

"6.41 cert" Bond says hier. reading in $\Sigma 96$ correct. Is $\Sigma 95$ wholly wrong or only the minute? ^{Possibly, however, that it was just the ink over pencil mark.} In Records the (v) is crossed out and "cert" added.

"6.33 cert." The second wire in $\Sigma 95$ is 54.2 instead of 54.3 making mean ^{wire $54.25 + \text{Diff. } 0.344 + \text{Diff. } + 0.06$} Prof. P. wrong in his corrected quantity ^{corr.} - should be 25.8 instead of 25.6 ^{-1.1 making Dec. $25.9 + \text{Diff. } + 2.2$}

According to hier. readings Σ in Zones $95 + 96$ should be $-0.2 + -1.5$. This would make an additional change in the Dec. of $\Sigma 96$. ^{Dec. $\Sigma 96 = 57.5 + \text{Diff. } + 1.3$}

"(2 26 2)
(2 47 cert)" $\Sigma 96$ correct by Rec.

" " " " "

" " " " "

" " " " "

Cor. to $\Sigma 95$ should be 0.0 instead of $+0.1$ Cor. to $\Sigma 96$ right. Dec. $\Sigma 95$ becomes $0^{\circ} 28' 12'' + \text{Diff.} = +1.1$

$\Sigma 96$ right Bond says hier. read in $\Sigma 98$ cor. Prof. intends $\Sigma 96$? $\Sigma 96$ "cert." Should be 26 if first Σ thrown out.

$\Sigma 98$. 2^d w. has 37.8 (intended prob. for 7.8)

$\Sigma 98$ "cert."

"54 is marked as "cert" but an "v" is inserted also. ^{This would make Dec. $\Sigma 100 = 39.6$} Cor. however, should be -3.4 instead of -3.3 ^{This makes Dec. $\Sigma 100 = 34.2 + \text{Diff.} = +0.3$}
" " to $\Sigma 100$ should be -3.8 instead of -3.7 ^{Dec. $\Sigma 100$ should be $26.9 + \text{Diff.} = 70.1$}
" " " " " ^{" -4.1 " " -4.0}
44.8 by Records.

Vol. 2.

Page. Stars no. Zone. Column. instead of. read.

P	axR	188.	76.	101	2 ^d m.	44.2	45.2(2)
See opp. page	P	191.	131	"	Decl.	36'	26'
	P	193.	141	"	"	better	23' 61.4
"	"	✓ 195	9	103	"	28'	38'
"	"	✓ 195	9	103	"	28'	38'
	X	199	126	103	"	34'	37' ^{if the fall.}
	✓	"	"	—	Remarks	£ 107.	£ 105?
See notes	X	✓ 203	3.18.20.36.	—	"	£ 108.	£ 106.2
See opp. page	M	204.	65.	106.	1 st m.	23 m	22 m (2)
"	"	axR 205.	53	104	Decl.	35 m	34 m
	✓	✓	64	"	"	inset	0° 34' 19.9
	✓	✓ 206.	97.	106.	2 ^d m.	50.7	54.7
See also opp. page	X	✓ 207	102.	104	Decl.	better	31' 60.7
	axR	"	113.	"	"	36'	35'
"	"	✓ 211.	22	107	"	38'	28'
"	"	✓	26	"	"	34'	24'
"	"	axR 213.	56.	107.	"	27'	28'
	R.	"	63.	"	"	14'	24'
	X	"	90	"	"	22'	21' ^{if the later}
	✓	✓ 215.	113.	"	"	30'	20'
	X	axR 219	8	Zone 104. No. 94. gives		30' 19.7	
	✓	✓	23.	109.	Decl.	26'	28'
	✓	✓ 224.	169.	110	Q.R.	15.19	55.19
See also opp. page	X	✓ 231	71	111	Decl.	39'	29'

Record made, however, 10 52 41.2 } 44.2 bad int?
Decs. by B's for #130 + 131 is given as follows $\begin{matrix} 7^h 12^m & 4 \\ 8^h 38^m & 5 \end{matrix}$

Doubt about cor. to $\Sigma 108$ however. No sign given in small table for d. but prob. sign should be -
Cor. however to $\Sigma 103$ should be -1.5 instead of -1.4
" to $\Sigma 105$ correct. This makes Dec. $27.5 + \text{Diff.} = +0.1$

"7" 33 cent.?"

105 by Rec.

$\Sigma 106$ " " but see notes for #3 which has an error.

$\Sigma 106$ correct. - Minute of $\Sigma 104$ should be 23 + final Dec. 23.5

4"30" cent. Bond says "mic. read. correct in Zone 106" d. however for $\Sigma 104$ should be -0.1 instead of 0.0 ^{This would make Dec. # 29.9 + Diff. = +2.3}

Cor. of -0.1 should be inserted as Dr. P. implies.

54.7 by Rec.

This would make 54.4 for $\Sigma 106$ + Diff. = +2.3
Cor. however to $\Sigma 106$ should be -1.6 instead of -1.5

$\Sigma 106$ "cent." Bond says "mic. read. correct in Zone 106."

Dec. should be 25.3 + Diff. = -0.3

Cor. to $\Sigma 105$ right

Cor. however to $\Sigma 107$ should be +2.3 instead of +2.2

Dec. $\Sigma 107$ should be 40.5 + Diff. = -0.2

" " " " " " " " +2.5 " " +2.4

Cor. to $\Sigma 108$ correct.

8' 1" cent."

Suggestion correct - Cor. however to $\Sigma 108$ should be +1.7 instead of +1.8 ^{Dec. $\Sigma 108 = 55.7 + \text{Diff.} = -1.2$}

Gr. to $\Sigma 107$ right.

Record for Dec. made 20 47 2 was lost ^{shows the later zone into doubt.} 1.52? which

No remark in Records.

Bond says "no reason for diff." between two zones.

Dec. $\Sigma 109$ should be 20.2 instead of 20.1 + Diff. = -0.1

Cor. to $\Sigma 109$ however should be -6.8 instead of -6.9

Dec. $\Sigma 111$ should be $0^h 29^m 33.8^s + \text{Diff.} = -5.2$

Cor. to $\Sigma 111$ should be -2 instead of +2. Cor. to $\Sigma 112$ right.

Vol. 2.

Page. Stars no. Hour. Column. instead of. read.

✓✓	236.	42.	113.	Q.R.	24 ^m 43.21	26 ^m 43.26
✓✓	"	43.	"	"	43.66	43.61
	237					
axR.	"	31.	"	Decl.	35.1	34.1
✓✓	238.	51.	"	Q.R.	33.76	3.76
✓✓	"	80.	"	"	42.09	43.09
See off. page	axR 239.	57	113.	Decl.	33.1	34.1
"	" " axR	60	"	"	32.1	31.1
"	✓✓ 240	108	113	Q.R.	52.13	52.08
"	✓✓ 240	108.	"	Diff.		
axR	241	128.	"	Decl.	39.1	38.1
P ✓	242.	176.	"	Q.R.	This obs. perhaps belongs to Dec. 177. if the chronograph reading is correct	
x axR	245.	185.	-	Remarks	Query: did the chronograph record 10 th mag.?	
✓✓	249.	6.	116.	Incr.	29	19(2)
n axR.	256	183.	"	2 ^d m.	25.5	29.5

Vol. 6.

✓.	2	26	117.	Q.R.	24.85 + c,	
✓.	2.	26	-	Diff.		
x	3	24.	117.	Incr.	81	71(2)
x	"	32.	118.	"	71	81(2)
✓✓	4	64	"	2 ^d m.	56.5	60.5
x.	5	75	-	Remarks	cancel "probably"	
✓✓	10	215.	117.	1 st m.	53 ^m	54 ^m (2)
✓✓	"	"	"	Q.R.	"	"(2)
x.	13	229	"	Incr.	21	31
✓✓	16	81	119	1 st m.	4.9	11.9(2)
✓✓	18.	115.	"	Q.R.	11 ^h 0 ^m 57 ^s	10 ^h 59 ^m 57 ^s
n.	19.	100.	"	Incr.	1'	0'
See note on page	x	"	"	Decl.	51'	50' (also 2117. No. 112.)

Fig. 7 omitted in no. of page.

"4.57 cent."

Suggestion apparently correct - needs examination, however.

"4.38 cent."

"1.47 cent."

✓

Diff. needs also to be cor. Diff. + 0.12

"8.4 cent."

Records not absolutely clear, but indicate quite conclusively that Dr. Peters is correct in his conjecture.

4.19 by Rec.

25.5 " "

✓ G. R. should be 24.95 instead of 24.85

✓ Diff. should be -1.3 instead of -2.3

"7.46 cent."

"7.38 " "

No remark in Records as to which is correct.

Should be 54.

" " 54

"3.30 cent."

The latter apparently correct, but the error is peculiar. ^{lowered by "ex"} Nothing in notes about either gone saw that obs. in Σ 173 as fol -

Vol. 6.

Page. Stars' lo. Long. Column. instead of read.

See opp. page. V	24	3	120	Diff.	+1.2	+0.2
P	"	35	120	1 st m.	21 ^m	24 ^{sec}
VV	25	20	"	Incr.	6'	8'
VV	"	34	121	Decl.	24.7	15.7 (if incr. right)
P	"	41	"	Incr.	0'	3'
VV	26	59	120	1 st m.	6.2	8.2
See opp. page. P	30	144	121	"	21.1	24.1
" " " V	36	67	—	Diff.		
X	37	134	—	"		
" " " P	44	251	123	Q.R.	insert	6 ^m 20.84
See opp. page. VV	46	29	125	2 ^d m.	2.3	21.3
VV	52	166	124	"	16.6	14.6
VV	64	102	126	Diff.	42.83	42.73
X.	"	107.	127.	Q.R.	27.3 ⁸⁾	27.39
VV	66.	147	"	"	insert	45.22
VV	68.	181	"	2 ^d m.	4.0	5.0
VV	72.	2	128	"	14.8	19.8
VV	"	25	130	Q.R.	insert	5.99
See opp. page. V	"	45	128	"		
VV	74	87	"	"	16.27	14.27
" " " X	76	97	—	Diff.		
" " " X	"	110	—	Diff.		
" " " X	84	79	131	"		
" " " VV	86	110	"	Q.R.	insert	12 ^m 53.61
" " VV	90	73	132	"	0.01	0.11

Vol. 6.

Page. Star's No. Low. Column. instead of. read.

See opp. page.	√ 96.	191.	—	Diff.		
	√ 100.	21	135	2 ^d w.	62.3	63.3
	√ 108.	199.	"	"	60.2	63.2
" " "	D. 120.	122.	137.	"	5.0	9.8
	√ 124.	182.	"	1 st w.	29. ^m	28. ^m (2.)
" " "	X " "	183.	"	"	59.2	del.
" " "	X " "	184.	"	"	insert.	59.2
See note to page.	" "	"	"	A. R.	"	58.21
	√ 130.					
	√ " "	105	"	2 ^d w.	36.6	38.6
	√ 134.	187	136	A. R.	33.38	35.38
	X 138	73	138	w. w.	29.00	29.60
See opp. page.	D 140	126	139	2 ^d w.	48.1	46.1
	√ 142	139	138	A. R.	59.01	59.61
	√ 152	18	142	2 ^d w.	33.6	38.6
" " "	√ 162.	70.	143.	A. R.	51. ^m	52. ^m

See notes also X 164

99. The A. R. is 4^h too small, the 1st w. having been observed and not the 2^d. The star is Lamm. 8068 and $Dm. + 0^{\circ}.4665$

X ² 172	274	—	Diff.		
1 opp. page. 2174	40	145	1 st w.	4.0	0.0
21 "	"	"	w. w.	0.10	0.05
21 "	"	"	A. R.	59.61	59.56
11 9 x R (180	145	146	1 st w.	42.3	43.3
11 2 "	"	"	w. w.	insert	43.30
11 9 x R "	178	"	2 ^d w.	45.9	48.9

✓ A.R. #133 should be 0.93 instead of 0.03 +
 Diff. should also be +0.13 instead of +0.113

2nd by Rec. 9.50 by Rec. apparently - attend however from another fig. ^{2.41 = 2.5}
^{9.0 would make m.w. 5.40 + A.R. #137 = 4.51}

1st m. undoubtedly wrong. 1st w. 45.7 by Rec.
 giving a m.w. of 59.2 + A.R. of 54.21 Diff. = 5.13
 Records have 59.2 + 63.2 respectively for Lines 126 + 107.

1 left off in printing l.s. of page.

35.38 correct, 35.38 appears to be correct - one miss. however, is
 wanting in this zone. EL.

Records have 33.6 for 1st m. with (?) for 2^d m.
 44.1 by Records but attention called to it.

✓ Mean reduced to 1st m. is also (Z 143) 17.45 instead
 of 17.95. This would make final A.R. #143.
 17.95 instead of 18.45 making a "diff." of +0.30
 59.2 is entered on 2^d m. in Records. There is a remark on same page
 of Record Book "Gorrun losing whole seconds".
 Diff. should be +0.08 instead of +0.21 + A.R. #144 = 13.25
 Record has blank instead of 4.0

Perhaps on account of the discrepancy the blank
 spaces were not filled.

Vol. 6.

Page. Stars No. Name. Column. instead of. read.

VV	180	142	145+146	A.R.	insert	33 ^h 42.07	42.09
VV	"	144	"	"	"	35 0.50	0.58
See opp. page 180	"	145	"	"	"	35 42.15	42.08
" " 180	"	146	"	"	"	36 3.49 ^V	3.23 ^B
VV	"	147	"	"	"	37 19.08	19.06
VV	"	148	"	"	"	37 28.13	—
VV	"	149	"	"	"	38 7.87	7.96
180XR	188	94	148	2 ^d m.	55.8	55.8	
"	"	115	147	"	48.0	42.0	
See opp. page	196	99	—	Diff.			
VV	"	150	150	A.R.	insert	55.14	
See note 180	198	165	There is no star in this position, but 10° farther in A.R. (perhaps an error in reading off the Chronograph sheet.)				
X	206	93	The figures of observations to be inserted.				
VV	212	7	153	A.R.	insert	30.55	?
VV	"	"	155	"	"	29.13	?
See opp. page	224	115	154	2 ^d m.	0.6	9.6	
VV	226	140	163	"	56.8	50.8	
VV	230	44	158	A.R.	16.43	16.93	
VV	238	199	—	Diff.			
" " " X	240	259	157	2 ^d m.	1.0	del. (?)	
X	244	319	158	"	62.8	63.8	
V	252	177	—	Diff.			
VV	264	103	162	1 st m.	27.1	22.1	
VV	274	57	—	Diff.			
"	286	146	166	2 ^d m.	13.3	15.3	
VV	296	49	174	"	25.0	29.0	
V	298	8	—	Diff.			

Diff. -0.02

" -0.08

Discrepancies remarked on previous page.
Most of the corrections suggested on opposite
should be 3.33, page seem correct but the whole needs examination.

Diff. $+0.02$

" -0.09

48 by Rec. Nic. R. to Z 147 is recorded as $-0.10 + Z 147$ as 0.08
perhaps intended for -0.09
Z 150 should be 8.49
Diff. should be -0.05 instead of $+0.05$ as the ~~Rec.~~
Suggestion apparently correct.

apparently,
Z 150 right, Insert for Z 151 $\{36.9\}41.1\{37.0\}$ for Z 152, $36.1\{46.1\}$ a discrepancy less

Records not fully clear but apparently 9.6

Diff. Correct. ~~Z 157, 9.1 R~~ There is also a note to this and two fol. stars, ^{examine sheet.} which says,

Diff. should be -0.45 instead of -0.25
2^d w. by Records is as follows (8.1) ^{been altered from something} but it seems to have ^{should be 26}

62, 8 by Records. Z 157 reads 27 $0.0\{3.9\}$ consequently the minute ^{in the Annals,}
G.R. Z 159 should be 26.20 +
Diff. should be $+0.24$ " " $+0.14$

22.1 by Rec.

✓ " " " $+0.08$ " " -0.12

del. Nothing appears on sec. w. in Records.

29.0 by Rec. Suggestion undoubtedly correct.

✓ Z 171 should be 41.43 +
Diff. should be -0.03 instead of $+0.17$

Vol. 6.

Page. Star's No. Zone. Column. instead of. read.

✓✓	291.	23	171	A.R.	28.83	28.57
✓✓	302	118	170	2 ^d m.	30.3	32.3
See opp. page. ✓	"	119	—	Diff.		
✓.	5	82	—	"		
✓.	13	230				
✓✓	15	24	119	Decl.	52'	55'
✓✓	17	88	"	"	42'	53' ^{1/2} if micr. correct.
See opp. page. ✓	"	90	"	"	41'	51'
✓	29	98	120	"	26.1	29.1
✓	43	190.	122.	"	59'	55'
axR.	"	192.	123	"	55'	54' ⁽²⁾ if later
axR.	"	194.	"	"	55'	54' ⁽²⁾ zone cor.
axR.	"	195.	"	"	53'	52' ⁽²⁾ rect. as used.
" " " ✓	"	200.	—	Diff.		
"	45	265	123	micr.	0'	4' ⁽²⁾
" " " ✓	49	87	125	"	7"	47"
axR	53	158	"	Decl.	43'	42' ^{1/2} if later Zone correct
✓✓	55	220	124	"	40'	43' ⁽²⁾ if micr. right.
See opp. page. ✓	"	224	125	"	41'	42' ^{1/2} if later & correct.
✓	57	230	124	micr. seems wrong. The star is Larr. 4890.		
✓	"	247	"	" " " Authority Dr. R. Schj.		
See opp. page. ✓	59	276	125	Decl. insert	0° 50' 47.7"	
" " " ✓	63	59	—	Diff.		
✓✓	65	100	127	Decl.	"	35.5
" " " ✓	67	146	126	"	"	0° 57' 0.1"
" " " ✓	"	149	—	Diff.		
" " " ✓	71	239	—	"		

Vol. 6.

Page. Star's No. Long. Column. instead of. read.

✓✓	71	240	127	hier.	insert	0' 54" (2)
See opp. page X	73	19	—	Diff.		
" " " P	75	46	130	Decl.	insert	0° 43' 25.5
✓✓	"	87	128	"	"	0 44 0.1
" " " ✓	79	156	—	Diff.		
See notes, ✓	83	28	—	"		
✓✓	"	30	129	hier.	6'	0' (2)
✓✓	87	107	131	Decl.	insert	37.4 / 5th star also 2.134. Dec. 3
✓✓	"	110	"	"	"	57.2
✓.	97	224				
✓.	111	252	—	Diff.		
✓.	"	261	—	"		
✓.	113	311	—	"		
✓✓	117	34	136	Decl.	32.2	22.2 / 1/2 if hier. right.
✓✓	127	40	"	hier.	30	38
See opp. page X	131	94	137	"	3'	41 (2)
See notes P	133	172	136	Decl.	insert	0° 55'
" " " P	"	"	137	"	59.3	55.3 } 55.3 }
See opp. page N	"	175.	136	"	101'	0° 57'
" " " N	137	"	138	"	46'	40' / 2 if hier right.
" " " D	"	31	139	"	42'	43' / 2 if plates gone correct
D	139	71	"	hier.	8	18
✓	141	96	—	Diff.		
✓	148	122				

9XR 153 16 142 Decl. Doubtful. 5th star is = 2145.30

54" by Rec.

Diff. should also be -0.3 instead of $+0.1$ ^{Dec. 130 should be 54"0}
 Mic. Read. 130 by Rec. but there is also a Read. 128 of 3' 16" ^{This change however marked as 12.13 day}

Dec. 128 should be 39' 42" ⁷
 " " " " -0.8 " " -0.2 ¹
 " " " " -7.8 " " -10.4

0.6 by Rec.

- ✓ Diff. as corrected. should be $+0.1$ instead of -0.3
- ✓ " " " " $+1.0$ " -1.0
- ✓ " " " " $+0.9$ " $+1.9$
- ✓ " should be inserted = -7.9

Mic. Right.

38 by Rec

~~Dec.~~ Mic. Read. 137 a "cert!"

Suggestion is apparently correct but the figures are so few that the sub. will bear investigation.
 Mic. Read 11' 1" by Records. making Dec. in Annals correct.

6' 50 " " " " " " " "
 Records a little confused - do not indicate, however, which one is right
 " do not say which one is correct - ^{much confusion}

Diff. when corrected, should be -0.8 instead of -1.8 ^{Dec. 138 should be 33' 7"}
 Accepting Prof. P.'s correction of 1.59 for 1.69 the st. R. for 141 should be 14.81 instead of 14.61 as he has it. This would also make the "Diff." -2.0 instead of -1.0
 Annals apparently correspond to Records. As remarks.

Vol. 6.

Page. Star's no. Long. Column. instead of. read.

See notes 155 } The columns are to be filled in from preceding
 157 } columns of hier. Readings.
 N (axR.) apparently in R. # 156. # 151 should be crossed out.
 159. 151 The hier. Read. of $\angle 142$, perhaps, belongs
 to no. 152, and the Decl. of no. 151, then is $46^{\circ} 43' 4''$

✓✓	161	3	143	hier.	27"	17" (?)
✓✓	163	81	144	Decl.	49.7	50.3 (= if not d. -0.3)
✓.	165	94	—	Diff.		
✓✓	"	103	"	Decl.	insert	54.8 } which agrees with chain of 143, with Lam. 8082 & L.H. 41004

axR x " 120 Lamont 8167 gives $50^{\circ} 32''$ (instead of $51'$)
 ✓. " 126 " 8182: $59^{\circ} 29' 4''$ - which shows that $\angle 144$ is right.

✓✓	167	149	143	Decl.	$0^{\circ} 50'$	$1^{\circ} 0'$
----	-----	-----	-----	-------	-----------------	----------------

axR " 169 182 " " 9.1 26.9

See opp page x " " " hier. 51' 52' (if the
 " " 171 233 " " 5' 4' (if the
 " " 171 233 " " 5' 4' (if the

See preceding p " " " Decl. 55' 54' (the star is
 Lam. 8702

249 " " 10 00

x° " 259 Lam. 8189. indicates that $\angle 144$ correct.

✓✓	"	270	144.	Decl.	59.4	60.0 (?)
----	---	-----	------	-------	------	----------

See notes. ✓ 177. 71 — Diff.

✓✓	181	152	146	Decl.	insert	16.8
✓✓	"	153	"	"	"	8.7
✓✓	"	154	"	"	"	24.5
✓✓	"	155	"	"	"	26.3
✓✓	"	156	"	"	"	22.2
✓✓	"	164	"	"	"	12.2
✓.	183	203	—	Diff.		

17" by Rec.

Should be 50.3 $\sqrt{}$ It would seem as if "d" was probably ~~0.3~~ + 1.6
 + Dec. Σ 144 should be 17.5
 Diff. will then become + 2.7 instead of - 0.3
 Σ 144 marked "Sun"

9' 35" "Sun" thus making Σ 144 right.

There is a note in connection with Σ 144 "Hazy or pass-
 See preceding. Records give no light.
 Records say to Σ 143 "5.45 (4.45?)"

~~From which A.R. would better read 1° 0' 2" and
 Record says Σ 144 "Sun" "first star of 13.786"
 144 "should also" J.R.~~

Σ 144 "Sun"

Prof. P's cor. would then make the final "Diff."
 - 4.1 instead of - 3.2

Suggestions apparently correct but better examine
 to see if more records cannot be obtained.

mag = 11

" = 14

" = 12.13

Dec. Σ 145 should be 207
 Correction makes "Diff." - 1.4 instead of + 0.6 + 1

Vol. 6.

Page. Star's No. Lower Column. instead of. read.

See opp. page	185	12	148	Decl.	insert	28.9	
" " " "	"	19	—	Diff.			
" " " X 187.	53	"	"	Minor.	2'	3' (2)	
See notes. P 189.	93	147	"	"	1'	0'	
See preceding. P	"	"	"	Decl.	51'	50' (Hann. Ser. 2.)	}
A x R " (A x R)	112	"	"	"	57'	58 "	
See opp. page X 195	55	149	"	"	better	44" 70.6	
X 201	153	"	"	Diff.			
A x R X 203.	25	152	"	Minor.	3'	6' (or is # 151 mm?)	
V 205	83	151	"	Decl.	insert	15.3	
V 206	126	—	"	Diff.			
See opp. page. X 209	140	The Decl. of $\zeta 152$: 48' 46.7 is probably correct					
V "	151	—	"	Diff.			
X 211	211	The minute of $\zeta 152$ is correct, the star being also $\zeta 85.806$.					
V V 213	5	155	"	Decl.	50.1	52.1 (2)	
A x R. X "	21	153	"	Minor.	10"	1" (otherwise Decl. 15.8 instead of 9.8)	
V 217.	126.	—	"	Diff.			
See opp. page. X 219	159	155	"	Decl.	60.0	52.0 (and can cel Remark.)	
V V 236.	177.	—	"	Diff.			
V V 237	137	155	"	d	+	—	}
V V "	180	"	"	"	+	—	
A x R " "	162	"	"	Minor.	7'	8' (this later # correct & Decl. 56' 12)	
A x R (A x R) 43	271	157	"	"	0'	1'	
See preceding. (A x R).	"	"	"	Decl.	46"	44' = $\zeta 89$, Dec. 87.	
A x R. X "	293	"	"	"	42'	41' (if later # given correct)	
A x R X "	309	$\zeta 158$ is right, the star being also $\zeta 89.113$					

be as Dr. P. suggests if we accept the "Read."
 Micr. Read. $\Sigma 148$ marked doubtful. - should
 Correction makes "Diff." $+0.3$ instead of -0.7
 $\Sigma 150$ sun $\Sigma 148$ "cert."

Original record reads ~~right~~ consistently
 but Prof. P. abs. throws doubt upon it.
 Same remark as above applies to this.

$\Sigma 150$ sun \checkmark Correction should be $44' 70.8$

\checkmark Diff. " then be $+1.9$ instead of -0.1
 no remarks in Records.

\checkmark Cor. makes "Diff." -0.20 instead of -0.30

Record says $\Sigma 152$ sun - seems to be $9' 9''$ altered from $9' 39''$.

\checkmark " " " -1.2 " ~~by about 1580 G.R. from #152.~~
 $\Sigma 152$ "Sun" $\Sigma 155, 106$ agrees closely in Dec. but differs

Should be 52.1 and Diff. = -1.6 instead of $+0.4$

Dec. should be $0^\circ 50' 18.5$

\checkmark Diff. " " -0.3 " " -3.3

\checkmark Prof. P. intends #157 instead of #159 and the quantity
 thus corrected would make "Diff." -1.8 instead of $+9.8$

\checkmark Cor. makes "Diff." $+0.01$ instead of -0.05

Signs of corrections from #137 to #180 ^{incl.} should evidently
 be changed from $+$ to $-$ as suggested.

Records question
 $\Sigma 15$ of hour. Prof. P. intends to say $46'$ instead of $56'$

~~Discrepancy in original records. Lower, "true star tan"~~
~~been in Dec.~~

no remark in Records.

Dr. Peters' remark seems correct.

Vol. 6.

Page. Star's no. Lane. Column. instead of. read.

See opp. page.	✓ 247	22	—	Diff.		
" " " X "		35	£161 is right, the star being also £160.63			
" " " ✓ 251	110	159	Decl.	53.8	54.8	
" " " 253	179	161	hier.	25"	23" (✓)	
✓ 257	246	—	Diff.			
P 259	285	161	hier.	7'	8' (✓) but perhaps the latter is correct.	
✓ 261	3	—	Diff.			
✓ 265	102	—	"			
✓ 273	17					
✓ 279	158	164	Decl.	48'	46' (✓) if hier. is right.	
axR. X 281	35	169	hier.	41	5' (✓) if £166 right.	
✓ 287	152	166	Decl.	54'	53' (✓) if hier. right.	
✓ 291	—	—	page 2	192	291	
axR P "	60	167	hier.	6'	7' (✓)	
X 299	12	171	"	3'	2' (✓) but perhaps £170 wrong and Decl. 43'	
axR. 301	78	170	"	2'	3' (✓)	

✓ Cor. makes "Diff." $+1.3$ instead of $+2.3$

£161 corresponds to £160.63 £161 "sun".

✓ " " " -2.3 " " -3.3

~~£161 + 2' 21" by Rec. making Dec. 29.6 + Diff. + 3.2~~

✓ " " " -0.4 " " -2.4

Original Record doubtful,

✓ " " " $+0.7$ " " -0.3

✓ " " " $+3.2$ " " $+2.2$

✓ " " " $+2.5$ " " $+1.1$

May, 10, 11 Dec. should be 46'

No Remark in Records.

Minute should be 55.

Figures in br. of page reversed.

Record £170 of 154" £172 "sun". but hier. Readings in "Annals" correspond to Records.

3' 9" £171 "sun".

from p. 6. of this book - copy from Dr. P.'s list referring to
page 122 31-32

a.R.

$\left\{ \begin{array}{l} 0^h 59^m 40.1 \\ 59 \end{array} \right\} \left\{ \begin{array}{l} 44.0 \\ 45.0 \end{array} \right\} \left\{ \begin{array}{l} 40.05 \\ 45.00 \end{array} \right\} \left\{ \begin{array}{l} 59 \ 40.3 \\ 59 \end{array} \right\} \left\{ \begin{array}{l} 44.4 \\ 48.2 \end{array} \right\} \left\{ \begin{array}{l} 44.35 \\ 48.20 \end{array} \right\}$

in. a. R. 1853.

$\left\{ \begin{array}{l} 0^h 59^m 43.63 \\ 59 \ 47.51 \end{array} \right\} \left\{ \begin{array}{l} 43.72 \\ 47.56 \end{array} \right\}$

Additional notes.

Vol. 1.

Page. Plati's No. Zone. Column.

X 111 98 23 in.

X 120 147 25 m. w.

X 122 31-32

X 137 103

" "

X 142 70 32 m. w.

X " " " a. R.

X " 75 32 "

X 143 62 30 in. + Dec.

Original Records say "not seen,"

Records have mins as follows. 1^h 04^m 22.4 : 26.1 ^{alt reads.} 27.2 1.4-26.2

1^h should also be inserted in Col. L 25. Univ. R.

Records say to L 26 #31 "1st w. lost" - L 26. #32 "faint neb.

1' 30" S. fol. no sig." - L 27. #32. "1st w. lost w sig"

All else is as in "Annals."

Decl. L 28 should read $0^{\circ} 13' 55''.0$

" L 29 " " $0^{\circ} 13' 55''.0$

Records read 2^h 57 55.9 00.0 2 57 59.90

There seems to be an ink mark drawn across 1st w.
Annals read right by records - Records have a note on this
and preceding, "faint { 2^d min lost,

Univ. reads 8' 37" to A. R. in Annals - There is however,
a 10th mag. star immediately after with Univ. R. of 9' 35" with
A. R. somewhat erased and marked by a X. - Possibly
Dr. P. right.

Notes.

Vol. 1.

Page. Peter's No. Zone. Column. instead of. read.

X 144, 96. 32 2^d m. + c.

X 155 79 31 Decl.

X 156 127

X 173 216

X 234 130 44 G.R. 20^m 21^mX 248 23 53 2^d m. w 17.5 14.5 (2)

		Zone 57. Cor. G.R.	Zone 57. Cor. G.R.
X Page 296.	#41	Cor. -47	1.83
	42	.47	24.53
	43	.47	51.22
	44	.47	5.92
	45	.47	2.82

	Zone 57. Cor. G.R.
Cor.	+28
	1.93
	.27
	24.67
	.27
	51.32
	57.5+27
	6.02
	.26
	2.96

X 297 32 57 Decl.

X 301 110 57 d

Vol. 2.

X 2 27 64 1st m. 0.0 46.2 (2)

X 9 156 63+64 Decl.

X 9 162 64 Decl.

Wires in Annals are correct by records but m. w. should be $59^{\circ}45'$ & Mean A.R. $58^{\circ}53'$. Diff. also $+0^{\circ}38'$

Dropping question in original records, Dec. ± 31 becomes $+6^{\circ}30''$. This, however, differs by abt. $10''$ from ± 33 . Record rather mixed but apparently right.

Original record of Micr. read, ± 34 a little doubtful. It is more than probable that the minute should be 41 but some pencil marks create uncertainty.

Seems to be 14.5 by alteration.

All the corrections apparently wrong and our "mean red to 2^d w." do.

Original notes had Micr. Read $-0^{\circ}26''$ but afterwards it was erased and $-0^{\circ}36''$ by zones $59+60''$ written in ink.

d should be -12.6 instead of -13.1 Decl. should then be $+0^{\circ}18'45''.4$ & "Diff." $= -0^{\circ}8'$ instead of -0.4

Records say 18 16 4 $\{ 50.2$ (matter in doubt)

No transit by Records in ± 64 Dec. in ± 63 put down as $-0^{\circ}19'$ with a note saying the $-$ sign "probably +". No satisfactory explanation of discrepancy.

As the Micr. reads the Decl. for ± 64 should be $0^{\circ}25'59''.8$ thus giving a "Diff." of $+1.3$ instead of -1.3 . There is, however, a large discrepancy in the Declinations of the two zones which the records do not clear up. Micr. Read $6-10$ find another erroneous

Notes.

	Vol. 2. Page.	Plan's No.	Long.	Column.	instead of "read."	
X	12	31	66	1st m.		
X	13	32	65	Decl.	29'	28' since $\neq 6.2$ is right.
X	16	114	"	A. R.	22 ^m	23 ^m
X	17	134	"	Decl.		
X	23	23	67	"		
X	41	57				
X	52	29	Query. Do the A. R. belong to two different stars?			
X	56	103				
X	"	"	76			
X	"	104	"			
X	"	105				
X	91	188	83	Decl.	29'	19'

Record for $\Sigma 66$ reads as follows $18.25'' - 5.9''$ $18.25'' 5.90''$

" " $\Sigma 65$ reads " - 0.52 erroneous Declination "

" " $\Sigma 66$ " " - 0.20 no A.R. Dec. right in $\Sigma 66$ "

According to the the minute would be 29 and the minor read. in Annuals for both zones should be changed,

23^m by minor. Read. - the ~~first~~ mean reduced to mean min is a little doubtful as to minute but was probably meant for 23.

$\Sigma 65$ by Records $\gamma 25 + \Sigma 66 - 7.16$ but several other Decs. have the - sign which appear as + in Annuals and the - sign is probably intended as such.

A.R. but Records say $\Sigma 68$ certain.

Minor Readings as Records have them but there seem to have been alterations in both,

The A.R.s are correct by Records. In Rec. there is no Dec. given to $\Sigma 76$, in proper place but at one side on same line there is a star given as follows
 "10-11 = 3.42 (No A.R.)" ^{possibly} From this it would seem the obs. thought it probable that the A.R. given in $\Sigma 76$ belonged to this star.

By Records 34.1 should be inserted in Col. 2^d w. $\Sigma 75$.

Zone 76 by Records reads as follows. viz:

00 ^h	3.3	39.3
"	"	3
"	"	41.1
"	"	3
"	"	43.5

The minor. Read - 0' 40" should be in $\Sigma 83$ instead of $\Sigma 84$. There is no minor. Read. in $\Sigma 84$. The A.R. in 1st min. $\Sigma 83$ is 13.7 with 34.7 on 2^d min. - The minute should evidently be 19 instead of 29 - There is also a note on page of Decs "2^d min of 1st = 1st min of 2^d"

Notes.

Vol. 2.

Page, Star's No. Zone. Column. instead of. read.

X 98 175 86 2^d n. 46.5 42.5 (?)

X 123 168 90³ micr.

X 124 214 } Query to.
X " 215.

X 125 214 89 Decl.

X 135 135 92 micr. - +

X " 136

X 203 3 - Remarks.

Original record has an obs. on 2nd W. 40.2 which has been crossed out and ~~there~~ 41.5 inserted above, with the preceding star (probably out of place?)

+ 1 40^R suspected for a planet - examined and found to be a star of 1.40.

Then are two stars given with exactly same A.R. as found ~~in Annals~~ ^{+ Decs.} - also Decs. as found in Annals. There is also the mark opposite the Decs. in each zone (which are braced) "same A.R."

Univ. Read L 89 should be 2.13 Applying the proper correction 0° 32' 9" this makes err. - 0.3

#135	6 ^h 5 ^m 59.7 ^s	6 ^h 5 ^m 56.2 ^s	0.2	11	8.08	11	9.00	} the 5 come
#136.	6 09 ^s	5 56.3	61.2	11	8.59	11.12	8.09	

The original record differs ^{considerably} from that adopted in Annals as appears from above.

#104 + 0 9 by Records but Zone 106 marked as cert,

Note. At the end of zones 117 + 118 in Record Book is the following note "In these zones the time is recorded as given by the Spring governor clock and is about 18^m 15^s fast." Consequently the original notes are about that amount of time ahead of time in Annals. Assuming 18^m 15^s as the exact correction to be applied there seem to be many errors of A.R. in Vol. 6.

Vol. 6

notes.

Vol. 6.

Page. Star's No. Lone. Column. instead of, read,

164 99

198 165.

71 238

127. Muir. Read.

83 28

133

172

136

Decl. & c.

155 }
157 }

177

71

In Record Book. ~~£ 144~~ in addition to what was noted on page 35, this book. there is a note to £ 144 as follows.

99 21^h 0^m — { 59.9 }
 # 100. 63.9 } these are probably misplaced

Immediately after the star as given in Annals, there is a star in Records as follows 59.3 63.3 but a note says "reject"

in Micr. Read. in original records.

Annals seem to correspond to Records only, there are two stars given on each Zone with same A. R. the first of which seems to have been adopted in each case.

Prof. P's suggestions are apparently ^{possibly} correct if the original records are so. but the mags are given precisely alike ^{while} and the and the R. A's differ by 4^h 5^m. Is it not probable that these are the same star with error of 4^h 5^m in one? The Records not quite clear in matter of R. A's — seem to indicate same star, however.

Page 155. # 79. 1^h 58^m is given in original Micr. Read. but immediately followed in col. of Rec. by "[0 58]"

also Micr. Read. £ 142 # 90 is "+ 3 52 20"

Record has for Micr. Read. £ 145 10^h 18^m

" " " " " " 146 6 22 ("Examined")

It was evidently concluded to call it 10^h 22^m from the examination but nothing appears in Records

The correction for "d" however in £ 145 is not

correctly made on any ^{Dec. # 145 should be 16.9 instead of 7.8} ~~separation~~

Vol. 6.

Page. Star's No. Zone. Column, instead of. Rad

189 93

259 286

258	284	161	2 ^d wire	wire	18.3
"	"	"	m. w	"	14.3
"	285	"	1 st w.	"	18.8
"	"	"	m. w		

Record reads $\approx 147 \quad 1' 35$

" " ≈ 148 seen \circ something sure
Does this mean that the minute should be
 \circ as Dr. P. thinks?

Micro. Read. ≈ 161 should be $4' 46''$ making Dec. $55.5'' +$
Diff. $+ 0.6''$

Micro. should be $18.60'' +$ Dec. should be $19.49''$, making
"Diff." $- 0.08''$ instead of $+ 0.12''$

Note. In the previous examination

✓ signifies that whatever is opposite it on same page is accepted as correct.

A • signifies simply that the matter has been examined - the conclusion being generally found on the opposite page or elsewhere, in "Additional Notes".

(A X R) signifies that the printed "Annals" correspond to the original "Records" on the point in question.

te

11 Circumpolar Stars corrected for precession

R.A.	$88^{\circ} 8$	$86^{\circ} 269$	$87^{\circ} 51$	$88^{\circ} 112$	$88^{\circ} 7$	$88^{\circ} 9$	$89^{\circ} 3$
1855 R.A.	$1^h 6^m 31^s$	$1^h 19^m 7^s$	$6^h 31^m 40^s$	$20^h 8^m 30^s$	$0^h 45^m 38^s$	$1^h 51^m 15^s$	$1^h 49^m 36^s$
1855 A.P.D.	$10^{\circ} 27' 49''$	$3^{\circ} 24' 1''$	$2^{\circ} 44' 51''$	$10^{\circ} 7' 27''$	$10^{\circ} 45' 24''$	$10^{\circ} 30' 42''$	$0^{\circ} 30' 42''$
α	$16^{\circ} 37' 45''$	$27^{\circ} 46' 45''$	$97^{\circ} 46' 45''$	$302^{\circ} 7' 30''$	$13^{\circ} 0' 45''$	$27^{\circ} 47' 0''$	$27^{\circ} 24' 0''$
$\alpha + (2 + r)$	$16^{\circ} 47' 20''$	$27^{\circ} 56' 20''$	$97^{\circ} 56' 20''$	$302^{\circ} 17' 5''$	$13^{\circ} 10' 20''$	$27^{\circ} 56' 35''$	$27^{\circ} 33' 35''$
$\log \sin. 1''$	7.38575	7.38575	7.38575	7.38575	7.38575	7.38575	7.38575
$\log \tan. d$	1.59261	1.22609	1.31886	1.70725	1.51330	1.57809	2.04776
$\log \cos. A$	9.98109	8.93497	-9.14026	9.72765	9.98842	9.94616	9.94769
$\log. w.$	8.95945	7.54681	-7.84487	8.82065	8.88747	8.91000	9.38120
$\log. 1 \div (1 - w)$	0.04148	0.00152	9.99697	0.02975	0.03489	0.03683	0.11947
$\log \tan. A$	9.47958	-1.06342	-0.85555	-0.19942	9.36928	9.72463	9.71758
$\log \tan. (A' - A)$	$+8.48051$	-8.61175	$+8.69739$	-9.04982	$+8.29164$	$+8.67146$	$+9.21825$
$A + (2' - r')$	$16^{\circ} 56' 57''$	$27^{\circ} 5' 57''$	$98^{\circ} 5' 57''$	$302^{\circ} 26' 42''$	$13^{\circ} 19' 57''$	$28^{\circ} 6' 12''$	$27^{\circ} 43' 12''$
$A' - A$	$+1^{\circ} 43' 55''$	$-2^{\circ} 20' 32''$	$+2^{\circ} 51' 7''$	$-8^{\circ} 23' 55''$	$+1^{\circ} 7' 17''$	$+2^{\circ} 41' 13''$	$+9^{\circ} 23' 8''$
α'	$18^{\circ} 40' 52''$	$27^{\circ} 45' 25''$	$100^{\circ} 57' 40''$	$292^{\circ} 2' 42''$	$14^{\circ} 27' 14''$	$30^{\circ} 47' 25''$	$37^{\circ} 6' 20''$
$\frac{1}{2} (A' - A)$	$+0^{\circ} 51' 57''$	$-1^{\circ} 10' 16''$	$+1^{\circ} 25' 33''$	$-4^{\circ} 11' 59''$	$+0^{\circ} 3' 38''$	$+1^{\circ} 20' 36''$	$+4^{\circ} 41' 34''$
$\frac{1}{2} (A' + A)$	$17^{\circ} 39' 17''$	$27^{\circ} 46' 4''$	$99^{\circ} 21' 53''$	$298^{\circ} 5' 6''$	$+13^{\circ} 13' 58''$	$29^{\circ} 17' 11''$	$32^{\circ} 15' 9''$
$\log. \theta$	2.69984	2.69984	2.69984	2.69984	2.69984	2.69984	2.69984
$\log \cos. \frac{1}{2} (A' + A)$	$+9.97901$	$+8.81761$	-9.21143	$+9.67282$	$+9.98831$	$+9.94061$	$+9.92722$
$\log \sec. \frac{1}{2} (A' - A)$	$5 -$	$9 +$	$14 -$	$117 +$	$0 +$	$12 +$	146
$\log. (d' - d)$	2.67890	1.51754	1.91141	2.37383	2.68815	2.64057	2.62852
$d' - d$	$- 7' 57''$	$- 0' 33''$	$+ 1' 22''$	$- 3' 56''$	$- 8' 8''$	$- 7' 17''$	$- 7' 5''$
1880 R.A.	$1^h 14^m 11^s$	$1^h 11^m 2^s$	$6^h 45^m 48^s$	$19^h 36^m 17^s$	$0^h 56^m 1^s$	$2^h 3^m 18^s$	$2^h 28^m 2^s$
1880 A.P.D.	$10^{\circ} 19' 52''$	$3^{\circ} 23' 28''$	$2^{\circ} 46' 13''$	$10^{\circ} 3' 31''$	$10^{\circ} 37' 16''$	$10^{\circ} 23' 31''$	$0^{\circ} 23' 43''$
1880 Dec.	$88^{\circ} 40'$	$86^{\circ} 37'$	$87^{\circ} 14'$	$88^{\circ} 56'$	$88^{\circ} 23'$	$88^{\circ} 36'$	$89^{\circ} 36'$
Results of Prof. P.	$\left\{ \begin{array}{l} 88^{\circ} 41' \\ 1^h 14^m \end{array} \right.$	$\left\{ \begin{array}{l} 86^{\circ} 36' \\ 1^h 10^m \end{array} \right.$	$\left\{ \begin{array}{l} 87^{\circ} 14' \\ 6^h 44^m \end{array} \right.$	$\left\{ \begin{array}{l} 88^{\circ} 57' \\ 19^h 43 \end{array} \right.$	$\left\{ \begin{array}{l} 88^{\circ} 23' \\ 5^h 12^m \end{array} \right.$	$\left\{ \begin{array}{l} 88^{\circ} 37' \\ 2^h 8^m \end{array} \right.$	$\left\{ \begin{array}{l} 89^{\circ} 37' \\ 2^h 28^m \end{array} \right.$

X

n.

from 1855 to 1880.

89° 35'	89° 37'	89° 1'	89° 26'	88° 4'	88° 9'	89° 35'	89° 37'
20° 13' 29"	22° 6' 40"	0° 11' 50"	15° 44' 30"	0° 45' 31"	14° 51' 8"	20° 13' 29"	22° 6' 40"
0° 14' 7"	0° 12' 3"	0° 23' 49"	0° 5' 0"	10° 45' 24"	10° 30' 48"	0° 14' 7"	0° 12' 3"
303° 22' 15"	331° 40' 0"	2° 46' 15"	236° 11' 0"	11° 22' 45"	27° 47' 0"	303° 22' 15"	331° 40' 0"
303° 31' 50"	331° 49' 35"	2° 55' 50"	236° 20' 35"	11° 32' 20"	27° 56' 35"	303° 31' 50"	331° 49' 35"
7.38575	7.38575	7.38575	7.38575	7.38575	7.38575	7.38575	7.38575
2.38665	2.45535	2.15945	2.83730	1.51329	1.57809	2.38665	2.45535
8.78751	9.94523	9.99943	-9.74368	9.99113	9.94616	9.74224	9.94523
8.55991	9.78633	9.54463	-9.96673	8.89017	8.91000	9.51464	9.78633
0.01606	0.41050	0.18742	9.71534	0.03513	0.03683	0.17198	0.41050
-0.17872	-9.72885	8.70921	0.17664	9.30994	9.72463	-0.17872	-9.72885
-8.75469	-9.92568	8.44126	-9.85871	8.23527	8.67146	-9.86534	-9.92568
303° 41' 27"	331° 59' 12"	3° 5' 27"	236° 30' 12"	11° 41' 57"	28° 6' 12"	303° 41' 27"	331° 59' 12"
-3° 15' 12"	-40° 7' 16"	1° 34' 56"	-35° 50' 25"	0° 59' 5"	2° 41' 13"	-36° 15' 22"	-40° 7' 16"
300° 26' 15"	291° 51' 56"	4° 40' 23"	200° 39' 47"	12° 41' 2"	30° 47' 25"	267° 26' 55"	291° 51' 56"
-1° 37' 36"	-20° 3' 38"	0° 47' 28"	-17° 55' 12"	0° 29' 32"	1° 20' 36"	-18° 7' 51"	-20° 3' 38"
301° 54' 14"	311° 45' 57"	3° 43' 18"	218° 25' 23"	12° 1' 52"	29° 17' 11"	285° 24' 9"	311° 45' 57"
2.69984	2.69984	2.69984	2.69984	2.69984	2.69984	2.69984	2.69984
+9.72304	+9.82353	+9.99909	-9.82193	9.99036	9.94061	9.42422	9.82353
-	18-	2718+	4-	2160+	2+	12+	1588-
2.42306	2.55055	2.69897	2.54337	2.69022	2.64057	2.13994	2.55055
- 4' 25"	- 5' 55"	- 8' 20"	+ 5' 49"	- 8' 10"	- 7' 17"	- 2' 18"	- 5' 55"
20° 1' 75"	19° 27' 28"	0° 18' 42"	13° 22' 39"	0° 50' 44"	2° 30' 10"	17° 49' 44"	19° 27' 48"
0° 9' 42"	0° 6' 8"	0° 15' 29"	0° 10' 49"	1° 37' 14"	1° 23' 31"	0° 11' 49"	0° 6' 8"
89° 50'	89° 54'	89° 45'	89° 49'	88° 23'	88° 36'	89° 48'	89° 54'
89° 48'	89° 53'	89° 45'	89° 48'	88° 23'	88° 37'	89° 48'	89° 53'
5h 42m	6h 18m	0h 18'	13h 17m	5h 12m	2h 8m	17h 42m	18h 18m
X	X					X	
				5m		7m	129m

$$Z+V = +23.0311(t'-t) - 0.0001922t^2 - 0.0000497t'^2$$

$$t' - t = 1840 - 1855 = 25 \text{ yrs.}$$

$$\text{Log. } 23.0311 = \frac{1.36229}{1.36231}$$

$$\text{" } 25 = \frac{1.39794}{2.76025}$$

$$\text{" } 575.8 = 2.76025$$

$$\begin{array}{r} 60 \overline{) 574.9} \\ 9' 35'' \end{array}$$

$$\text{Log. } 55 = 1.74026$$

$$\text{" } 552 = 3.48072$$

$$\text{" } .0001922 = 6.28375$$

$$\text{" } .581 = 9.76447$$

$$\begin{array}{r} .315 \\ .899 \end{array}$$

$$\text{Log. } 80 = 1.90309$$

$$3.80618$$

$$\text{" } .0000497 = 5.69636$$

$$\text{" } .318 = 9.50254$$

$$Z'-V' = +23.0311(t'-t) + 0.0000497t^2 + 0.0001922t'^2$$

$$\begin{array}{r} 575.8 \\ 1.15 \\ 1.23 \end{array}$$

$$60 \overline{) 577.2}$$

$$(Z'-V') = 9' 37''$$

$$\text{Log. } 552 = 3.48072$$

$$\text{" } .0000497 = 5.69636$$

$$.150 = 9.17708$$

$$\text{Log. } 802 = 3.80618$$

$$\text{" } .0001922 = 6.28375$$

$$1.23 \quad 0.08993$$

$$\theta = +20.0611(t'-t) + 0.0000432t^2 - 0.0000432t'^2$$

$$\text{Log. } 20.0611 = \frac{1.30233}{1.30235}$$

$$\text{" } 25 = \frac{1.39794}{2.76029}$$

$$\text{" } 501.5 = 2.76029$$

$$\begin{array}{r} 60 \overline{) 501.5} \\ 8' 21'' \end{array}$$

$$\theta = 8' 21''$$

$$501.38 \text{ by Red. Cat.}$$

$$\text{Log. } 552 = 3.48072$$

$$\text{" } .0000432 = 5.63548$$

$$\text{" } .131 = 9.11620$$

$$\text{Log. } 802 = 3.80618$$

$$\text{" } .0000432 = 5.63548$$

$$\text{" } .276 = 9.44166$$

$$\text{Log. } 501.4 = 2.70018$$

$$\text{" } \sin 1'' = 6.68557$$

$$2 \theta \sin 1'' = 7.38575$$

$$\text{Log. catan. } 1^\circ 27' 49'' = \frac{1.59666}{1.59261}$$

$$\text{" } 30 \quad 24' 1'' = \frac{1.22613}{1.22609}$$

$$1^\circ 7' 27'' = \frac{1.71014}{1.70725}$$

$$1^\circ 45' 24'' = \frac{1.51495}{1.51330}$$

$$0^\circ 14' 7'' = \frac{2.39014}{2.38665}$$

$$0^\circ 23' 49'' = \frac{2.17454}{2.15945}$$

$$0^\circ 5' 0'' =$$

$$0^\circ 12' 3'' = \frac{2.45709}{2.45535}$$

$$0^\circ 14' 7'' = \frac{2.39014}{2.38665}$$

$$0^\circ 12' 3'' = \frac{2.45709}{2.45535}$$

$$0^\circ 14' 7'' = \frac{2.39014}{2.38665}$$

$$0^\circ 12' 3'' = \frac{2.45709}{2.45535}$$

$$0^\circ 14' 7'' = \frac{2.39014}{2.38665}$$

$$0^\circ 12' 3'' = \frac{2.45709}{2.45535}$$

$$0^\circ 14' 7'' = \frac{2.39014}{2.38665}$$

$$0^\circ 12' 3'' = \frac{2.45709}{2.45535}$$

$$0^\circ 14' 7'' = \frac{2.39014}{2.38665}$$

$$0^\circ 12' 3'' = \frac{2.45709}{2.45535}$$

$$\text{Sun } 1'' = 0.000004848$$

$$\text{Log. } 1'' = 4.6855749$$

$$8.95945 = \text{Log. } 0.0911$$

$$\text{Log. } (1-u) = \text{Log. } 0.9089 = 9.95552$$

$$1 = \frac{0.}{0.04148}$$

$$8.95070 = \text{Log. } 0.0709$$

$$\text{Log. } 0.9291 = 9.96806$$

$$\frac{0.}{0.03192}$$

$$8.91000 = \text{Log. } 0.0813$$

$$\text{Log. } 0.9187 = 9.96317$$

$$\frac{0.}{0.03683}$$

$$9.38120 = \text{Log. } 0.2405$$

$$\text{Log. } 0.7595 = 9.88053$$

$$\frac{0.}{0.11947}$$

$$8.55991 = \text{Log. } 0.0363$$

$$\text{Log. } 0.9637 = 9.98394$$

$$\frac{0.}{0.01606}$$

$$9.78633 = \text{Log. } 0.6114$$

$$\text{Log. } 0.3886 = 9.58950$$

$$\frac{0.}{0.41050}$$

$$9.54463 = \text{Log. } 0.3505$$

$$1. \text{ } 0.6495 = 9.81258$$

$$\frac{0.}{0.18742}$$

$$-9.96673 = \text{Log. } -0.9263$$

$$1. \text{ } 1.9263 = 0.28466$$

$$\frac{0.}{9.71534}$$

$$8.48051 \quad 1^{\circ} 43' 55''$$

$$\frac{47669}{7382}$$

$$-8.61175 \quad 2^{\circ} 20' 32''$$

$$\frac{009}{310} 166.0 \div 5$$

$$\frac{5.2}{156} 6.0 \div 32.$$

$$8.69739 \quad 2^{\circ} 51' 7''$$

$$\frac{254}{31}$$

$$\frac{4.28}{160} 31.00 \div 7.4$$

$$-9.04952 \quad 8^{\circ} 23' 55''$$

$$\frac{173}{109}$$

$$8.58112 \quad 2^{\circ} 10' 59''$$

$$\frac{7788}{333} 324.0 \div 59$$

$$\frac{490}{495}$$

$$+8.67146 \quad 2^{\circ} 41' 13''$$

$$\frac{269}{457} 59.0 \div 13.$$

$$\frac{150}{135}$$

$$9.21425 \quad 9^{\circ} 23' 8''$$

$$\frac{14}{11}$$

$$-8.75469 \quad 3^{\circ} 15' 12''$$

$$\frac{222}{27} 46.0 \div 12.$$

$$\frac{32}{16}$$

$$-9.92565 \quad 40^{\circ} 7' 16''$$

$$\frac{61}{7}$$

$$8.44126$$

$$\frac{3696}{460} 430 \quad 1^{\circ} 34' 56''$$

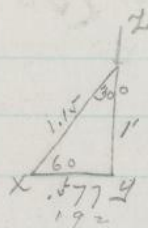
$$\frac{7.7}{315} 430.0 \div 56$$

$$\frac{452}{462}$$

$$-9.85471 \quad 35^{\circ} 50' 25''$$

$$\frac{60}{11}$$

Relative to plate used in parallax work.



$$\sin 60^\circ : 1' = \sin 30^\circ$$

$$\sin 60^\circ : 1' = \sin 90^\circ : 1.155$$

$$9.6990$$

$$9.9375$$

$$\log .577 = 9.7615$$

$$9.9375$$

$$1.155 = 0.0625$$

$$1.155$$

$$.385$$

$$1.540$$

$$\text{Call } YZ = (1\frac{1}{2})' = 187.80 + 62.60 = 250.40 \text{ Rev.}$$

$$XY = .577' \times 187.80 = 108.37 \text{ Rev.}$$

Log. cir. of circle having for radius the focal length of E. Equatorial
in inches = 3.2277

$$360$$

$$3600$$

$$216000$$

$$1080$$

$$1296000$$

$$3.2277$$

$$6.1127$$

$$7.1150$$

$$3.3802$$

$$0.4952$$

$$1.7782$$

$$2.2734$$

$$187.80$$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

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$$=$$

$$\sin 80^\circ : 0.4' = \sin 90^\circ$$

$$9.6021 = \log .4$$

$$9.9934$$

$$406 = 9.6087$$

$$\sin 80^\circ : .4' = \sin 10^\circ$$

$$9.2597$$

$$9.6021$$

$$8.8418$$

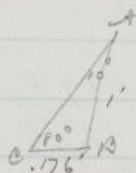
$$9.9934$$

$$8.8484$$

$$BC = .0706$$

$$.0235$$

$$\text{Call } BC = .0941$$



$$\sin 80^\circ : 1' = \sin 10^\circ : BC$$

$$9.2397 = \sin 10$$

$$9.9934 = \sin 80$$

$$9.2463 = .176 = BC$$

$$\text{Call } BC \text{ for ruling } .176 \times \frac{2}{3} = .352 =$$

$$.117' = (.117 \times 187.80) \text{ Rev.} = 21.97 \text{ Rev.}$$

$$\log .117 = 9.0682$$

$$187.8 = 2.2718$$

$$19$$

$$1.3419 = 21.97 \text{ Rev.}$$

$$2/251.50$$

$$140.75$$

$$93.90$$

$$234.65$$

$$125.30$$

$$109.45$$

$$187.80$$

$$2/37560$$

$$125.20$$

$$187.80$$

$$3145.44$$

$$3333.24$$

Photometric work,

New values for diameters of planets adopted See p. 74. 69

(Log. $\frac{A+H}{P}$ to. Photometer II. (Table I.)

1262.46 109.45 1152.01	460 25.8 8.4692 9.5727 9.5722 1.201	do.	390 = 9.5911 380 1.5798 8.0113 0.1148 2.55 9.709 0.486
1503.21 109.45 1393.76	15.90 do.	14.15 390 25.8 8.1795 0.2830 9.782 0.501	do.
1593.09 1423.64	3.27 do.	3.17 do.	0.2830 9.718 0.573
1650.27 1541.42	3.01 do.	2.86 390 25.7 8.1812 0.0649 9.642 0.420	192 0.2830 do.
1811.37 1701.92	3.66 390 37.7 8.0148 9.8985 9.532 0.366	2.65 390 37.7 9.8985 9.493 0.405	0.0649 9.865 0.260 390 9.5911 25.6 1.4082 8.1829 0.0666 9.532 0.535
1853.10 1743.65	do.	2.54 363 25.4 8.1551 0.0388 9.536 0.503	1.42 390 25.6 8.1829 0.0666 9.532 0.535
1926.92 1817.48	3.17 do.	3.15 363 37.5 7.9859 0.0894 9.568 0.521	4.03 0.0388 9.434 0.605 do
0.0666 9.567 0.500	2.61 do.	3.32 363 36.9 7.9929 0.0964 9.720 0.376	0.0894 9.568 0.521 363 9.5599 36.5 1.5623 7.9976 9.5813 9.471 0.410
0.2586 9.886 0.373	3.90 do.	2.35 do	3.32 0.0894 9.568 0.521 363 9.5599 36.5 1.5623 7.9976 9.5813 9.471 0.410
0.2620 9.676 0.588	4.14 363 24.0 8.1797 0.0634 9.455 0.610	2.55 do	2.57 0.0634 9.471 0.410
9.8813 9.428 0.453	4.07	2.55 do	3.11 0.0634 9.471 0.493
0.0634 9.628 0.435			

Photometric Work. (Photometer II)

$$\text{Light} = \left(\frac{E}{A} \right)^2$$

$$\text{mag.} = \frac{10. - \text{Log. Light}}{2.4} \quad (\text{Table 1.})$$

1.201 5.638 7.276 = Log. Light. 2.724 6.81 = mag.	1.234 8.671 7.342 2.658 6.64	0.406 7.843 5.686 4.314 10.78	0.515 7.952 5.904 4.096 10.24
0.501 7.938 5.876 = Log. Light. 4.124 10.31 = mag.	0.573 8.010 6.020 3.980 9.95	0.478 7.915 5.830 4.170 10.42	0.456 7.893 5.786 4.214 10.53
0.283 7.720 5.440 4.560 11.40	0.563 8.000 6.000 4.000 10.00	0.428 7.860 5.720 4.280 10.70	0.260 7.697 5.394 4.606 11.51
0.366 7.803 5.606 4.394 10.98	0.405 7.842 5.684 4.316 10.79	0.535 7.972 5.944 4.056 10.14	
0.500 7.937 5.874 4.126 10.31	0.416 7.853 5.706 4.294 10.73	0.503 7.940 5.880 4.120 10.30	0.605 8.042 6.084 3.916 9.79
0.373 7.810 5.620 4.380 10.95	0.591 8.028 6.056 3.944 9.86	0.521 7.958 5.916 4.084 10.21	0.521 7.958 5.916 4.084 10.21
0.528 8.025 6.050 3.950 9.87	0.617 8.054 6.108 3.892 9.73	0.076 7.813 5.626 4.374 10.93	0.410 7.847 5.694 4.306 10.76
0.453 7.890 5.780 4.220 10.55	0.610 8.047 6.094 3.906 9.76	0.407 7.844 5.688 4.312 10.78	0.493 7.930 5.860 4.140 10.35
0.425 7.872 5.744 4.256 10.64			

$$\begin{array}{r} 9.477 \\ 1.579 \\ \hline 7.898 \\ 5.796 \\ \hline 4/4.204 \\ 10.51 \end{array}$$

$$\begin{array}{r} 9.813 \\ 0.326 \\ \hline 9.487 \\ 1.563 \\ \hline 7.924 \\ 5.828 \\ \hline 4/4.172 \\ 10.43 \end{array}$$

Table 2.

$$E = \frac{a}{\sin R} =$$

(Ap. small tel.)
(sin R.)

$$\text{Log. Light} = 2 \log \left(\frac{E}{a} \right)$$

0.385 7.825 5.650 = Log. Light. 4.350 10.87	0.175 7.612 5.224 4.776 11.94	0.267 7.704 5.408 4.592 11.48	0.410 7.847 5.694 4.306 10.76
0.381 7.818 5.636 4.364 10.91	0.400 7.837 5.674 4.326 10.81	0.549 7.986 5.972 4.028 10.07	0.506 7.943 5.886 4.114 10.28
0.317 7.754 5.508 4.492 11.20	0.424 7.861 5.722 4.278 10.69		

Table 3.

$$E = \frac{af}{F \sin R}$$

$$f = 70.36 \text{ cm}$$

$$R = 682.8 "$$

$f \cdot f = 1.847$ $\text{Log. } f = 2.834$ $\frac{9.013}{9.013}$ $12.69 = 1.103$ $\frac{0.116}{0.116}$ 0.365 = Log. R 7.805 = Log. Light. 5.610 = Log. Light. 1.297 = Log. Light. 0.295 7.732 5.464 4.536 11.34	0.346 = Log. R 7.783 5.566 = " Light. 4.434 11.08 = Log. 0.311 7.748 5.496 4.504 11.26	0.391 7.828 5.656 4.344 10.86 7.65 = 0.884 $\frac{9.013}{9.597}$ $\frac{0.287}{0.287}$ 7.724 5.448 4.552 11.32	0.345 7.785 5.570 4.430 11.07 0.272 7.709 5.418 4.582 11.45
--	---	---	--

Photometer II. Table 6.

$$E = \frac{a}{\text{Cor. Reading}}$$

$$\text{Light} = \left(\frac{E}{A} \right)^2$$

12.2 = 1.080 9.832 7.269 4.535 5.462 13.65	11.5 = 1.047 9.865 7.302 4.604 5.396 13.49	12.74 = 1.105 9.807 7.244 4.488 5.512 13.78	12.95 = 1.113 9.799 7.236 4.472 5.528 13.82	13.5 = 1.141 9.771 7.208 4.416 5.584 13.96	13.92 = 1.114 9.798 7.238 4.470 5.530 13.82
12.89 = 1.110 9.802 7.239 4.478 5.522 13.80	9.85 = 0.993 9.919 7.356 4.712 5.288 13.22	11.09 = 1.045 9.867 7.304 4.608 5.392 13.48	3.75 = 0.574 9.818 7.285 4.510 5.490 13.72	3.80 = 0.580 9.812 7.249 4.498 5.502 13.75	4.32 = 0.625 9.757 7.194 4.388 5.612 14.00

Photometric Work. (Photometer B.)

Log. Light =

$2(\log B - \log A)$

is Log. A =

$\log B - \frac{\log \text{Light}}{2}$

6.31 = 0.800 9.592 7.029 4.054 5.942 14.15	3.65 = 0.566 9.526 7.263 4.526 5.474 13.65	3.77 = 0.577 9.515 7.252 4.504 5.496 13.74	3.77 = 0.576 9.516 7.253 4.506 5.494 13.70	3.71 = 0.569 9.523 7.260 4.520 5.480 13.70	3.90 = 0.591 9.501 7.238 4.476 5.524 13.81
10.00 = 0.602 9.790 7.227 4.454 5.546 13.86	11.75 = 1.071 9.789 7.226 4.452 5.545 13.87	13.65 = 1.136 9.724 7.161 4.322 5.675 14.19	12.36 = 1.092 9.764 7.205 4.410 5.590 13.97	12.47 = 1.110 9.750 7.187 4.374 5.626 14.06	12.34 = 1.091 9.769 7.206 4.412 5.588 13.97
10.06 = 1.002 9.851 7.295 4.590 5.410 13.52	10.33 = 1.014 9.846 7.283 4.566 5.434 13.58	4.17 = 0.620 9.870 7.307 4.616 5.386 13.46	4.15 = 0.618 9.872 7.309 4.618 5.382 13.45	4.24 = 0.627 9.863 7.300 4.600 5.400 13.50	4.35 = 0.635 9.852 7.289 4.578 5.422 13.55

Table Y.

$E = \frac{Af}{H \cdot R}$	8.539 2.563 = Log. 366 1.102 1.245 7.854 = Log. H 7.291 4.582 5.418 13.54	12.7 = 2.104 8.539 0.643			
$R = 682.8$		9.883 7.320 4.640 5.360 13.40	9.911 7.348 4.696 5.304 13.26	9.866 7.303 4.606 5.394 13.48	9.893 7.330 4.660 5.343 13.35
$f = 23.59$					
$\log f = 1.373$					7.65 = 1.884 8.509 0.623
$\frac{R}{f} = 2.834$	9.802 7.239 4.478 5.522 13.80	9.885 7.322 4.644 5.356 13.39	9.881 7.318 4.636 5.364 13.41	9.791 7.228 4.456 5.544 13.86	9.847 7.284 4.568 5.432 13.58
$\frac{R}{f} = 8.539$					
	9.812 7.249 4.498 5.502 13.75	9.861 7.298 4.596 5.404 13.51	9.876 7.313 4.626 5.374 13.40	9.863 7.308 4.600 5.400 13.50	9.861 7.298 4.596 5.404 13.51
	9.883 7.320 4.640 5.360 13.40	9.795 7.232 4.464 5.536 13.84	9.809 7.246 4.492 5.508 13.77	9.842 7.279 4.558 5.442 13.60	9.867 7.304 4.608 5.392 13.48

9.884 7.321 4.642 5.358 13.39	9.873 7.310 4.620 5.380 13.45	9.846 7.283 4.566 5.434 13.58
---	---	---

Table 5.

.363 14.8 9.560 1.274 8.286 9.849 8.965 7.402 4.804 5.196 12.99	do.	do.	.363 14.9 9.560 1.276 8.284 9.847 8.954 7.391 4.782 5.218 13.04	do.	.363 19.1 9.560 1.281 8.279 9.842 8.919 7.356 4.712 5.288 13.22
do.	do.	do.	.363 16.4 9.560 1.215 8.345 9.908 9.022 7.459 4.918 5.082 12.70	do.	do.
8.957 7.394 4.888 5.212 13.03	do.	do.	8.977 7.414 4.828 5.172 12.93	do.	do.

Sem. diam. Mars. Oct. 18 = 9".8

Diam. " " = 19".6

.913 = 9.9605

9.9802

Log. 19.6 = 1.2923

" VP = 9.9802

" 14.7 = 1.2725 for Oct. 18, Mars.

$$\begin{array}{r}
 7.85 \\
 15.60 = 1.1931 \\
 \hline
 9.9802 \\
 14.9 \quad 1.1733
 \end{array}$$

1.039 P for Jupiter's semidiam (P being polar diam.)

For Mars. - Diam. = D VP D being diam. from Am. Ab. & P being phase.

Diameters of planets.

Sept. 4. Mars.

S. Diam. from Al. 13.40

Diams 26.80 Log. = 1.4281

$$\begin{array}{r} \sqrt{998} \\ 26.8 \\ \hline \end{array} \quad \begin{array}{r} = 9.9995 \\ = 1.4276 \end{array}$$

Sept. 9. Mars.

Diams. from Al. 26.60 Log. = 1.4249

$$\begin{array}{r} \sqrt{993} \\ 26.4 \\ \hline \end{array} \quad \begin{array}{r} = 9.9969 \\ = 1.4218 \end{array}$$

Sept. 10. Mars. 26.52 " 1.4235

$$\begin{array}{r} \sqrt{992} \\ 26.3 \\ \hline \end{array} \quad \begin{array}{r} = 9.9965 \\ = 1.4200 \end{array}$$

Sept. 11. Mars. 26.42 = 1.4219

$$\begin{array}{r} \sqrt{991} \\ 26.2 \\ \hline \end{array} \quad \begin{array}{r} = 9.9961 \\ = 1.4180 \end{array}$$

Sept. 12 Mars. 26.34 = 1.

Table 1.

Recomputation of a part of Table 1.	26.8	9.881 1.428 8.453 9.556 10.124 8.621 7.242 2.755 6.89	do.	8.453 0.217 8.654 7.308 2.692 8.73	390 35.3	9.591 1.583 8.008 9.111 9.402 7.839 5.671 4.322 10.80	do.	8.008 9.511 7.948 5.596 4.104 10.26
corresponding to new values of diameters of planets	390 26.6	9.591 1.425 8.166 9.269 9.417 7.924 5.248 4.152 10.38	do.	9.559 7.996 5.992 4.008 10.02	do.	9.464 7.901 5.102 4.198 10.49	do.	9.442 7.879 5.758 4.222 10.60
do.	do.	9.269 7.706 5.412 4.588 11.47	do.	9.549 7.986 5.972 4.028 10.07	390 26.5	9.591 1.423 8.168 9.052 9.410 7.847 5.694 4.306 10.76	do.	9.247 7.684 5.368 4.632 11.58

Photometric Work.

75

Table 1.

Recomputation of a part of Table 1.	$\begin{array}{r} 390 \\ 35.1 \\ 9.591 \\ 1.551 \\ \hline 8.010 \\ 9.594 \\ 9.362 \\ 7.799 \\ 5.598 \\ 4.402 \\ 1.100 \end{array}$	do.	$\begin{array}{r} 363 \\ 26.3 \\ 9.560 \\ 1.420 \\ \hline 8.140 \\ 9.024 \\ 9.488 \\ 7.925 \\ 5.950 \\ 4.324 \\ 1.081 \end{array}$	$\begin{array}{r} 390 \\ 26.4 \\ 9.591 \\ 1.422 \\ \hline 8.169 \\ 9.053 \\ 9.521 \\ 7.958 \\ 5.916 \\ 4.084 \\ 1.021 \end{array}$	do.	$\begin{array}{r} 363 \\ 25.2 \\ 9.560 \\ 1.401 \\ \hline 8.159 \\ 9.262 \\ 9.519 \\ 7.926 \\ 5.906 \\ 4.094 \\ 1.023 \end{array}$
	$\begin{array}{r} 9.402 \\ 7.839 \\ 5.678 \\ 4.322 \\ 1.080 \end{array}$		$\begin{array}{r} 9.401 \\ 7.838 \\ 5.676 \\ 4.324 \\ 1.081 \end{array}$			$\begin{array}{r} 9.490 \\ 7.927 \\ 5.854 \\ 4.146 \\ 1.036 \end{array}$
	$\begin{array}{r} 363 \\ 25.4 \\ 9.560 \\ 1.405 \\ \hline 8.155 \\ 9.258 \\ 9.590 \\ 8.027 \\ 6.056 \\ 3.946 \\ 9.86 \end{array}$	$\begin{array}{r} 363 \\ 37.9 \\ 9.560 \\ 1.579 \\ \hline 7.981 \\ 9.084 \\ 9.516 \\ 7.953 \\ 5.906 \\ 4.094 \\ 1.023 \end{array}$				$\begin{array}{r} 363 \\ 25.2 \\ 9.560 \\ 1.401 \\ \hline 8.159 \\ 9.262 \\ 9.519 \\ 7.926 \\ 5.906 \\ 4.094 \\ 1.023 \end{array}$
do.	$\begin{array}{r} 9.618 \\ 8.055 \\ 6.110 \\ 3.890 \\ 9.72 \end{array}$	$\begin{array}{r} 363 \\ 37.3 \\ 9.560 \\ 1.572 \\ \hline 7.988 \\ 9.091 \\ 9.371 \\ 7.808 \\ 5.616 \\ 4.354 \\ 1.096 \end{array}$		$\begin{array}{r} 363 \\ 37.0 \\ 9.560 \\ 1.568 \\ \hline 7.992 \\ 8.876 \\ 9.405 \\ 7.842 \\ 5.684 \\ 4.316 \\ 1.079 \end{array}$	do.	$\begin{array}{r} 9.448 \\ 7.885 \\ 5.770 \\ 4.280 \\ 10.57 \end{array}$
$\begin{array}{r} 363 \\ 24.7 \\ 9.560 \\ 1.393 \\ \hline 8.167 \\ 9.051 \\ 9.598 \\ 8.035 \\ 6.070 \\ 3.930 \\ 9.82 \end{array}$	do	$\begin{array}{r} 9.395 \\ 7.832 \\ 5.664 \\ 4.336 \\ 1.084 \end{array}$		$\begin{array}{r} 9.481 \\ 7.918 \\ 5.836 \\ 4.164 \\ 1.041 \end{array}$	do.	$\begin{array}{r} 9.420 \\ 7.860 \\ 5.720 \\ 4.280 \\ 10.70 \end{array}$

Table 7.

Partial recomputation on account of change in value
of aperture from 12.7 to 12.69

$\log \frac{f}{D} = 8.539$	4.694 5.306 13.26	4.604 5.396 13.49	4.658 5.342 13.35
4.476 5.524 13.81	4.642 5.358 13.39	4.634 5.366 13.41	4.454 5.546 13.86
4.594 5.406 13.51	4.624 5.376 13.44	4.594 5.406 13.51	4.638 5.362 13.40
4.462 5.538 13.84	4.490 5.510 13.77	4.556 5.444 13.61	4.606 5.394 13.48

Photometric Work.

Table 7.

4.640	8.872	8.871	8.845
5.360	7.315	7.308	7.282
13.40	4.630	4.616	4.564
	5.370	5.384	5.436
	13.42	13.46	13.59

Table 8.

Full ap.
of Large Tel.
after Nov.

1877 = 37.95^{days}

9.398	9.310	9.270	9.288
7.819	7.731	7.691	7.709
5.631	5.462	5.382	5.418
4.362	4.538	4.618	4.582
10.90	11.34	11.54	11.45
9.310	9.302	9.349	9.318
7.731	7.723	7.770	7.739
5.462	5.446	5.540	5.478
4.538	4.554	4.460	4.522
11.34	11.38	11.15	11.30
9.347	9.309	9.351	9.314
7.768	7.730	7.772	7.735
5.506	5.460	5.544	5.470
4.464	4.540	4.456	4.530
11.16	11.35	11.14	11.32
9.342	9.332	9.331	9.303
7.763	7.753	7.752	7.724
5.526	5.506	5.504	5.448
4.474	4.494	4.496	4.552
11.18	11.23	11.24	11.38
9.280	9.292	9.328	9.327
7.701	7.713	7.749	7.748
5.402	5.426	5.498	5.496
4.598	4.574	4.502	4.504
11.49	11.43	11.25	11.26
9.320	9.313	9.318	9.288
7.741	7.734	7.739	7.709
5.482	5.468	5.478	5.418
4.518	4.532	4.522	4.582
11.29	11.33	11.30	11.45

$$\begin{array}{r}
 9.295 \\
 7.716 \\
 \hline
 1.479 \\
 4.568 \\
 \hline
 11.42
 \end{array}$$

$$\begin{array}{r}
 9.298 \\
 7.719 \\
 \hline
 1.439 \\
 4.562 \\
 \hline
 11.40
 \end{array}$$

Correction of a part of Table 5 due to change in value of diam. planet.

$$36.6 = 1.563$$

$$\begin{array}{r}
 .363 = 9.560 \\
 \hline
 1.123
 \end{array}$$

$$\begin{array}{r}
 15. = 1.176 \\
 \hline
 9.947
 \end{array}$$

Table 9. (Photometer G.)

$$\begin{array}{r} 12.69 = 1.103 \\ \underline{r.539} \\ 9.642 \\ \underline{9.400} \\ 1.579 \\ \underline{7.821} \\ 5.642 \\ \underline{1.410} \end{array}$$

9. 362
4 7 8 3
5. 5 6 6
1 3. 9 1

$$\begin{array}{r} 9.312 \\ \times 436 \\ \hline 552 \\ 11736 \\ 39696 \\ \hline 404712 \end{array}$$
$$\begin{array}{r} 26 \overline{) 1104} \quad 1.4^2 \\ \underline{104} \\ 60 \\ \underline{52} \\ 8 \\ \underline{0} \end{array}$$

24/ 1.75(.05)

79

$$\begin{array}{r} 34 \overline{) 4-3(1.6} \\ \underline{34} \\ 190 \end{array}$$

$$\begin{array}{r} 200 \\ 14 \overline{) 200} \\ \underline{14} \\ 60 \\ 52 \overline{) 60} \\ \underline{52} \\ 80 \end{array}$$

$$\begin{array}{r} 25 \\ 2 \\ \hline 50 \\ 24 \\ \hline 50 \end{array} \quad \begin{array}{r} 17 \\ 4 \\ \hline 21 \\ 8 \\ \hline 29 \end{array} \quad \begin{array}{r} 12 \\ 4 \\ \hline 26 \\ 3 \\ \hline 29 \end{array}$$
 $\frac{72}{12}$

$\begin{array}{r} 24 \\ 18.6 \\ \hline 35 \end{array}$
 $\begin{array}{r} 5.4 \\ 3.5 \\ \hline 190 \end{array}$
 $\begin{array}{r} 1.2 \\ 1.60 \\ \hline 181 \end{array}$

$24 \mid 16.0 \text{ (} \cdot 5$
 119
 $25 \mid 2.79 \text{ (} \cdot 08$

$$\begin{array}{r} 46 \\ 14 \\ \hline 124 \\ 46 \\ \hline 64 \end{array}$$

187 ✓

~~144.~~

2 1 6
7

7.13
459

$$\begin{array}{r} 7.15 \\ 4.59 \\ \hline 34 \overline{) 254} \quad 1075 \\ \underline{238} \\ 160 \end{array}$$
$$\begin{array}{r} 60.375 \\ - 18.15 \\ \hline 42.225 \end{array}$$
$$\begin{array}{r} 34 \overline{) 223} \quad 6.6 \\ \underline{204} \\ 190 \\ \underline{204} \\ 375 \\ \underline{370} \\ 50 \\ \underline{50} \\ 0 \end{array}$$
$$\begin{array}{r} 38 \overline{) 20.2} \quad (.53) \\ \underline{190} \\ 120 \\ \underline{116} \\ 40 \\ \underline{38} \\ 20 \end{array}$$
~~$$\begin{array}{r} 7.2 \\ 4.6 \\ 34 \overline{) 2.600} \end{array}$$~~

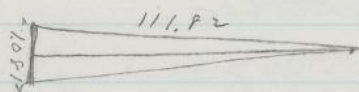
1840

$$\begin{array}{r} 64 \\ 42 \\ \hline 106 \end{array}$$
$$\begin{array}{r} 129 \\ 231 \\ 64 \\ \hline 25 \overline{) 295} \quad | 8.4 \\ \underline{250} \\ 150 \\ \underline{140} \\ 10 \\ \underline{10} \\ 0 \end{array}$$
$$\begin{array}{r} 325 \\ 285 \\ \hline 34 \overline{) 406} \\ \underline{34} \\ 60 \end{array}$$
$$\begin{array}{r} -1.2 \\ -6.0 \\ \hline 25.3 \end{array}$$
$$\begin{array}{r} 26 \overline{) 1208} \\ \underline{104} \\ 160 \\ \underline{156} \\ 40 \\ \underline{38} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Jupiter's Satellites.

79

u.68557



$$.5405 : \sin \alpha = 111.82 : 1$$

$$\text{Log. } .5405 = 9.73240$$

Angles sub- " $111.82 = 2.04852$

extended by $0^\circ 16' 37.5 = 7.68428$

Satellites $0^\circ 33' 15.0$

$$\begin{array}{r} .66754 \\ 43.9 \overline{) 1644.0} \quad (37.5 \\ \underline{1317} \\ 3270 \\ \underline{3073} \\ 1970 \\ \underline{1756} \end{array}$$

$$\begin{array}{r} .910 \div 2 = .455 \\ \text{Log. } .455 = 9.65801 \\ " 177.81 = 2.24996 \\ 0^\circ 8' 48.4 = 7.40805 \\ 0^\circ 17' 36.8 \quad 85.4 \overline{) 4123.0} \quad (48 \\ \underline{36612} \\ 46118 \\ \underline{3408} \\ 7150 \\ \underline{6816} \\ 3340 \end{array}$$

$$1.537 \div 2 = .7685$$

$$\text{Log. } .7685 = 9.88564$$

" $283.63 = 2.45276$

$$0^\circ 9' 19.5 = 7.43288$$

$$0^\circ 18' 39.0 \quad 76.3 \overline{) 1491.0} \quad (19.5$$

$$\begin{array}{r} 41797 \\ \underline{763} \\ 7280 \\ \underline{7667} \\ 4130 \\ \underline{3815} \end{array}$$

$$1.212 \div 2 = .641$$

$$\text{Log. } .641 = 9.80686$$

" $491.15 = 2.69798$

$$0^\circ 4' 26.7 = 7.06579$$

$$0^\circ 8' 53.4 \quad 16.1 \overline{) 4309.0} \quad (26.7$$

$$\begin{array}{r} 3230 \\ \underline{10790} \\ 11000 \end{array}$$

Check on preceding

This, more accurate.

$$\begin{array}{r} 7.68428 \\ 4.68557 \\ \hline 2.99871 = 997.0 \\ 1994.0 \\ \hline \text{No. 1.} = 0^\circ 33' 14.0 \end{array}$$

$$\begin{array}{r} 7.43288 \\ 4.68557 \\ \hline 2.74731 = 558.9 \\ 1117.8 \\ \hline \text{No. 3.} = 0^\circ 18' 37.8 \end{array}$$

$$\begin{array}{r} 7.40805 \\ 4.68557 \\ \hline 2.72248 = 527.8 \\ 1055.6 \\ \hline \text{No. 2.} = 0^\circ 17' 35.6 \end{array}$$

$$\begin{array}{r} 7.10888 \\ 4.68557 \\ \hline 2.42331 = 265.0 \\ 530.0 \\ \hline \text{No. 4.} = 0^\circ 8' 50.0 \end{array}$$

$$\sin 16' 2'' = \frac{7.66754}{98}$$

$$\text{Log. } 5.2028 = 6.71623$$

$$6.95249$$

$$6.68557 = 1849 = 0^\circ 3' 4.9$$

$$0^\circ 6' 9.8$$

Jupiter's Satellites.

$$\begin{array}{r}
 864 \quad 151904 \\
 \underline{152064} \\
 152915.904 \\
 40
 \end{array}$$

$$\begin{array}{r}
 353376 \\
 306720 \\
 \hline
 3070.73376 \\
 320
 \end{array}$$

$$\begin{array}{r}
 552096 \\
 618624 \\
 \hline
 619176.096 \\
 -240
 \end{array}$$

$$\begin{array}{r}
 306720 \\
 553200 \\
 \hline
 1447506.720 \\
 200
 \end{array}$$

$$\begin{array}{r}
 3.7 \\
 \text{Log. } 176986 = 0.247719 \\
 \text{" } 15. = 0.24793 \\
 \text{" } 2 = 1.17609 \\
 \text{" } 2 = 9.07184 \\
 \text{" } 2 = 0.30103 \\
 \text{" } 2 = 2.99871 \\
 (1^{\text{st}} \text{ sat.}) 235.3 = 2.37158
 \end{array}$$

$$\begin{array}{r}
 \text{Log. } 3.55409 = 0.55072 \\
 \text{" } \frac{2}{15} = 0.55073 \\
 \text{" } \frac{2}{15} = 9.12494 \\
 \text{" } \frac{2}{15} = 9.67567 \\
 \text{" } \frac{2}{15} = 2.72248 \\
 (2^{\text{d}} \text{ sat.}) 250.1 = 2.39815
 \end{array}$$

$$\begin{array}{r}
 \text{Log. } 7.16639 = 0.85528 \\
 \text{" } 7.16639 = 0.85530 \\
 \text{" } 7.16639 = 9.98024 \\
 \text{" } 7.16639 = 2.74731 \\
 (3^{\text{d}} \text{ sat.}) 534.0 = 2.72755
 \end{array}$$

$$\begin{array}{r}
 \text{Log. } 16.75355 = 1.22401 \\
 \text{" } 16.75355 = 1.22410 \\
 \text{" } 16.75355 = 0.34904 \\
 \text{" } 16.75355 = 2.42331 \\
 (4^{\text{th}} \text{ sat.}) 592.0 = 2.77235
 \end{array}$$

$$\begin{array}{r}
 0.24793 \\
 1.17609 \\
 \hline
 9.07184
 \end{array}$$

$$\begin{array}{r}
 2.26692 = \text{Log. Sem. diam. seen as seen from Jup. at mid.} \\
 0.30103 \\
 \hline
 2.56795 = \text{" diam. seen.} \\
 9.07184 \\
 \hline
 3.49611 = 3.134.0
 \end{array}$$

$$\begin{array}{r}
 1.03773 \\
 71623 \\
 \hline
 I 1.75396
 \end{array}$$

Jupiter's Satellites.

$$\begin{array}{r} \text{Log. } 1.76946 = 0.24793 \\ \text{" } 15 = 1.17609 \\ \hline 9.04184 \end{array}$$

$$\begin{array}{r} 2.99471 \\ 0.30103 \\ \hline 3.29574 \\ 9.07184 \\ \hline 4.22790 = 16900 \text{ Secs.} \end{array}$$

$$\begin{array}{r} \text{Log. } 15 = 1.17609 \\ \text{" } 2 = 0.30103 \\ \hline 0.87506 \end{array}$$

$$\begin{array}{r} \text{Log. } 3.55409 = 0.55073 \\ \text{" } 30 = 1.47712 \\ \hline 9.07361 \\ 2.72248 \\ \hline \end{array}$$

$$2^{\text{d}} \text{ Sat.} = 445.2 = 3.64887$$

$$\begin{array}{r} 7.16639 = 0.85530 \\ 1.47712 \\ \hline 9.37818 \\ 2.74731 \\ \hline \end{array}$$

$$\begin{array}{r} 16.75355 = 1.22410 \\ 30 = 1.47712 \\ \hline 9.44698 \\ 2.42331 \\ \hline 2.67633 \end{array}$$

$$(3^{\text{d}} \text{ Sat.}) 2339.5 = 3.36913$$

$$\begin{array}{r} 1.76946 = 0.24793 \\ 1.47712 \\ \hline 8.47081 \\ 2.99471 \\ \hline (1^{\text{st}} \text{ Sat.}) 58.8 = 1.76952 \end{array}$$

$$\begin{array}{r} 3.55409 = 0.55073 \\ 1.47712 \\ \hline 9.07361 \\ 2.72248 \\ \hline (2^{\text{d}} \text{ Sat.}) 62.5 = 1.79609 \end{array}$$

$$\begin{array}{r} 0.85530 \\ 1.47712 \\ \hline 9.37818 \\ 2.74731 \\ \hline (3^{\text{d}} \text{ Sat.}) 1375 = 2.12549 \end{array}$$

$$\begin{array}{r} 1.22410 \\ 1.47712 \\ \hline 9.44698 \\ 2.42331 \\ \hline (4^{\text{th}} \text{ Sat.}) 148.0 = 2.17029 \end{array}$$

$$\begin{array}{r} 2.26692 \\ 8.77081 \\ \hline 1.03773 \\ 10.9 \text{ Secs.} \\ (1^{\text{st}} \text{ Sat.}) \end{array}$$

$$\begin{array}{r} 9.07361 \\ 1.34053 \\ \hline 21.9 \text{ Secs.} \\ (2^{\text{d}} \text{ Sat.}) \end{array}$$

$$\begin{array}{r} 9.37818 \\ 1.64510 \\ \hline 44.2 \\ (3^{\text{d}} \text{ Sat.}) \end{array}$$

$$\begin{array}{r} 9.74698 \\ 2.01390 \\ \hline 103.3 \\ (4^{\text{th}} \text{ Sat.}) \end{array}$$

Log. semi. diam. Seen as seen from Jupiter = 2.26692

5.13 5.06

Jupiter's Satellites.

$1.03773 = \log. \text{ time at Jup. mean dis.}$
 $0.71623 = \log. \text{ dis. 1st Sat. (Earth's dis. being 1)}$
 $1.75396 = \log. \text{ time of passing over arc equal to that subtended by Sun's diam. at dist. 1.}$
 $\log. R.V. \text{ July 1.77} = 0.70915$
 $11.1 = 1.04481$
 $11.2 = 1.04748$
 $11.2 = 1.05007$
 1.34053 (3rd Sat.) 1.64510 (4th Sat.) 2.01390
 $(2^{\text{nd}} \text{ Sat.})$ (2.05676) 2.36133 $2.73013 = \log. \text{ time at dist. 1.}$
 $22.3 = 1.34761$ $44.9 = 1.65218$ $104.9 = 2.02098$
 $22.4 = 1.35032$ $45.2 = 1.65489$ $105.6 = 2.02369$
 $22.5 = 1.35287$ $45.4 = 1.65744$ $106.2 = 2.02624$

γ	.99499	.97980	.95394	.91652	.86603
x	.1	.2	.3	.4	.5
$90 - \alpha$	$5^\circ 44'$	$11^\circ 32'$	$17^\circ 27'$	$23^\circ 35'$	$30^\circ 0'$
$180 - 2\alpha$	$11^\circ 28'$	$23^\circ 4'$	$34^\circ 54'$	$47^\circ 10'$	$60^\circ 0'$
$\text{Nat. sin } 2\alpha$	.19880	.39180	.57215	.73333	.86603
α	$344'$	$692'$	$1047'$	$1415'$	$1800'$
$\frac{\alpha}{10800}$	.0319	.0641	.0970	.1310	.1667
	.4681	.4359	.4030	.3690	.3333
$.159 \times \sin 2\alpha$	.0316	.0623	.0910	.1166	.1377
$A = \frac{\alpha}{180} - .159 \sin 2\alpha$	.0003	.0018	.0060	.0144	.0290
	.4365	.3736	.3120	.2524	.1986
γ	.79999	.71416	.59999	.43588	0
x	.6	.7	.8	.9	1.0
α	$36^\circ 52'$	$44^\circ 26'$	$53^\circ 8'$	$64^\circ 9'$	90°
2α	$73^\circ 44'$	$88^\circ 52'$	$106^\circ 16'$	$128^\circ 18'$	180°
$\text{Nat. sin } 2\alpha$	.95997	.99980	.95997	.71416	0
α	$2212'$	$2666'$	$3188'$	$3849'$	
$\frac{\alpha}{10800}$	.2048	.2469	.2952	.3564	.5000
	.2952	.2531	.2048	.1436	
$.159 \times \sin 2\alpha$	.1526	.1590	.1526	.1248	0
$A = \frac{\alpha}{180} - .159 \sin 2\alpha$	.0522	.0879	.1426	.2316	.5000
	.1426	.0941	.0522	.0188	

Jupiter's Satellites.

.0003	.0015	.0060	.0144	.0290
6.4771	7.2553	7.7782	8.1584	8.4624
3.523	2.745	2.222	1.842	1.538
mag. = 8.81	6.86	5.55	4.60	3.84

.0522	.0579	.1426	.2316	.5000
8.7177	8.9440	9.1541	9.3647	9.6990
1.282	1.056	0.846	0.635	0.301
mag. = 3.20	2.64	2.11	1.59	.75

$$6.2832 = 0.79515$$

$$.1592 = 9.20182$$

4681	9.1670	0.330	.82
14045	9.607	0.393	.98
13426	9.555	0.465	1.16
12819	9.450	0.550	1.37
12235	9.349	0.651	1.63
11686	9.227	0.773	1.93
11175	9.071	0.929	2.32
10723	8.859	1.141	2.85
10342	8.534	1.466	3.66
10069	7.839	2.161	5.40
5319	9.726	0.274	.68
5952	9.775	0.225	.56
6574	9.818	0.182	.45
7181	9.856	0.144	.36
7765	9.890	0.110	.27
8314	9.920	0.080	.20
8822	9.946	0.054	.13
9277	9.967	0.033	.08
9658	9.985	0.015	.04
9931	9.997	0.003	.01

Time taken for Satellites to have ^{arc} equal to their own di.

1.76952	1.79609	2.12549	2.17029
58.12	62.53	133.50	148.01
<u>235.21</u>	<u>250.12</u>	<u>534.00</u>	<u>592.04</u>

1.03773	1.34053	1.64510	2.01390
10.91	21.90	44.17	65.22
<u>43.64</u> Secs.	<u>87.60</u>	<u>176.68</u>	<u>103.25</u>
<u>235.21</u>	<u>250.12</u>	<u>534.00</u>	<u>413.00</u>
<u>278.92</u>	<u>337.72</u>	<u>710.68</u>	<u>592.04</u>
			<u>1005.04</u>

1 st Sat.	11.09	44.36	235.21		
	11.16	44.64		279.94	210.
	11.22	44.88			
	22.26	89.04	250.12		
	22.40	89.60		339.72	340.
	22.54	90.16			
	44.59	179.56	534.00		
	45.17	180.68		714.68	715.
	45.44	181.76			
	104.95	419.50	592.04	1011.84	
	105.61	422.44		1014.48	
	106.23	424.92		1016.96	

9.364	9.413	9.747	9.517
7.801	7.920	8.154	8.024
5.602	5.440	6.368	6.048
4.398	4.560	3.632	3.952
10.99	11.40	9.08	9.28

$$\frac{6/66.74}{11.12} + 41.35 = \frac{108.09}{10.81} \quad (\text{Table 2})$$

$$\frac{4/43.97}{10.99} + \frac{45.41}{11.35} = \frac{89.38}{11.17} \quad (\text{Table 3})$$

$$\frac{13.64}{6.80} + \frac{24.06}{10.51} + \frac{22.34}{11.17} + \frac{53.18}{10.63} + \frac{40.86}{10.24} + \frac{40.04}{10.01} + 10.95$$

$$\frac{62.97}{10.49} = \frac{328.04}{10.25} \quad (\text{Table 1.})$$

$$\frac{328.01}{10.61} = \frac{311.40}{10.48}$$

Table of Constants.

Holes.	Apertures.	Focal lengths.
$d_1 = .760$	37.95 cms.	682.5 cms. (6 th Exp.)
$Q' = .390$	36.60 "	23.59 (Tab. 4)
$R_3 = .363$	12.89 "	7.036 (Tab. 3)
	7.65 "	
	.94 "	
	.134	
	.425	
	.309	

$$\begin{aligned} .0729 &= 8.863 \\ 36.6 &= 1.563 \end{aligned}$$
$$.0719 = 8.257$$

$\begin{array}{r} 9.061 \\ 1.563 \\ \hline 7.498 \\ 4996 \\ 5.004 \\ 12.51 \end{array}$	$\begin{array}{r} 9.570 \\ 1.563 \\ \hline 8.007 \\ 6.014 \\ 3.986 \\ 9.96 \end{array}$	$\begin{array}{r} 9.015 \\ 1.563 \\ \hline 7.452 \\ 4.904 \\ 5.096 \\ 12.74 \end{array}$	$\begin{array}{r} 9.016 \\ 1.563 \\ \hline 7.453 \\ 4.906 \\ 5.094 \\ 12.73 \end{array}$
---	---	--	--

$$\begin{array}{r} 129.47 \\ \times 19.95 \\ \hline 1159.43 \quad (2.68) \\ \underline{11} \\ 22 \\ \underline{22} \\ 74 \\ \underline{66} \\ 88 \\ \underline{77} \end{array}$$

Photometric Work.

87

$$12.7 = 1.104$$

$$\frac{8.539}{9.643}$$

9.

$$\begin{array}{r} 4.356 \\ 10.89 \end{array} \quad \begin{array}{r} 4.432 \\ 11.05 \end{array} \quad \begin{array}{r} 4.532 \\ 11.33 \end{array}$$

3 3.30

Table VIII.

Lys. of Light + Constants.	9.295	9.291	9.419	9.422
	7.716 5.432 4.568 11.42	7.712 5.424 4.576 11.44	7.840 5.680 4.320 10.80	7.843 5.686 4.314 10.78
	9.371	do.	9.335	9.384
	7.792 5.584 4.416 11.04		7.756 5.512 4.488 11.22	7.805 5.610 4.390 10.97
	9.405	9.435	9.365	9.375
	7.826 5.682 4.348 10.87	7.856 5.712 4.288 10.72	7.786 5.572 4.428 11.07	7.796 5.592 4.408 11.02
	9.283	9.321	9.319	9.323
	7.704 5.408 4.592 11.48	7.742 5.484 4.516 11.29	7.740 5.480 4.520 11.30	7.744 5.488 4.512 11.28
	9.305	9.262	9.291	9.322
	7.726 5.452 4.548 11.37	7.683 5.366 4.634 11.58	7.712 5.424 4.576 11.44	7.743 5.486 4.514 11.28
	9.234	9.237		
	7.655 5.310 4.690 11.72	7.658 5.316 4.684 11.71		

Photometric Work.

Table (P. obs.)

42.4 = 1.627 43.9 = 1.643 44 = 9.496 9.461 7.882 5.764 4.236 10.59	42.1 = 1.624 43.6 = 1.640 9.499 9.419 7.840 5.680 4.320 10.50	39.3 = 1.594 40.7 = 1.610 9.529 9.294 7.715 5.430 4.570 11.42	39.2 = 1.593 40.6 = 1.609 9.530 9.266 7.687 5.374 4.626 11.56
38.4 = 1.584 39.8 = 1.600 9.539 9.420 7.841 5.682 4.318 10.79	38.1 = 1.581 39.5 = 1.597 9.542 9.283 7.704 5.408 4.592 11.42	38.0 = 1.580 39.4 = 1.596 9.543 9.359 7.720 5.560 4.440 11.10	37.9 = 1.579 39.4 = 1.595 9.544 9.442 7.863 5.726 4.274 10.68
37.8 = 1.577 39.2 = 1.593 9.546 9.429 7.850 5.700 4.300 10.75	37.6 = 1.575 39.0 = 1.591 9.548 9.344 7.765 5.530 4.470 11.17		

$$\log. A \times H = 1.123$$

$$43.9 = 1.643$$

$$9.496$$

$$\sin. 10.84 = 9.275$$

$$H = 0.205$$

$$36.6 = 1.563$$

$$1.642$$

$$7.284$$

$$2.716$$

$$7.$$

$$36.3 = 9.560$$

$$12.7 = 1.104$$

$$0.664$$

$$1.643$$

$$9.021$$

$$9.275$$

$$\log. H = 9.746$$

$$36.6 = 1.563$$

$$1.183$$

$$\log. \text{light} = 6.366$$

$$3.634$$

$$.9$$

$$9.560$$

$$2.65 = 0.884$$

$$0.444$$

$$1.643$$

$$1.801$$

$$9.275$$

$$\log. H = 9.526$$

$$1.563$$

$$7.963$$

$$\log. 2. = 5.926$$

$$4.074$$

$$10.18$$

$$37.95 = 1.579$$

$$H = 9.560$$

$$1.139$$

$$P = 1.643$$

$$9.496$$

$$0.035$$

$$9.461$$

$$1.579$$

$$7.882$$

$$5.764$$

$$4.236$$

$$10.59$$

$$37.95 = 1.579$$

$$9.560$$

$$1.139$$

$$0.035$$

$$1.104$$

$$1.139$$

$$37.2 = 1.570$$

$$0.017$$

$$1.587$$

$$1.139$$

$$9.552$$

$$1.039$$

$$(0.016)$$

Photometric Work.

89

Table. (P. obs.)

9.346 7.767 5.534 4.466 11.16	9.329 7.750 5.500 4.500 11.25	9.235 7.656 5.312 4.688 11.72	9.230 7.651 5.302 4.698 11.74
9.340 7.761 5.522 4.478 11.19	9.363 7.744 5.568 4.432 11.08	9.316 7.807 5.614 4.316 10.96	9.300 7.721 5.442 4.558 11.39
9.275 7.696 5.392 4.608 11.52	9.325 7.746 5.492 4.501 11.27		

Table (U. obs.)

9.549 7.740 5.340 4.015	9.347 7.768 5.536 4.464 11.16	9.376 7.717 5.594 4.406 11.01	37.0 1.580 1.597 9.542 9.421 7.849 5.698 4.302 10.75
9.419 7.740 5.680 4.320 10.80	9.426 7.847 5.694 4.306 10.76	9.350 7.771 5.542 4.458 11.14	37.4 1.573 1.590 9.549 9.311 7.782 5.464 4.536 11.34
37.1 1.569 1.586 9.553 9.377 7.798 5.596 4.404 11.01	37.0 1.568 1.585 9.554 9.376 7.797 5.594 4.406 11.01		

Table (Phot. I by art. stars.)

9.321 7.742 5.484 4.516 11.29	9.337 7.758 5.516 4.484 11.21	9.398 7.819 5.638 4.362 10.90	9.373 7.794 5.588 4.412 11.03
9.375 7.796 5.592 4.408 11.02	9.345 7.766 5.532 4.468 11.17	9.504 7.925 5.850 4.150 10.37	9.371 7.792 5.584 4.416 11.04

Photometric Work.

Table (P. obs.)

9.351	9.366	9.369
7.802	7.787	7.790
5.604	5.574	5.580
4.396	4.426	4.420
10.99	11.06	11.05

Table (S. obs.)

9.273	9.437	9.369	9.375
7.694	7.858	7.790	7.796
5.388	5.716	5.580	5.592
4.612	4.284	4.420	4.408
11.53	10.71	11.05	11.02
9.336	9.425	9.419	9.360
7.757	7.846	7.840	7.781
5.514	5.692	5.680	5.562
4.486	4.308	4.320	4.438
11.21	10.77	10.80	11.09
9.450	9.415	9.391	9.384
7.901	7.836	7.812	7.805
5.802	5.672	5.624	5.610
4.198	4.328	4.376	4.390
10.49	10.82	10.94	10.97

Table (U. obs.)

9.342	9.358	9.239	9.323
7.763	7.779	7.660	7.744
5.526	5.558	5.320	5.488
4.474	4.442	4.680	4.512
11.18	11.10	11.70	11.28
9.367	do.	9.378	9.383
7.788		7.799	7.804
5.576		5.598	5.608
4.424		4.402	4.392
11.06		11.00	10.98
9.364	9.372		
7.785	7.793		
5.570	5.586		
4.430	4.414		
11.07	11.03		

$$23.59 = 1.372 \times 10$$

$$61.28 = 2.834 \times 9$$

$$8.53844$$

Photometric Work.

91

(Photometer I.)

$$\log \frac{f}{D} = A.539$$

1.407
9.946
9.392
7.813
5.626
4.374
10.92

9.397
7.812
5.636
4.364
10.91

9.377
7.798
5.596
4.404
11.01

9.316
7.807
5.614
4.316
10.96

9.370
7.791
5.512
4.418
11.04

1.301
9.840
9.403
7.824
5.641
4.352
10.88

1.280
9.819
9.397
7.818
5.636
4.364
10.91

1.262
9.801
9.390
7.811
5.622
4.378
10.94

1.202
9.781
9.396
7.817
5.634
4.366
10.91

1.224
9.763
9.390
7.811
5.622
4.371
10.94

1.204
9.743
9.387
7.801
5.616
4.384
10.96

1.183
9.722
9.385
7.819
5.638
4.362
10.90

1.161
9.700
9.384
7.805
5.610
4.390
10.97

1.144
9.683
9.390
7.811
5.622
4.371
10.94

1.123
9.662
9.400
7.821
5.642
4.358
10.89

1.101
9.640
9.388
7.809
5.618
4.382
10.95

1.085
9.624
9.398
7.819
5.638
4.362
10.90

1.060
9.599
9.383
7.804
5.608
4.392
10.92

1.041
9.580
9.389
7.809
5.618
4.382
10.95

1.021
9.560
9.393
7.814
5.628
4.372
10.92

1.002
9.541
9.389
7.810
5.620
4.380
10.95

0.983
9.522
9.394
7.815
5.630
4.370
10.92

962
9.501
9.388
7.809
5.618
4.382
10.95

940
9.479
9.390
7.811
5.622
4.378
10.94

928
9.462
9.389
7.810
5.620
4.380
10.95

898
9.437
9.389
7.810
5.620
4.380
10.95

883
9.422
9.384
7.805
5.610
4.390
10.97

864
9.403
9.409
7.830
5.660
4.340
10.88

<p> $.840$ 9.379 9.392 7.813 5.626 4.374 10.93 </p>	<p> $.819$ 9.358 9.401 7.822 5.644 4.356 10.89 </p>	<p> $.801$ 9.340 9.395 7.816 5.632 4.368 10.92 </p>	<p> $.784$ 9.323 9.378 7.799 5.598 4.402 11.00 </p>
<p> $.754$ 9.293 9.381 7.802 5.664 4.396 10.99 </p>	<p> $.743$ 9.282 9.371 7.792 5.584 4.416 11.04 </p>	<p> $.723$ 9.262 9.378 7.799 5.598 4.402 11.00 </p>	<p> $.616$ 9.155 9.373 7.794 5.588 4.412 11.03 </p>
<p> $.520$ 9.059 9.389 7.810 5.620 4.380 10.95 </p>	<p> $.418$ 8.957 9.377 7.798 5.596 4.404 11.01 </p>	<p> $.330$ 8.869 9.392 7.813 5.626 4.374 10.93 </p>	
<p> 9.325 7.746 5.492 4.508 11.27 </p>	<p> 9.360 7.781 5.562 4.438 11.09 </p>	<p> 9.366 7.787 5.574 4.426 11.06 </p>	<p> 9.360 7.781 5.562 4.438 11.09 </p>
<p> 9.361 7.782 5.564 4.436 11.09 </p>	<p> 9.358 7.779 5.558 4.442 11.10 </p>	<p> 9.358 7.779 5.558 4.442 11.10 </p>	<p> 9.371 7.792 5.594 4.416 11.04 </p>
<p> 9.362 7.783 5.566 4.434 11.08 </p>	<p> 9.368 7.789 5.578 4.422 11.05 </p>	<p> 9.365 7.786 5.572 4.428 11.07 </p>	<p> 9.343 7.764 5.528 4.472 11.18 </p>
<p> 9.357 7.778 5.556 4.444 11.11 </p>	<p> 9.345 7.766 5.532 4.468 11.17 </p>	<p> 9.361 7.782 5.564 4.436 11.09 </p>	<p> 9.343 7.764 5.528 4.472 11.18 </p>

9.337 7.751 5.516 4.424 11.21	9.366 7.787 5.574 4.426 11.06	9.376 7.797 5.594 4.406 11.01	9.366 7.787 5.5714 4.426 11.06
9.365 7.786 5.572 4.428 11.07	9.346 7.767 5.534 4.446 11.11	9.355 7.776 5.552 4.448 11.12	9.354 7.775 5.550 4.450 11.12
9.374 7.795 5.590 4.410 11.02	9.347 7.768 5.536 4.464 11.16	9.347 7.768 5.536 4.464 11.16	9.355 7.776 5.552 4.448 11.12
9.368 7.789 5.578 4.422 11.05	9.354 7.775 5.550 4.450 11.12	9.370 7.791 5.582 4.418 11.04	9.361 7.782 5.564 4.436 11.09
9.348 7.769 5.538 4.462 11.15	9.367 7.788 5.576 4.424 11.06	9.360 7.781 5.562 4.438 11.09	9.342 7.763 5.526 4.474 11.18
9.374 7.795 5.590 4.410 11.02	9.355 7.776 5.552 4.448 11.12	9.367 7.784 5.574 4.426 11.06	

$$\begin{array}{r}
 111 \\
 10 \\
 \hline
 220 \\
 22211 \\
 \hline
 21086 \\
 39/43297 \quad 1110 \\
 \hline
 39 \\
 39 \\
 \hline
 78 \\
 78 \\
 \hline
 78
 \end{array}$$

$$\begin{array}{r}
 -81 \\
 +78 \\
 \hline
 -3
 \end{array}$$

$$\begin{array}{r}
 169 \quad 72 \\
 \hline
 209 \quad 220 \\
 \hline
 72 \\
 220 \\
 \hline
 221.52 \\
 39/159 \quad 41 \\
 \hline
 156 \quad 30
 \end{array}$$

$$\begin{array}{r}
 -104 \\
 +89 \\
 \hline
 191 \\
 39/191 \quad 49 \\
 \hline
 156 \\
 350 \\
 \hline
 351
 \end{array}$$

Photometric Work.

Photometer I. (U bbs.)

9.372
7.793
5.526
4.414
11.03

9.365
7.789
5.575
4.422
11.05

9.339
7.760
5.520
4.480
11.20

9.337
7.758
5.516
4.484
11.21

9.339
7.760
5.520
4.450
11.20

9.363
7.784
5.568
4.432
11.05

9.354
7.775
5.550
4.450
11.12

9.376
7.797
5.594
4.406
11.01

9.364
7.788
5.576
4.424
11.06

9.372
7.793
5.586
4.414
11.03

9.373
7.794
5.588
4.412
11.03

9.364
7.785
5.570
4.430
11.07

9.369
7.790
5.580
4.420
11.05

9.365
7.786
5.572
4.428
11.07

9.365 do.

9.364
7.785
5.570
4.430
11.07

9.374
7.795
5.590
4.410
11.02

9.365
7.789
5.578
4.422
11.05

9.379
7.800
5.600
4.400
11.00

9.358
7.779
5.588
4.442
11.10

9.375
7.799
5.598
4.402
11.00

9.361
7.782
5.564
4.436
11.09

9.388
7.809
5.618
4.382
10.95

9.357
7.778
5.586
4.444
11.11

9.347
7.765
5.536
4.464
11.16

9.349
7.770
5.540
4.460
11.15

9.366
7.784
5.564
4.436
11.09

9.385
7.806
5.612
4.388
10.97

9.370 7.791 5.582 4.418 11.04	9.372 7.793 5.586 4.414 11.03	9.370 7.791 5.582 4.418 11.04	9.352 7.773 5.546 4.454 11.13
9.365 7.786 5.572 4.428 11.07	9.360 7.781 5.562 4.438 11.09	9.355 7.776 5.552 4.448 11.12	9.350 7.771 5.542 4.458 11.14
9.376 7.794 5.594 4.406 11.01	9.357 7.778 5.556 4.444 11.11	9.353 7.774 5.548 4.452 11.13	

Conjunction of Jupiter and Saturn,
 1878. Dec. 30. $3^h 13^m 5^s$ Sid. time (Sat. - Jupiter = +1.75)
 $\Delta \text{Dec.} = -41.3$
 " " $3^h 20^m 45^s$ " " (Sat. - Jap.) $\Delta \text{R.A.} = +1.78$
 " " $3^h 24^m 52^s$ " " " " $\Delta \text{R.A.} = +2.12$
 $\Delta \text{Dec.} = -42.0$
Approx. time of Con. = $3^h 0^m$ Sid. time, = Dec. 29. 15^h M. S.

Assumed time of conjunction Dec 29. 16^h C.M.T.

$24/4.74(20$
 $\begin{array}{r} 24 \\ 216 \\ \hline 194 \end{array}$
 Mean daily motion of Jupiter = 4.538036
 Sid. period of rev. of Jupiter = 79.33
 Long. of Greenwich from Washington = $-5^h 4^m 12.512$
 " " Cambridge " " = $-0^h 23^m 41.11$
 " " " " Greenwich = $-4^h 44^m 31.01 = -4.74$
 Long. of Cambridge from Washington = $-0^h 23^m 41.11$

13.67	13.20	12.89	2.13	1.80	394	648	3.22	2.76	2.34
2.734	2.64	2.578	2.426	2.36	1.782	1.682	.644	.552	.448
.58	.46	4.93	4.85	4.53	3.03	2.34	1.90	1.50	
.116	.092	.986	.970	.906	.606	.468	.380	.300	
1.34	54	10.35	4.81	4.13	2.09	1.71	1.49	1.14	.91
.268	.108	2.07	.962	.826	.418	.342	.298	.228	.182
4.41	4.41	4.08	4.07	3.83	2.90	3.53	3.14	3.85	
.882	.8	.816	.814	.766	.580	.706	.628	.770	
1.49	1.61		2.3	2.69					
.298	.322			.538					

1.81
3.02

$$\begin{array}{r}
 79 \\
 135 \\
 22 \\
 \hline
 20 \\
 218.49 \\
 208.17 \\
 \hline
 39/426.66 \quad (10.94) \\
 39 \\
 366 \\
 351 \\
 \hline
 156 \\
 156 \\
 \hline
 81
 \end{array}$$

$$\begin{array}{r}
 41 \\
 30 \\
 \hline
 81
 \end{array}$$

$$\begin{array}{r}
 77 \\
 124 \\
 5 \\
 \hline
 19 \\
 208.17 \\
 \hline
 39/162 \quad (4.2) \\
 156 \\
 608 \\
 739 \\
 \hline
 21
 \end{array}$$

Mean time = Sid. time - R. A. Mean Sun.

$$3^h = \text{Sid. time.}$$

$$1^h 35^m 10.52 = \text{R. A. Mean Sun Dec. 30.}$$

$$8^h 24^m 49.48$$

$$- 1^h 22.70 = \text{Corr. for } 8^h 24^m 49.48$$

$$- 46.72 = 9^h 55.65 \times 4^h 44.5$$

Dec. 30. $8^h 22^m 40.06 = \text{mean time of inferior conjunction of Jupiter.}$

$$\text{R. A. Saturn Dec. 30. } 8^h 23^m = 23^h 52^m 45.12$$

$$\text{" " Oct. 12. } 0^h 23^m = 23^h 56^m 47.38$$

$$4^h 2.26$$

$$\bullet = .1$$

$$\circ = 2$$

$$- = 4$$

~~~~~

$$\begin{array}{r} 0.0660 \\ 9.165K \\ \hline 9.231K \\ 0.7626 \end{array}$$

170

32.7

8.9

8.1

14.0

4.6

33.6

14.6

29.1

---

8/145.6

18.2

26.4

---

44.6

22.3

---

66.90

33.45



$$4^m \quad 2^s.26 = 4^m.04 = 1^s.06$$

$$360^\circ - 1.01 = 358.99$$

$$\frac{360}{358.99} \times 79.33 = 79.55$$

$$\text{Log. } 360 = 2.55630$$

$$\text{" } 79.33 = \frac{1.89944}{4.45574}$$

$$\text{" } 358.99 = \frac{2.55508}{1.90066}$$

$$\text{" } 79.55 =$$

$$\left( \text{Dec. } 30, \text{ rh } 23^m \right) - 79.55 =$$

$$\text{Oct. } 11.80 = \text{time inf. con. Jupiter.}$$

$$\text{R. A. Saturn July } 24.47 = 0^h \quad 14^m \quad 10.00$$

$$\text{" " Oct. } 11.80 = \frac{23^h \quad 56^m \quad 47.15}{17^m \quad 22.45}$$

$$17^m \quad 22.45 = 4.34$$

$$360 - 4.34 = 355.66$$

$$\frac{360}{355.66} \times 79.33 = 80.30$$

$$\text{Log. } 360 \times 79.33 = 4.45574$$

$$\text{" } 355.66 = \frac{2.55103}{1.90471}$$

$$\text{" } 80.30 =$$

$$\text{July } 23.50 (1878) = \text{time inf. con. Jupiter.}$$

$$\text{Dec } 30 \quad \gamma$$

$$29 \quad \frac{18}{15h} = 3^\circ$$

$$\frac{15}{24} \quad 69^m$$

R. A. Saturn. Dec. 30.  $23^m = 23^h 52^m 45^s.12$

" " Oct. 12.  $0^h 23^m = 23^h 56^m 43^s.65$   
 $3^m 58^s.73$

$$3^m 58^s.73 = 0.99$$

$$\frac{360}{360.99} \times 79.33 = 79^d.11$$

Time of inf. con. of Saturn  
 = Oct. 12.24

$$\text{Log. } 360 = 2.55630$$

$$\text{" } 79.33 = 1.89944$$

$$\text{" } 360.99 = 2.55750$$

$$79.11 = 1.89824$$

R. A. Sat. Oct. 12.24 =  $23^h 56^m 40^s.39$

" " July 24.91 =  $0^h 14^m 8^s.58$   
 $17^m 28^s.19$

$$17^m 28^s.19 = 4.37$$

$$\frac{360}{364.37} \times 79.33 = 78^d.38$$

Time of inf. con. of  
 Saturn = July 25.86

$$\text{Log. } (360 \times 79.33) = 4.45574$$

$$\text{" } 364.37 = 2.56154$$

$$\text{" } 78.38 = 1.89420$$

$$a^2 = a^2 e^2 + b^2$$

$$a^2 (1 - e^2) = b^2 \quad a^2 = \frac{b^2}{1 - e^2} \quad (1 - e^2) = \frac{b^2}{a^2}$$

$$\pi a b = \pi b \frac{b}{\sqrt{1 - e^2}} = \frac{\pi b^2}{\sqrt{1 - e^2}}$$

$$\pi a b = \frac{\pi b^2}{\sqrt{1 - e^2}} = \frac{a}{b} \pi b^2$$

$$\sqrt{1 - e^2} = \frac{b}{a}$$



$.927 = \text{Polar diam. Sat.} - \text{Eq. diam. being taken as 1.}$

$$\text{Log. } .927 = 9.9671$$

$$1.0787 = \frac{10.}{0.0329} \quad \text{being taken as 1.}$$

$1.0787 = \text{Eq. diam.} - \text{polar diam.}$

$$\text{Hence } \frac{a}{b} = 1.0787 + \frac{\text{Log. } 1.0787}{.4} =$$

cor. for Saturn to a sphere having area corresponding to polar diam.

$$\text{Log. } 1.0787 = 0.0329 + \div .4 = -.082 = \text{Cor. in mag. for ball,}$$

$$162''8 = 2.2116$$

$$146''3 = 2.1653$$

$$\text{Newcomb} = 1.113$$

$$\frac{0.0463}{1.0} = .12 \text{ mag.}$$

Jupiter.

$$\text{Polar comp. by mean} = \frac{1}{16.84}$$

$$\text{Log. } 16.84 = 1.22634$$

$$15.84 = 1.19976$$

$$1.0631 = 0.02658$$

Ratio by Newcomb.

$$195''8 = 2.29181$$

$$184''2 = 2.26529$$

$$1.0630 = 0.02652$$

$$0.02652 \div .4 = .07 \text{ mag. subtracted.}$$

$$147. = 365.26 \quad \text{Oct. 12.24 1877.}$$

$$- 365.26$$

$$\text{Oct. 11.98 1877.}$$

$$- 31.39$$

$$\text{Sept. 10.59 1877}$$

$$79.33 \times 5 = 396.65$$

$$365.26$$

$$31.39$$

$$\text{app. R. A. Sat. Oct. 12.24 1878.} = 23^h 56^m 40.39$$

$$\text{" " " Sept. 10.59 1877} = 23^h 15^m 6.81$$

$$41^m - 33.58 = 7.42 \text{ per m.}$$

$$360 - 2.01 = 357.99$$

$$\frac{360}{357.99} \times 79.33 =$$

$$\text{Log. } 360 \times 79.33 = 4.45574$$

$$\text{" } 357.99 = 2.55379$$

$$79.33 = 1.90195$$

$$4.6$$

Camb. time Sup. Cor.  
1<sup>st</sup> Sat. Jup.  
 1877.

$$\text{Oct. 17 } 17^h 30^m = 17^h .5$$

$$\text{Oct. 23 } 0^h 59^m = 1.0$$

$$\text{Sept. 24. } 17^h .1$$

$$\text{Oct. 17. } 17^h .5$$

$$\text{Aug. 4. } 9^h .6$$

$$\text{" } 7. \quad 22^h .5$$

$$\text{" } 11. \quad 11.4$$

$$\text{Sept. 24. } 17^h .1$$

$$\text{Oct. 15. } 22^h .0$$

$$\text{Aug. 8. } 22^h .5$$

1<sup>st</sup> Sat. Jupiter,  
 Log.  $203.489 = 2.30854$

$$\text{" } 24 = \underline{1.38021}$$

$$\text{" } 8.48 = 0.92833$$

Better still —

$$-23.7^m = \text{Long. Camb. from Wash.}$$

$$\text{Log. } 23.7 = 1.37475$$

$$\text{" } 60 = \underline{1.77815}$$

$$9.59660$$

$$\text{" } 8.48 = \underline{0.92833}$$

$$= 0.52493 = 3.3 = \text{motion } 1^{\text{st}} \text{ Sat. in time}$$

corresponding to  $23.7$

Then  $180^\circ - 3.3 = 176.7 = \text{Corr. quantity to be used with}$   
Wash. time Sup. Cor. to ob-  
tain Sup. Cor.

2<sup>d</sup> Satellite (Jupiter)

$$101.375 = 2.00593$$

$$24 = \underline{1.38021}$$

$$\text{Hor. mot.} = 4.2250.62572$$

$$9.59660$$

$$0.22232 = 1.67 = \text{mot. Sat. in } 23.7$$

$$180 - 1.7 = 178.3$$



Jupiter's 3<sup>d</sup> Sat.

$$\text{Log. } 50.318 = 1.70172$$

$$\text{" } 24 = 1.38021$$

$$2.70 = 0.32151$$

$$9.59660$$

$$0.83 = 9.91811$$

mean. mot. 3<sup>d</sup> Sat. for 23.7

$$180 - 0.8 = 179.2$$

Jupiter's 4<sup>th</sup> Sat.

$$\text{Log. } 21.571 = 1.33387$$

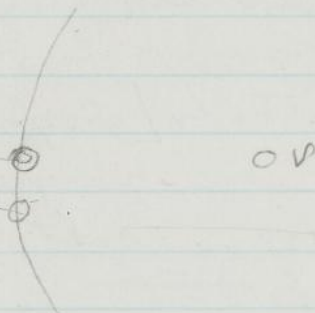
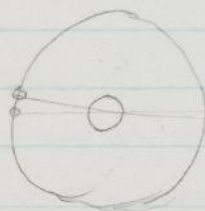
$$\text{" } 24 = 1.38021$$

$$9.95366 = 0.9 = \text{motion Sat. in 1 hour.}$$

$$9.59660$$

$$9.55026 = 0.4 = \text{mot. Sat. in } 23.7$$

$$180 - 0.4 = 179.6$$



| 1877.     |      |       |       |       |
|-----------|------|-------|-------|-------|
| Aug. 11.  | 14.0 | 17.7  | 17.2  | 10.0  |
|           |      | 14.4  | 72.   | 16.1  |
|           |      | 18.4  | 12.6  | 1     |
| " 28.     | 6.6  | 180.1 | 102.8 | 186.0 |
| Sept. 14. | 0.1  | 18.0  | 16.4  | 17.7  |
|           |      | 120   | 120   | 96.   |
| " 30.     | 18.4 | 18.4  | 5.8   | 18.4  |
|           |      | 156.4 | 156.2 | 132.1 |
| Oct. 17.  | 13.6 | 10.4  |       |       |
|           |      | 6.5   |       |       |
| Nov. 3.   | 9.3  | 16.9  | 16.7  | 10.4  |
|           |      |       | 18.4  | 6.4   |
| Nov. 20.  | 5.5  |       | 25.1  | 17.2  |

1878.

Oct. 4. 8<sup>h</sup> 3

14.7

3.3

- 17.8

" 21. 2.0

72

144

144

Nov. 6. 20.7

88.7

6.2

2

" 23. 16.0

153.5

163.8

15.7

15.7

17.6

21.4

17.2

17.9

17.5

16.1

20.7

21.0

38.2

187.9

Satellites (Comp. <sup>with exception of hour.</sup> with proof - longitudes - maps. - Red. to polar diam.

Other Sat. of Saturn (Comp and maps. - Red. to polar diam.

Satellites of Jup. (Comp - Longitudes - maps. - Red. to pol. diam.

Faint Stars (Comp. & maps. finished -

Asteroids [Comp. (Vesta, Ceres, + Pallas not fully comp. and radii inserted from best proof, in pencil. - maps.

Uranus,

$$120 = 2.07918$$

$$1910 = 3.28103$$

$$15.92 = 1.20185$$

$$\sqrt{1910} = 43.7$$

$$23.5 = 41.11$$

$$4^h 44^m 31.01$$

$$60/44.52 = 1.35$$

$$4.74 = 0.67578$$

$$1.20185$$

$$75.4 = 1.87763$$

$$180.1$$

$$255.4 = \text{Cor. given.}$$

to be used,  
in connection  
with given time



## Mimas.

## Enceladus.

Sept. 25 9.8

3.408

$$\begin{array}{r} 1146 \\ 155.9 \\ 255.4 \\ 115.31 \\ \hline 1675.6 \\ 1440 \\ \hline 236 \\ 45 \end{array}$$

4 7.6

4.317

$$\begin{array}{r} 1211 \\ 309.2 \\ \hline 2213.7 \\ 2160 \\ \hline 59.7 \\ 64 \end{array}$$

2 9.9

2.412

$$\begin{array}{r} 157.4 \\ 139.30 \\ \hline 1316.1 \\ 1080 \\ \hline 236.1 \\ 32 \\ \hline 6.86 \\ 14.31 \\ \hline 282.0 \end{array}$$

$$\begin{array}{r} 139.3 \\ 147.8 \\ \hline 1688.5 \\ 1440 \\ \hline 248.5 \\ 3.18 \\ \hline 251.7 \end{array}$$

$$\begin{array}{r} 359.02 \\ 132.2 \\ \hline 1510.6 \\ 1440 \\ \hline 70.6 \end{array}$$

2-7.9

2.329

$$\begin{array}{r} 764 \\ 125.7 \\ 199.1 \\ \hline 1344.2 \\ 1080 \\ \hline 264 \end{array}$$

$$\begin{array}{r} 3 \quad 6.3 \\ 45 \\ \hline 3.262 \quad 158 \\ 60 \end{array}$$

$$\begin{array}{r} 359.0 \\ 106.1 \\ \hline 1860.5 \\ 1800 \\ \hline 60.5 \\ 11.13 \\ \hline 71.6 \end{array}$$

$$\begin{array}{r} 60.5 \\ 15.92 \\ 3.18 \\ \hline 79.6 \end{array}$$

$$\begin{array}{r} 60.5 \\ 76.4 \\ 7.96 \\ \hline 84.4 \end{array}$$

$$\begin{array}{r} 234.65 \\ 85.5 \\ \hline 1340.6 \\ 1080 \\ \hline 260 \end{array}$$

$$\begin{array}{r} 24/9.3(327) \\ 9.3 \\ \hline 2370 \\ 1980 \\ \hline 1680 \end{array}$$

3.387

$$\begin{array}{r} 24/9.3(346) \\ 9.3 \\ \hline 2370 \\ 1980 \\ \hline 140 \\ 144 \end{array}$$

$$\begin{array}{r} 309.14 \\ 572.07 \\ 61.93 \\ 180. \\ 37.64 \\ \hline 1169.49 \\ 1080 \\ \hline 89.0 \end{array}$$

$$\begin{array}{r} 0.89982 \\ 4.74=0.67575 \\ 37661.57560 \end{array}$$

$$\begin{array}{r} 5/1313.6 \\ 262.7 \text{ per day.} \end{array}$$

$$\begin{array}{r} \text{Log. } 262.7 = 2.41946 \\ 24 = 1. \end{array}$$

$$\begin{array}{r} \text{Log. } 1313.6 = 3.118463 \\ " \quad 120 = 2.079181 \\ \text{per hour } 10.95 = 1.039282 \end{array}$$

$$\begin{array}{r} \text{Log. } 4.74 = 0.67575 \\ 1.03928 \\ \hline 51.9 = 1.71506 \\ 231.9 \end{array} \quad 2.417$$

$$\begin{array}{r} 127.33 \\ 109.7 \\ \hline 994.3 \\ 720 \\ \hline 274.3 \\ 218 \\ \hline 276.48 \\ 274.3 \\ 3.27 \\ \hline 7.6 \end{array}$$

$$\begin{array}{r} 24/7.5(325) \\ 7.5 \\ \hline 2250 \\ 60 \\ \hline 45 \\ 120 \\ \hline 3.325 \end{array}$$

## Tethys.

$$\begin{array}{r} 5/953.46 \\ 24/190.69 \text{ per day.} \\ 168 \\ \hline 226 \\ 216 \\ \hline 100 \end{array}$$

(7.94 per day)

$$\begin{array}{r} 7.94 \\ 7.5 \\ \hline 635.2 \\ 555.5 \\ \hline 6.932 \end{array}$$

$$\begin{array}{r} 7.94 = 0.89982 \\ 4.44 = 0.67575 \\ 35.3 = 1.54720 \end{array}$$

Dis.

$$\begin{array}{r}
 143.98 \\
 364.59 \\
 4274 \\
 180. \\
 25.98 \\
 \hline
 817.29 \\
 720 \\
 \hline
 97.
 \end{array}$$

$$\begin{array}{r}
 5/657.67 \\
 24/131.58 \text{ per day.} \\
 120 \\
 \hline
 115 \\
 96 \\
 \hline
 193 \\
 192 \\
 \hline
 \end{array}
 \quad (5.48 \text{ per hour.})$$

$$\begin{array}{r}
 24.24 \quad 24/7.8(325 \\
 60 \\
 48 \\
 \hline
 120 \\
 24.225
 \end{array}$$

$$\begin{array}{r}
 4.74 = 0.67578 \\
 5.48 = 0.75878 \\
 \hline
 1.41456
 \end{array}$$

$$\begin{array}{r}
 5.48 \\
 7.8 \\
 \hline
 4384 \\
 3836 \\
 \hline
 42744
 \end{array}$$

Rhea

$$\begin{array}{r}
 210.61 \\
 239.07 \\
 25.90 \\
 180. \\
 15.73 \\
 \hline
 671.31 \\
 341
 \end{array}$$

$$\begin{array}{r}
 5/398.47 \\
 24/79.69(3.32 \\
 72 \\
 720 \\
 \hline
 49
 \end{array}
 \quad 24/7.8(325$$

Table for Red. to polar diam. (Saturn)

Arg. = Elev. of Earth above plane of ring.

$$\left. \begin{array}{l}
 \text{From } 0^\circ \text{ to } 1^\circ 14' = 0 \text{ mag.} \\
 \text{" } 1^\circ 14' \text{ to } 3^\circ 48' = 1 \text{ " } \\
 \text{" } 3^\circ 48' \text{ --- } = 2 \text{ " }
 \end{array} \right\}$$

+ .05 for Ellip.

Total subtractive,

$$1.104$$

$$\begin{array}{r}
 37.95 = 1.579 \\
 9.305 \\
 \hline
 7.726 \\
 5.452
 \end{array}$$

$$\begin{array}{r}
 9.305 \\
 1.579 \\
 \hline
 7.726 \\
 5.452
 \end{array}$$

$$\begin{array}{r}
 1.579 \\
 9.312 \\
 \hline
 7.733 \\
 5.466
 \end{array}$$



## Constant of G. (Table IX.)

|                                                                                             |                                                                                          |                                                                                          |                                                                                          |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| $\begin{array}{r} 9.312 \\ 1.563 \\ \hline 7.749 \\ 5.498 \\ 4.502 \\ 11.25 \end{array}$    | $\begin{array}{r} 9.305 \\ 1.563 \\ \hline 7.742 \\ 5.494 \\ 4.516 \\ 11.29 \end{array}$ | $\begin{array}{r} 9.369 \\ 1.579 \\ \hline 7.790 \\ 5.590 \\ 4.420 \\ 11.05 \end{array}$ | $\begin{array}{r} 9.360 \\ 1.579 \\ \hline 7.781 \\ 5.562 \\ 4.438 \\ 11.09 \end{array}$ |
| $\begin{array}{r} \log \frac{f}{H} = \\ 8.539 \\ 37.95 = 1.579 \\ \hline 0.118 \end{array}$ | $\begin{array}{r} 9.347 \\ 7.784 \\ 5.568 \\ 4.432 \\ 11.01 \end{array}$                 | $\begin{array}{r} 9.355 \\ 7.795 \\ 5.590 \\ 4.410 \\ 11.02 \end{array}$                 | $\begin{array}{r} 9.402 \\ 7.839 \\ 5.678 \\ 4.322 \\ 10.80 \end{array}$                 |
| $\begin{array}{r} 9.362 \\ 7.799 \\ 5.598 \\ 4.402 \\ 11.00 \end{array}$                    | $\begin{array}{r} 9.343 \\ 7.780 \\ 5.560 \\ 4.440 \\ 11.10 \end{array}$                 | $\begin{array}{r} 9.372 \\ 7.809 \\ 5.618 \\ 4.382 \\ 10.95 \end{array}$                 |                                                                                          |

Jan 25. 1877. app. Disc diam. = .923

$$\begin{array}{r} \log .923 = 9.9652 \\ 9.9826 \end{array}$$

Jan. 25. 1878. app. disc diam = .885

$$\begin{array}{r} .887 \\ .875 \\ \hline .012 \end{array}$$

$$\begin{array}{r} 9.9469 \\ 9.9734 \end{array}$$

Jan. 25. '78. rev. diam diam = 3.8

$$\begin{array}{r} \log 7.6 = 0.8808 \\ 9.9734 \end{array}$$

$$7.15 - 0.8542$$

$$9.9420$$

$$\begin{array}{r} 9.9395 \\ 0.0605 \\ \hline 1 \end{array}$$

$$\log. 12.70 = 1.1038 \quad 1.104$$

$$\begin{array}{r} .363 \\ \hline 9.5599 \\ 0.6637 \end{array} \quad \begin{array}{r} 9.560 \\ 0.664 \end{array}$$

$$\begin{array}{r} 7.1 \\ \hline 0.1515 \\ 9.8122 \end{array} \quad \begin{array}{r} 0.151 \\ 9.813 \end{array}$$

$$\begin{array}{r} 9.477 \\ 37.95 = 1.579 \\ \hline 7.898 \\ 5.796 \\ 4.204 \\ 10.51 \end{array} \quad \begin{array}{r} 9.412 \\ 1.579 \\ \hline 7.833 \\ 5.666 \\ 4.334 \\ 10.23 \end{array}$$

$$\begin{array}{r} 36 \\ 27 \\ \hline 81 \\ 18406 \\ \hline 10.51 \end{array}$$

$$\begin{array}{r} 17/16.61 (.98 \\ \hline 153 \\ 131 \\ 126 \end{array}$$

$$\begin{array}{r} 112 \\ 91 \\ \hline 157 \\ 16722 \\ 31 \\ 16 \\ 38 \end{array} \quad \begin{array}{r} -06 \\ 9.94 \\ 3.976 \end{array}$$

$$\begin{array}{r} 53.18 \\ 10.64 \\ \hline 10.94- \\ 84.06- \\ 22.34- \\ 53.18- \\ 40.26- \\ 40.04- \\ 62.97- \\ \hline 31314.39 \\ 10.48 \end{array}$$

$$\begin{array}{r} 26/207.13 / 7.97 \\ \hline 182 \\ 251 \\ 234 \\ 173 \end{array}$$

Photometer E,

For all readings preceding Nov. 16, 1877, the corr. = 14.74

" " " after " " " " = 14.67



## Bright Double Stars.

|                         |                         |                           |                          |                           |                                                                          |
|-------------------------|-------------------------|---------------------------|--------------------------|---------------------------|--------------------------------------------------------------------------|
| 3.328<br>6.672<br>2130. | 3.924<br>6.076<br>5390. | 1.440<br>6.560<br>275.0   | 1.700<br>6.300<br>50.101 | 2.648<br>7.352<br>445.0   | 2.554<br>7.416<br>384.0                                                  |
| 1.308<br>6.692<br>2030  | 1.540<br>6.460<br>34.70 | 0.080<br>9.920<br>1200    | 2.028<br>7.972<br>107.0  | 0.384<br>9.616<br>242.0   | 2.628<br>7.372<br>425.0                                                  |
| 2.668<br>7.332<br>466.0 | 1.784<br>6.216<br>60.80 | 1.924<br>6.076<br>83.90   | 2.144<br>7.856<br>139.0  | 2.368<br>7.632<br>233.0   | <del>1.024</del><br><del>7.976</del><br>9.94<br>3.976<br>6.024<br>946.0. |
| 1.004<br>6.996<br>10.10 | .360<br>9.640<br>2.290  | 1.140<br>X 8.860<br>13.80 | 1.304<br>8.696<br>20.10  | 1.040<br>8.960<br>11.00   | 1.228<br>8.772<br>16.90                                                  |
| 1.756<br>8.744<br>18.00 | 1.084<br>8.916<br>12.10 | 1.044<br>8.956<br>11.10   | .696<br>9.304<br>4.970   | .624<br>9.376<br>4.210    | 2.020<br>7.980<br>105.0                                                  |
| 2.672<br>7.328<br>470.0 | .904<br>9.096<br>8020   | 1.372<br>8.628<br>23.50   | 1.124<br>8.176<br>66.70  | 1.104<br>8.896<br>12.70   | 2.256<br>7.744<br>180.0                                                  |
| .988<br>9.012<br>9.730  | 1.896<br>8.104<br>78.70 | 1.164<br>8.836<br>14.60   | 2.316<br>7.684<br>207.0  | 2.168<br>X 7.832<br>147.0 | .436<br>9.564<br>2.730                                                   |
| 1.636<br>8.364<br>4320  | 1.852<br>8.148<br>71.10 | 1.928<br>8.072<br>84.70   | 1.300<br>8.700<br>200.0  | 1.316<br>8.684<br>20.70   | 1.652<br>8.348<br>44.90                                                  |

## Bright Double Stars.

|                            |                       |                       |                       |                       |                       |
|----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 248<br>9752<br>1770        | 2504<br>7496<br>319.0 | 552<br>9448<br>3560   | 1968<br>8032<br>92.90 | 1496<br>8504<br>31.30 | 2108<br>7492<br>124.0 |
| 3812<br>6188<br>6490.      | 1310<br>8620<br>24.00 | 1168<br>8832<br>14.70 | 2484<br>7516<br>305.0 | 1048<br>8952<br>11.20 | 340<br>9660<br>2190   |
| 1476<br>8524<br>29.90      | 1948<br>8052<br>88.70 | 1568<br>8432<br>37.00 | 1176<br>8824<br>15.00 | 1052<br>8948<br>11.30 |                       |
| X<br>2500<br>7500<br>316.0 | 2516<br>7484<br>328.0 | 848<br>9152<br>7.050  | 1740<br>8260<br>54.90 | 1760<br>8240<br>57.50 | 760<br>9240<br>5750   |
| 2868<br>7132<br>738.0      | 584<br>9416<br>3840   | 588<br>9412<br>0.870  | 1048<br>8952<br>11.20 | 060<br>9940<br>11.50  | 368<br>9632<br>2330   |
| 488<br>9512<br>3080        | 604<br>9396<br>4020   | 1812<br>8188<br>64.90 | 1180<br>8820<br>15.10 | 1072<br>8928<br>11.80 | 1164<br>8836<br>1460  |
| 2136<br>7464<br>136.0      | 844<br>9156<br>6980   | 3152<br>6248<br>1420. | 928<br>9072<br>8470   | 860<br>9140<br>7.240  |                       |
|                            |                       |                       |                       |                       | X                     |



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Adopted Constants.

5 in. ap.

[illegible]



|                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                      |                                                                                             |                                                                                             |                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <div><div>.064</div><div>8.8062</div><div>1.4252</div><div>7.3810</div><div>.00240</div><div></div><div>8.6902</div><div>1.4262</div><div>7.2640</div><div>.00154</div><div></div><div>8.5315</div><div>1.4192</div><div>7.1122</div><div>.00129</div></div> | <div><div>.058</div><div>8.7634</div><div>1.4252</div><div>7.3382</div><div>.00218</div><div></div><div>8.7076</div><div>1.4262</div><div>7.2814</div><div>.00191</div><div></div><div></div><div></div><div></div><div></div></div> | <div><div>.051</div><div>8.7076</div><div>1.4252</div><div>7.2824</div><div>.00192</div><div></div><div>8.7709</div><div>1.4262</div><div>7.3447</div><div>.00221</div><div></div><div></div><div></div><div></div><div></div></div> | <div><div>.041</div><div>8.6128</div><div>1.4252</div><div>7.1876</div><div>.00154</div><div></div><div>8.5115</div><div>1.4275</div><div>7.0910</div><div>.00123</div><div></div><div></div><div></div><div></div><div></div></div> | <div><div>.049</div><div>8.6902</div><div>1.4262</div><div>7.2640</div><div>.00184</div><div></div><div>8.4150</div><div>1.4281</div><div>6.9869</div><div>.00097</div><div></div><div></div><div></div><div></div><div></div></div> |                                                                                             |                                                                                             |                                                                                             |
| <div><div>7.3810</div><div>7.3382</div><div>7.2824</div><div>7.1876</div><div>7.0910</div><div>7.2640</div><div>7.1122</div><div>7.</div></div>                                                                                                              | <div><div>2.619</div><div>2.662</div><div>2.718</div><div>2.812</div><div>2.736</div><div>2.736</div><div>2.719</div><div>2.655</div><div>2.909</div><div>3.013</div><div>2.888</div></div>                                          | <div><div>13.09</div><div>13.31</div><div>13.59</div><div>14.06</div><div>13.61</div><div>13.61</div><div>13.60</div><div>13.27</div><div>14.55</div><div>15.06</div><div>14.44</div></div>                                          | <div><div>114.64</div><div>73.16</div><div>141.87.40 (10.43)</div><div>74</div><div>72</div><div>60</div></div>                                                                                                                      | <div><div>.0255</div><div>1020</div><div>.0357</div><div>.00845</div><div>.05070</div><div>106760</div><div>.0282</div><div>1410</div><div>.0423</div><div>.0422</div><div>.0844</div><div>422</div><div>.08862</div></div>          |                                                                                             |                                                                                             |                                                                                             |
| <div><div>9.221</div><div>7.658</div><div>5.316</div><div>4.684</div><div>11.71</div></div>                                                                                                                                                                  | <div><div>8.222</div><div>6.659</div><div>3.318</div><div>6.682</div><div>16.70</div></div>                                                                                                                                          | <div><div>9.211</div><div>7.648</div><div>5.296</div><div>4.704</div><div>11.76</div></div>                                                                                                                                          | <div><div>8.212</div><div>6.649</div><div>3.298</div><div>6.702</div><div>16.75</div></div>                                                                                                                                          | <div><div>9.278</div><div>7.715</div><div>5.450</div><div>4.570</div><div>11.42</div></div>                                                                                                                                          | <div><div>8.279</div><div>6.716</div><div>3.432</div><div>6.568</div><div>16.42</div></div> | <div><div>9.292</div><div>7.729</div><div>5.458</div><div>4.542</div><div>11.35</div></div> | <div><div>8.293</div><div>6.730</div><div>3.460</div><div>6.540</div><div>16.35</div></div> |
| <div><div>9.435</div><div>7.872</div><div>8.744</div><div>6.256</div><div>10.64</div><div>15.64</div></div>                                                                                                                                                  | <div><div>9.439</div><div>7.876</div><div>5.752</div><div>4.248</div><div>10.62</div></div>                                                                                                                                          | <div><div>9.431</div><div>7.868</div><div>5.736</div><div>4.264</div><div>10.66</div></div>                                                                                                                                          | <div><div>9.412</div><div>7.849</div><div>5.698</div><div>4.302</div><div>10.75</div></div>                                                                                                                                          |                                                                                                                                                                                                                                      |                                                                                             |                                                                                             |                                                                                             |
| <div><div>9.393</div><div>7.830</div><div>5.660</div><div>4.340</div><div>10.85</div></div>                                                                                                                                                                  | <div><div>9.388</div><div>7.825</div><div>5.650</div><div>4.350</div><div>10.87</div></div>                                                                                                                                          |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                      |                                                                                             |                                                                                             |                                                                                             |

664 35  
 $\frac{57}{95}$

.252  
 $\frac{.13}{846}$   
 252  
 .03666

.0255  
 $\frac{1530}{.04060}$

.00282  
 $\frac{.01692}{.0267}$

.0267  
 $\frac{2136}{267}$   
 .21627

.0255  
 $\frac{1020}{.0357}$

.0510  
 $\frac{1275}{.06375}$

.0244  
 $\frac{976}{.03436}$

+0.01

-0.09

.64) +0.05

+0.11

-0.09

+0.14

-0.18

$\sqrt{.35}$

$\pm .07$

+0.01

+0.04

.68) -0.08

+0.02

+0.02

+0.09

-0.08

$\sqrt{.14}$

.01

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.05

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35

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+0.08

(.61) -0.02

+0.05

-0.01

-0.08

+0.13

-0.11

$\sqrt{.24}$

$\pm .05$

-0.06

-0.01

(.59) +0.03

-0.01

+0.03

+0.06

-0.08

$\sqrt{.14}$

$\pm .03$

+0.04

(.53) +0.03

-0.02

-0.04

$\sqrt{.20}$

$\pm .03$

+0.04

-0.06

$\sqrt{.13}$

$\pm .03$

-0.03

-0.02

(.51) +0.05

+0.02

-0.01

+0.04

-0.06

$\sqrt{.13}$

$\pm .03$

-0.01

(.62) -0.02

+0.02

-0.01

+0.04

+0.06

-0.04

$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

+0.02

-0.01

+0.04

+0.06

-0.04

$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

+0.02

-0.01

+0.04

+0.06

-0.04

$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

+0.02

-0.01

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+0.06

-0.04

$\sqrt{.10}$

$\pm .02$

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(.62) -0.02

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$\sqrt{.10}$

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(.62) -0.02

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$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

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(.62) -0.02

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$\sqrt{.10}$

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(.62) -0.02

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(.62) -0.02

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$\sqrt{.10}$

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(.62) -0.02

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$\sqrt{.10}$

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(.62) -0.02

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$\sqrt{.10}$

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(.62) -0.02

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$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

+0.02

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+0.04

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$\sqrt{.10}$

$\pm .02$

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(.62) -0.02

+0.02

-0.01

+0.04

+0.06

-0.04

$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

+0.02

-0.01

+0.04

+0.06

-0.04

$\sqrt{.10}$

$\pm .02$

-0.01

(.62) -0.02

+0.02

-0.01

+0.04



$$\begin{array}{r} +2.37 \\ -2.21 \\ \hline 4.58 \end{array}$$

|         |         |
|---------|---------|
| • +.32  | • - .23 |
| • .01   | • .11   |
| • .14   | • .47   |
| • .28   | • .00   |
| • .10   | • .42   |
| • .52   | • .27   |
| • .33   | • .12   |
| • .32   | • .36   |
| • .54   | • .62   |
| • .46   | • .62   |
| • .31   | • .25   |
| • .09   | • .25   |
| • .66   | • .62   |
| • .20   | • .76   |
| • .22   | • .66   |
| • .384  | • .07   |
| • .198  | • .585  |
| • .1.00 | • .2    |
| • .5.52 | • .5.83 |

|          |      |                  |
|----------|------|------------------|
| 8.58     | 8.99 | <del>70.03</del> |
| 8.40     | 9.32 | 270              |
| 8.62     | 9.04 | II.              |
| 8.49     | 9.16 | 9/93.51          |
| 9.11     | 8.92 | 10.39            |
| 9.23     | 8.96 |                  |
| 9.06     | 8.43 |                  |
| 9.15     | 8.47 |                  |
| 9.46     | 8.91 |                  |
| 9.72     |      |                  |
| 9.08     |      |                  |
| 11/98.90 |      |                  |
| 8.99     |      |                  |

*Vitau*

$$\begin{array}{r} 118.51 \\ 24.81 \\ \hline 142.82 \end{array} \quad (8.40)$$

$$\begin{array}{r} 17/136 \\ 68 \\ 68 \\ \hline 2 \end{array}$$

| 270       | 90        |
|-----------|-----------|
| 10.38     | 10.82     |
| 10.12     | 11.66     |
| 10.24     | 10.03     |
| 10.65     | 10.25     |
| 9.99      | 10.33     |
| 9.85      | 9.79      |
| 12.27     | 9.86      |
| 10.38     | 10.42     |
| 9.72      | 10.32     |
| 10.24     | 10.66     |
| 10.34     | 10.05     |
| 10.72     | 9.71      |
| 12/124.90 | 12/123.30 |
| 10.41     | 10.27     |

|      |      |
|------|------|
| -42  | +43  |
| .46  | .14  |
| .47  | .79  |
| .68  | .38  |
| .12  | .42  |
| .58  | .05  |
| .17  | .18  |
| .24  | .19  |
| .18  | .18  |
| 3.32 | .56  |
|      | 3.32 |

When *Vitau* in ap. or the N. Equatorial has been used - assume a reduction of 2.38 Maps.

*Indicium*

Diff. Map. between 37.95 + 7.65 = 3.48 Maps.

| 90    | 270   | Dis. | 270       | 90    | 270   |
|-------|-------|------|-----------|-------|-------|
| 12.63 | 12.88 | 90   | 10.30     | 11.39 | 11.30 |
| 11.32 | 12.62 | 270  | 10.57     | 11.12 | 11.61 |
| 13.09 | 12.39 | 90   | 10.54     | 11.20 | 11.79 |
| 12.39 | 11.60 | 270  | 10.10     | 11.72 | 12.16 |
| 12.78 | 12.48 | 90   | 11.25     | 11.49 | 11.92 |
| 11.72 | 12.26 | 270  | 10.90     | 10.91 | 12.06 |
| 13.24 | 12.37 | 90   | 10.97     | 11.89 | 11.95 |
| 12.61 | 11.63 | 270  | 10.34     | 11.78 | 12.29 |
| 11.63 | 11.59 | 90   | 10.06     | 11.40 | 12.64 |
| 12.08 | 12.08 | 270  | 10.24     | 10.64 | 12.06 |
|       |       | 90   | 11/114.64 |       | 12.37 |
|       |       | 270  | 10.42     |       | 12.00 |

$$10.7 - (2) + 10.$$

$$20.7 - (2)$$

$$\begin{array}{rcl} \text{Sept. 23} & -3.11 & \\ \text{" 24} & -3.09 & \\ \text{" 25} & -3.06 & \end{array} \left. \vphantom{\begin{array}{r} \\ \\ \end{array}} \right\} + 20.7 = \begin{cases} 17.59 \\ 17.61 \\ 17.64 \end{cases}$$

## Photometer II. (Satellites of Saturn)

| No.             | Date.               | Sat.                | Cov.         | Cov. Cov.    | Mag.             |
|-----------------|---------------------|---------------------|--------------|--------------|------------------|
|                 | 1877.               |                     | (for Sat.)   | (for Mars.)  |                  |
| 247             | Sept. 23.           | Rhea. (Mars.)       | 20.7         | 17.59        | 10.01            |
| 248             | "                   | "                   | "            | "            | 9.93             |
| 260.            | Sept. 24.           | "                   | "            | 17.61        | 9.67             |
| 278.            | " 25.               | "                   | "            | 17.64        | 9.87             |
| 279.            | " "                 | "                   | "            | 17.64        | 9.49             |
| 261.            | " 24                | Dione.              | "            | 17.61        | 10.24            |
| 196.            | " 13.               | Enceladus (Sat.)    | "            |              | 11.92            |
| 197             | " "                 | "                   | "            |              | 12.13            |
| 259             | " 24.               | " (Mars.)           | "            | 17.61        | 12.05            |
| 257             | " "                 | Titan (")           | "            | "            | 7.84             |
| <del>104.</del> | <del>Aug. 24.</del> | <del>" (Sat.)</del> | <del>"</del> | <del>"</del> | <del>11.39</del> |
| 264.            | Sept. 24.           | " (Mars.)           | "            | 17.61        | 8.87             |
| 265.            | " "                 | "                   | "            | "            | 8.81             |
| 181.            | " 11.               | Tethys (Sat.)       | "            |              | 10.97            |
| 182             | " 11.               | "                   | "            |              | 11.01            |
| 249.            | " 23.               | " (Mars.)           | "            | 17.59        | 10.14            |
| 250.            | " 23.               | "                   | "            | "            | 10.43            |
| 258.            | " 24.               | "                   | "            | 17.61        | 10.69            |
| 262.            | " "                 | "                   | "            | "            | 10.52            |
| 263.            | " "                 | "                   | "            | "            | 10.74            |
| 276.            | " 25.               | "                   | "            | 17.64        | 10.39            |
| 277             | " "                 | "                   | "            |              | 10.38            |



Rhea.

Enceladus.

|           |           |           |        |           |       |           |
|-----------|-----------|-----------|--------|-----------|-------|-----------|
| 17.64     | <u>II</u> | 90        | 270    | <u>II</u> | .90   | 270       |
| 7.77      | 47.97     | 10.10     | 9.84   | 3/35.56   | 10.99 | 10.63     |
| 9.87      | 9.59      | 9.81      | 9.44   | 11.85     | 10.67 | 11.64     |
|           |           | 9.54      | 11.29  |           | 11.20 | 11.23     |
|           |           | 10.53     | 9.60   |           |       | 11.88     |
| 17.64     |           | 10.85     | 9.95   | 3/32.86   |       | 11.07     |
| 8.15      |           |           | 9.29   | 10.95     |       | 11.21     |
| 9.49      |           | 50.83     | 9.87   |           |       | 11.35     |
|           |           | 10.17     | 9.53   |           |       | 11.49     |
|           |           |           | 10.22  |           |       | 11.49     |
|           |           |           | 9.53   |           |       | 11.33     |
|           |           |           | 10.11  |           |       | 10/113.32 |
| 108.67    |           |           |        |           |       | 16.33     |
| 2.37      |           |           |        |           |       |           |
| 11/106.29 | (9.66)    | 11/108.67 | (9.88) |           |       |           |
| 99        |           | 99        |        |           |       |           |
| 72        |           | 96        |        |           |       |           |
| 66        |           | 88        |        |           |       |           |
| 69        |           | 87        |        |           |       |           |

No.

Photometer II. (Sat. of Saturn.)

| Tab. 1. | Date.     | Sat.  | Cor.  | Cor. Cor. | Mag.  |
|---------|-----------|-------|-------|-----------|-------|
| 256.    | Sept. 24. | gasp. | Uran. | 20.7      | 17.61 |
| 266.    | "         | "     | "     | "         | 10.47 |
| 267.    | "         | "     | "     | "         | 10.34 |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| .152 | .074 | .091 | .074 | .104 | .061 | .056 | .056 |
| 134  | 64   |      | 64   | 63   | 52   |      |      |
| 78   | 6    |      |      |      |      |      |      |
| .23  | .11  | .08  | .12  | .17  | .10  | .11  | .11  |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| .165 | .056 | .069 | .057 | .022 | .043 | .108 | .130 |
| 154  |      | 56   | 57   |      |      | 61   | 121  |
| 110  |      | 13   | 29   |      |      | 47   |      |
| .21  | .09  | .12  | .15  | .04  | .07  | .12  | .20  |

|      |  |     |     |     |     |  |  |
|------|--|-----|-----|-----|-----|--|--|
| .295 |  |     |     |     |     |  |  |
| 231  |  | 425 | 424 | 425 |     |  |  |
| 64   |  |     |     |     |     |  |  |
| .38  |  | 669 | 670 | 671 | 672 |  |  |

## Photometers.

|            |    |      |   |                                          |
|------------|----|------|---|------------------------------------------|
| Photometer | D. | Red. | = | $\frac{\text{Log. Cosec.}}{2}$           |
| "          | E. | "    | = | $\frac{\text{Log. Read.}}{2}$            |
| "          | G. | "    | = | "                                        |
| "          | I. | "    | = | "                                        |
| "          | H. | "    | = | $\frac{\text{Log. Cotan.}}{2} \times 10$ |
| "          | J. | "    | = | $\frac{\text{Log. Read.}}{2}$            |
| "          | K. | "    | = | $\frac{\text{Log. Cosec.}}{2}$           |
| "          | P. | "    | = | $\frac{\text{Log. Cotan.}}{2}$           |
| "          | B. | "    | = | $\frac{\text{Log. Cotan.}}{2}$           |
| "          | C. | "    | = | $\frac{\text{Log. Cotan.}}{2}$           |
| "          | Q. | "    | = | $2.11 + 5 \log. R. + 2 \text{ mag.}$     |

Form for photometer P =  $b = \frac{5}{X} \log. \text{Cot. } \frac{1}{2} a + 2.00$

## Sat. of Neptune.

Mean daily motion =  $61.25''$

$\text{Log. } 61.25'' = 1.787156$

"  $24. = 0.380211$

$25.52 \text{ per hr.} = 1.406945$

$4^h 44^m 31.01$

$44.52$

$4^h 742$

$344 \quad 33 \quad 34.6$

$305 \quad 10 \quad 5.0$

$587$   
 $246.3$

Sept. 23.

$10.1$   
 $4.74$   
 $14.84$   
 $13$

$1.84 = 0.2648$

$1.4069$

$47.0 = 1.6717$

$52.1$

$14.84$   
 $25.$

$10.16 = 1.00689$

$1.40694$

$259.2 = 2.41353$

$169.3$

$36.0$

$190.7$

$\text{Dec. } 28.4$

$2.6$

$22.56$

$13.548$

$55.16$

$55.708$

$8.4$

$4.74$

$13.14$

$16.14 = 1.20790$

$1.40694$

$2.61484$

$321.92$   
 $10.2$   
 $332.1$

$27.0$   
 $321.9$

$46.9$

$36.9$



Oct. 28.  $\begin{array}{r} 9.6 \\ 4.74 \\ \hline 14.34 \\ 20. \\ \hline \end{array}$   
 $5.66 = 0.75282$   
 $144.4 = 2.15976$   
 $\begin{array}{r} 90. \\ 234.4 \\ \hline 5.10 \\ \hline 239.50 \end{array}$   
 $\begin{array}{r} 234.4 \\ 101.21 \\ \hline 244.6 \end{array}$

~~Nov. 12~~  
 Nov. 12.  $\begin{array}{r} 7.2 \\ 4.74 \\ \hline 11.94 \end{array}$   
 " "  $\begin{array}{r} 12. \\ .06 = 8.77815 \\ 1.53 \quad 0.18509 \\ \hline 270 \\ 268.47 \\ \hline 271.0 \\ 268.5 \\ \hline 273.6 \end{array}$

Oct. 29  $\begin{array}{r} 8.6 \\ 4.74 \\ \hline 13.34 \end{array}$   
 " 28  $\begin{array}{r} 20. \\ 17.34 = 1.23905 \\ 1.40694 \\ \hline 442.6 \quad 2.64599 \\ 360 \\ \hline 82.6 \\ 90 \\ \hline 172.6 \\ 5.10 \\ \hline 177.7 \end{array}$

$\begin{array}{r} 7.66 \\ 268.54 \\ \hline 276.2 \end{array}$

4.54

May, 24.91

$\begin{array}{r} 11.97 \\ 11.94 \\ 11.64 \\ 12.14 \\ \hline 447.72 \\ 11.93 \end{array}$   
 $\begin{array}{r} 10.69 \\ 12.07 \\ 12.17 \\ 12.25 \\ 12.42 \\ 12.56 \\ 12.36 \\ 12.28 \\ 12.28 \\ 12.14 \\ 12.14 \\ 12.04 \\ 11.64 \\ \hline 157.19 \end{array}$   
 $\begin{array}{r} 6.09 \\ 31.41 \\ \hline 43.50 \\ 4.54 \\ \hline 174.00 \\ 217.50 \\ \hline 174.00 \\ 1974900. \end{array}$

Nov. 6.  $\begin{array}{r} 9.8 \\ 4.74 \\ \hline 14.54 \end{array}$   
 " "  $\begin{array}{r} 15. \\ .46 = 9.66276 \\ 11.9 = 1.06970 \\ \hline 270. \\ 258.3 \\ \hline 5.1 \\ \hline 263.4 \\ 258.2 \\ \hline 7.66 \\ \hline 266.0 \end{array}$

$\begin{array}{r} 5.14 \\ 31. \\ 7.41 \\ \hline 43.55 \end{array}$

$\begin{array}{r} 1.63899 \\ 0.65666 \\ \hline 2.29565 \\ 197.6 \end{array}$

$\begin{array}{r} 454 \\ 235 \\ \hline 2270 \\ 905 \\ \hline 11350 \end{array}$

$\begin{array}{r} 157.19 \\ 157.19 \\ \hline 7.1 \\ 6.6 \\ \hline 119 \end{array}$   
 $13) 157.19 (12.09$   
 $\begin{array}{r} 276 \\ \hline 119 \end{array}$   
 $\begin{array}{r} 25.86 \\ 5.14 \\ \hline 31.41 \end{array}$







.860  
9.140

|                        |       |                        |       |                        |       |                         |       |
|------------------------|-------|------------------------|-------|------------------------|-------|-------------------------|-------|
| .49<br>0.196<br>9.604  | 1570  | .38<br>0.152<br>9.648  | 1420  | 5.44<br>2.336<br>7.664 | 217.0 | 10.02<br>4.008<br>5.992 | 10200 |
| 2.32<br>0.928<br>9.072 | 8470  | 6.02<br>2.408<br>7.592 | 256.0 | 4.47<br>1.788<br>6.212 | 61.40 | 0.52<br>0.328<br>9.672  | 2130  |
| 6.91<br>2.764<br>7.236 | 581.0 | 0.01<br>0.004<br>9.996 | 1010  | 5.69<br>2.276<br>7.724 | 119.0 | 5.55<br>2.220<br>7.780  | 166.0 |
| 0.93<br>0.372<br>9.628 | 2350  | 2.53<br>1.012<br>8.988 | 1030  |                        |       |                         |       |

$$\begin{array}{r} .023 \\ 15 \\ \hline 115 \\ 23 \\ \hline 345 \end{array}$$

Silan

Mean daily motion = 22.577

Time of yr. 15.96 days.

Sun App. R. A. Sat. Aug. 1. 1877 = 23h 25m 38.9

$$\begin{array}{r} 23 \ 21 \ 56.10 \\ 3 \ 6.99 \\ \hline 3 \ 16 \end{array}$$

$$\begin{array}{r} 22.577 = 1.35328 \\ 360 = 2.55630 \\ 15.96 = 1.20302 \end{array}$$

$$\begin{array}{r} 4 \ 31 \ 6 \\ 0 \ 7 \ 9 \\ \hline 0 \ 7 \ 9 \end{array}$$

22.577 = 1.35328

24 = 1.38021

per hr. = 0.94 = 9.97307

hr. = 0.016

R.A. Dec. 28.1177 = 23h 5m 34.76

23 25

$$\begin{array}{r} 22 \\ 016 \\ \hline 752 \\ 0.052 \end{array}$$

$$\begin{array}{r} 360 \\ 360.79 \\ \hline \end{array} \times 15.96$$

Log 360 = 2.55630

" 15.96 = 1.20303

3.75933

360.79 = 2.55726

15.92 = 1.20207



$$\log 16.914 = 1.22824$$

$$360 = 2 \cdot \sqrt{56} 30$$

Rev.  $21.2 \text{ days} = 1.32806$

Handwritten calculations on lined paper:

Top left:  $22.577$  and  $227.4$  with a diagonal line through them.

Middle left:  $90302$  and  $1581792$  with a diagonal line through them.

Bottom left:  $159687$  and  $111.72$  with a diagonal line through them.

Right side:  $360$  and  $256$  with a diagonal line through them.

$$\begin{array}{r} 360 \\ 154 \\ \hline 256 \\ 256 \end{array}$$

$$11.38 \times 22.6 = 255.4$$

$$\begin{aligned} 239.4 &= 2.37912 \\ 22.577 &= 1.35366 \\ 5405 &= 3.73278 \\ 15^r + 50 \end{aligned}$$

$$22.577 = 1.353 \underline{66}$$

$$5405 = 3.73278$$

$$1\sqrt{x} + 50$$

$$344^{\circ} 33' 34.6'' = 349.56^{\circ} \quad 350.25^{\circ}$$

$$\begin{array}{r} 99 \\ 256 \end{array} \quad \begin{array}{r} 104 \\ 256 \end{array}$$

$$\frac{27.4}{239.4} = 2.37912$$

$$2.2557 = 1.35328$$

$$\sqrt{400} = 3.73240$$

$$\begin{array}{r} 239.4 \\ 123.0 \\ 2.6 \\ \hline 365.0 \end{array}$$

22

$$\begin{array}{r} 22.577 \\ \times 2.6 \\ \hline 135462 \\ 451156 \\ \hline 587002 \end{array}$$

$$\begin{array}{r} 22.557 \\ \underline{365} \\ 112785 \\ \underline{135342} \\ 67671 \\ \underline{33056} \\ 360823 \\ \underline{720} \\ 360823 \\ \underline{720} \\ 360823 \end{array}$$

$$\begin{array}{r} 14.62 \\ 10.38 \\ \hline 25.00 \end{array}$$

|                  |       |                |       |                |       |                |       |
|------------------|-------|----------------|-------|----------------|-------|----------------|-------|
| 1.296<br>8.704   | 19.80 | 2.828<br>7.172 | 673.0 | 1.312<br>8.688 | 20.50 | 0.740<br>9.260 | 5.490 |
| 2.116<br>7.884   | 131.0 | 2.236<br>7.764 | 172.0 | 2.812<br>7.188 | 649.0 | 0.820<br>9.180 | 6.610 |
| 0.476<br>9.524   | 2.990 | 0.760<br>9.240 | 5.750 | 0.184<br>9.816 | 1.530 | 2.216<br>7.784 | 164.0 |
| 1.068<br>8.932   | 11.70 | 1.412<br>9.588 | 2.580 | 1.088<br>8.912 | 12.20 | 1.720<br>8.280 | 52.50 |
| 0.568<br>9.432   | 37.00 | 2.132<br>7.868 | 136.0 | 0.660<br>9.340 | 45.70 |                |       |
| -0.012<br>10.012 | -1030 | 1.896<br>8.104 | 78.70 | 0.212<br>9.788 | 1630  | 1.052<br>8.948 | 11.30 |
| 1.052<br>8.948   | 11.30 |                |       |                |       |                |       |

705  
 679  
 839  
 643  
 711  
 637  
 377  
 377  
 235  
 340  
 273  
 429  
 146245  
 60  
 24  
 5

Titān

Surf. Corr. Oct. 8. 1848

13.9 S. In. S. 1.866  
 4.74  
 9.16 Chas. time. 519.6  
 6928  
 7499.56

280.23  
 229.23  
 142.71  
 230.65  
 290.35  
 230.69  
 375.96  
 299.40  
 208.25  
 324.05  
 444.90  
 185.64

3242.00



## Equations of condition. (Lapetus) 123

$$l = a \sin V + b \cos V + c$$

|      |                                                    |                                                   |
|------|----------------------------------------------------|---------------------------------------------------|
| 30°  | $705 = (a \cdot 5 + b \cdot 866 + c) \times 5$     | $a \cdot 25 + b \cdot 433 + c \cdot 5 = 3525$     |
| 60°  | $679 = (a \cdot 866 + b \cdot 5 + c) \times 866$   | $a \cdot 750 + b \cdot 433 + c \cdot 866 = 5881$  |
| 90°  | $839 = (a + c) \times 1$                           | $a + c = 839$                                     |
| 120° | $643 = (a \cdot 866 - b \cdot 5 + c) \times 866$   | $a \cdot 750 - b \cdot 433 + c \cdot 866 = 5571$  |
| 150° | $711 = (a \cdot 5 - b \cdot 866 + c) \times 5$     | $a \cdot 25 - b \cdot 433 + c \cdot 5 = 3555$     |
| 180° | $637 = (0 - b + c) \times 0$                       | $= 0$                                             |
| 210° | $377 = (-a \cdot 5 - b \cdot 866 + c) \times -5$   | $a \cdot 25 + b \cdot 433 - c \cdot 5 = -1885$    |
| 240° | $377 = (-a \cdot 866 - b \cdot 5 + c) \times -866$ | $a \cdot 750 + b \cdot 433 - c \cdot 866 = -3261$ |
| 270° | $235 = (-a + c) \times -1$                         | $a - c = -235$                                    |
| 300° | $340 = (-a \cdot 866 + b \cdot 5 + c) \times -866$ | $a \cdot 750 - b \cdot 433 - c \cdot 866 = -2941$ |
| 330° | $273 = (-a \cdot 5 + b \cdot 866 + c) \times -5$   | $a \cdot 25 - b \cdot 433 - c \cdot 5 = -1865$    |
| 360° | $429 = (0 + b + c) \times 0$                       | $= 0$                                             |

$$12 \overline{) 6245} = 520 =$$

$$17 \overline{) 12} = c$$

$$12 \overline{) a \ 6.000} = a$$

$$12 \overline{) 1463} = 122 = 244$$

|                                              |                                             |          |
|----------------------------------------------|---------------------------------------------|----------|
| $(a \cdot 5 + b \cdot 866 + c) \times 866$   | $= a \cdot 433 + b \cdot 750 + c \cdot 866$ | $= 611$  |
| $(a \cdot 866 + b \cdot 5 + c) \times 5$     | $= a \cdot 433 + b \cdot 25 + c \cdot 5$    | $= 340$  |
| $(a + c) \times 0$                           | $=$                                         | $= 0$    |
| $(a \cdot 866 - b \cdot 5 + c) \times -5$    | $= -a \cdot 433 + b \cdot 25 - c \cdot 5$   | $= -322$ |
| $(a \cdot 5 - b \cdot 866 + c) \times -866$  | $= -a \cdot 433 + b \cdot 75 - c \cdot 866$ | $= -616$ |
| $(0 - b + c) \times -1$                      | $= 0 + b - c$                               | $= -637$ |
| $(-a \cdot 5 - b \cdot 866 + c) \times -866$ | $= a \cdot 433 + b \cdot 75 - c \cdot 866$  | $= -326$ |
| $(-a \cdot 866 - b \cdot 5 + c) \times -5$   | $= a \cdot 433 + b \cdot 25 - c \cdot 5$    | $= -188$ |
| $(-a + c) \times 0$                          | $=$                                         | $= 0$    |
| $(-a \cdot 866 + b \cdot 5 + c) \times 5$    | $= -a \cdot 433 + b \cdot 25 + c \cdot 5$   | $= 170$  |
| $(-a \cdot 5 + b \cdot 866 + c) \times 866$  | $= -a \cdot 433 + b \cdot 75 + c \cdot 866$ | $= 236$  |
| $(0 + b + c) \times 1$                       | $= 0 + b + c$                               | $= 429$  |

$$12 \overline{) 66.0} = b$$

$$12 \overline{) 303} = -25 = -50$$

$$l = 244 \sin. N - 50 \cos. N + 520$$

$$l = 520 + 250 \sin. w.$$

|            | <u>Sines</u> | <u><math>250 \times \sin. w</math></u> | <u>Computed value</u> |
|------------|--------------|----------------------------------------|-----------------------|
| $25^\circ$ | .259         | 65                                     | 585                   |
| 45         | .707         | 177                                    | 697                   |
| 75         | .966         | 241                                    | 761                   |
| 105        | .966         | 241                                    | 761                   |
| 135        | .707         | 177                                    | 697                   |
| 165        | .259         | 65                                     | 585                   |
| 185        | -.087        | -22                                    | 498                   |
| 215        | -.574        | -143                                   | 377                   |
| 245        | -.906        | -226                                   | 294                   |
| 275        | -.996        | -249                                   | 271                   |
| 305        | -.819        | -205                                   | 315                   |
| 335        | -.423        | -106                                   | 414                   |

|      |      |                               |                 |
|------|------|-------------------------------|-----------------|
| 7700 | 26.6 | $= a.0185 + b.0326 + c.0376$  | $\times .0185$  |
| 679  | 26.1 | $= a.0332 + b.0192 + c.0383$  | $\times .0332$  |
| 839  | 29.2 | $= a.0345 + c.0345$           | $\times .0345$  |
| 643  | 25.4 | $= a.0341 - b.0197 + c.0394$  | $\times .0341$  |
| 711  | 26.7 | $= a.0187 - b.0324 + c.0375$  | $\times .0187$  |
| 637  | 25.2 | $= 0 - b.0397 + c.0397$       | $\times .0$     |
| 377  | 19.4 | $= -a.0258 - b.0446 + c.0515$ | $\times -.0258$ |
| 377  | 19.4 | $= -a.0446 - b.0258 + c.0515$ | $\times -.0446$ |
| 235  | 15.3 | $= -a.0654 + c.0654$          | $\times -.0654$ |
| 340  | 18.4 | $= -a.0471 + b.0272 + c.0543$ | $\times -.0471$ |
| 273  | 16.5 | $= -a.0303 + b.0525 + c.0606$ | $\times -.0303$ |
| 429  | 20.7 | $= 0 + b.0483 + c.0483$       | $\times 0$      |
|      | 22.4 | $= -a.0662 + b.0015 + c.0465$ |                 |



| Hydrid values | (d-c)<br>Diffs. |       |                                      |
|---------------|-----------------|-------|--------------------------------------|
| 705           | +120            | x.033 | .89 = a.00063 + b.00109 + c.00125    |
| .679          | -18             | .019  | .49 = a.00063 + b.00036 + c.00072    |
| 839           | +78             | 0     | 0 = 0                                |
| 643           | -118            | -0.20 | -.50 = -a.00068 + b.00040 - c.00078  |
| 711           | +14             | -0.32 | -.86 = -a.00061 + b.00102 - c.00118  |
| 637           | +52             | -.040 | -1.00 = 0 + b.00160 - c.00160        |
| 377           | -121            | -.045 | -.85 = a.00117 + b.00202 - c.00229   |
| 377           | 0               | -.026 | -.49 = a.00117 + b.00068 - c.00133   |
| 235           | -59             | 0     | 0 = 0                                |
| 340           | +69             | +0.27 | .49 = -a.00127 + b.00073 + c.00146   |
| 273           | -42             | +0.52 | .83 = -a.00156 + b.00270 + c.00317   |
| 429           | +15             | +0.48 | 1.01 = 0 + b.00230 + c.00230         |
|               |                 | 12)   | +.01 = -a.00052 + b.01290 + c.00172  |
|               |                 |       | +.001 = -a.00004 + b.00107 + c.00014 |

|                                     |      |                                      |
|-------------------------------------|------|--------------------------------------|
| .500 = a.00036 + b.00063 + c.00065  | .038 | 1.03 = a.00072 + b.00125 + c.00144   |
| .86 = a.00109 + b.00063 + c.00125   | .038 | .99 = a.00125 + b.00072 + c.00144    |
| .99 = a.00116 + c.00119             | .034 | .99 = a.00116 + c.00116              |
| .85 = a.00116 - b.00068 + c.00133   | .039 | .97 = a.00133 - b.00078 + c.00152    |
| .51 = a.00036 - b.00061 + c.00070   | .037 | 1.00 = a.00070 - b.00118 + c.00137   |
| 0 = 0                               | .040 | 1.00 = -b.00160 + c.00160            |
| -.49 = +a.00068 + b.00114 - c.00133 | .051 | .97 = -a.00133 - b.00229 + c.00260   |
| -.85 = a.00202 + b.00117 - c.00229  | .051 | .97 = -a.00229 - b.00133 + c.00260   |
| -.97 = a.00422 + c.00422            | .065 | .97 = -a.00422 + c.00422             |
| -.85 = a.00221 - b.00127 + c.00254  | .054 | .97 = -a.00254 + b.00146 + c.00292   |
| -.48 = a.00090 - b.00156 - c.00183  | .061 | .98 = -a.00183 + b.00317 + c.00372   |
| -.0 = 0                             | .048 | 1.01 = +b.00230 + c.00230            |
| +.07 = a.01416 - b.00052 + c.00643  | 12)  | 11.85 = -a.00705 + b.00072 + c.02689 |
| .006 = a.00118 - b.00004 + c.00054  |      | .99 = -a.00059 + b.00006 + c.00224   |







Taken from "Nature" of Oct. 10, 1878,

$$\begin{array}{r} 587 \\ 560 \\ \hline 547 \end{array}$$

Stat.

339 Green. In. S. Def. Con. = Oct. 8. 1878. 13.9

$$\begin{array}{r} 4.74 \\ \hline \end{array}$$

Camb. " " " " = " " " 9.16 = 38 day.

$$\text{Log. } 22.577 = 1.35366$$

$$\text{" } 360 = 2.55630$$

$$15.95 \text{ day} = 1.20264$$

$$\begin{array}{r} 365 \\ 8.31 \\ 3.60 \\ \hline 15.95 \end{array} \begin{array}{r} 376.98 \\ 3190 \\ \hline 5798 \\ 4785 \\ \hline 10.13 \end{array} \begin{array}{r} 1.00561 \\ 1.35366 \\ \hline 22.90 = 2.35927 \\ 360 \\ 131 \\ 256 \\ \hline -127 \end{array}$$

$$10.13 = 1.00561$$

$$1.35366$$

$$22.90 = 2.35927$$

$$\begin{array}{r} 360 \\ 131 \\ 256 \\ \hline -127 \end{array}$$

Nov. 9. 1878. gh.6

$$\begin{array}{r} 4.74 \\ \hline \end{array}$$

4.686 Camb. to

9.20 day.

$$\begin{array}{r} 15.3 \\ \hline 6.1 \end{array}$$

$$22.577$$

$$6.1$$

$$22.577$$

$$13.5462$$

$$137.7197$$

$$345$$

$$-207$$

$$189.$$

$$360$$

$$549$$

$$207$$

$$342$$

$$24.3 = 1.38561$$

$$1.35366$$

$$54.6 = 2.73927$$

$$360$$

$$189.$$

$$15.3 = 1.18469$$

$$1.35366$$

$$345.4 \quad 2.53835$$



*Hyperion*  
 Long. Con. Sept. 24. 84 1878. G. M. J.  
 " " " 24.64 " Comb. time.

$$\begin{array}{r} 24 \overline{) 47.4} \\ .20 \end{array}$$

$$16.914 = 1.22824$$

$$360 = 2.55630$$

$$21.2844 = 1.32806$$

Oct. 1.4

to

Sept. 24.64

$$365 - 676 =$$

358.24

21.28/358.24 (16 revs.)

$$\begin{array}{r} 2128 \\ 14544 \\ 12768 \end{array}$$

$$17.76 = 1.24944$$

$$1.22824$$

$$300.4 = 2.47768$$

$$360.$$

$$\frac{360.}{60.} = \text{Long. Hyp. at Oct. 1.4 1877.}$$

*Titan*  $\frac{9.62}{11.1}$  preceding Sept. 24. 1877. =  $60^\circ$  (40)

"  $\frac{8.15}{11.1}$  " " 25. " =  $47^\circ$  (65)

(Supposed to be J.) 8.9 following Oct. 6. " =  $49^\circ$  (314)

$$\begin{array}{r} 120 \\ 57 \\ \hline 177 \\ 120 \end{array}$$

*Titan*  $\frac{1.96}{11.1}$  preceding Sept. 26 + 27. 1877. =  $10^\circ$  (88)  
 " (2) Nov. 2. 1877. (12°) fol.

22. 145 R.

$$\begin{array}{r} 111 \overline{) 9.62} \quad (.867) \\ 888 \\ \hline 740 \\ 666 \\ \hline 740 \end{array}$$

$$\begin{array}{r} 111 \overline{) 1.96} \quad (.177) \\ 111 \\ \hline 850 \\ 770 \\ \hline 80 \end{array}$$

$$\begin{array}{r} 111 \overline{) 8.15} \quad (.734) \\ 777 \\ \hline 380 \\ 333 \\ \hline 470 \end{array}$$

$$\begin{array}{r} 104 \\ 264 \\ \hline 264 \\ 264 \\ \hline 0 \end{array}$$

Hyperion,

Sat - Hyp. Oct. 21. 1878 =  $16^{\circ}.4$  l.  $90^{\circ}$ 

$$\begin{array}{r} 140 \\ 33 \\ \hline 172 \\ 15 \\ \hline 187 \\ 62 \end{array}$$

Nov. 23. 1878. Transit

Saturn to Lapetus =  $10^{\circ}.7$  (192) /  $60^{\circ}.16$ 

X

722

X Nov. 29. 1878 Saturn to Lapetus =  $24^{\circ}.8$  (218)  $44^{\circ}.36$ Dec. 6. " " " =  $34.4$  (250)  $64^{\circ}.16$ X Sept. 24. 1877. Lapetus  $\frac{28.65}{32.15}$  preceding, (73)  $63^{\circ}$ X " 25. " "  $\frac{29.2}{32.15}$  " (77.5)  $65^{\circ}$ X " 27. " "  $\frac{29.4}{32.15}$  " (82)  $66^{\circ}$ X Oct. 26. 1878. " Transit Saturn Lapetus Saturn"  $34^{\circ}$  (64)  $64^{\circ}.16$ X Nov. 2. 1877. " (2) 35.5 fol.  $90$ 

$$\begin{array}{r} 34.2 | 10.70 \quad (.312) \\ 10.29 \\ \hline 410 \\ 343 \\ \hline 670 \end{array}$$

$$\begin{array}{r} 32.15 | 28.650 \quad (.89) \\ 28.720 \\ \hline 9300 \\ 28935 \\ \hline 3650 \end{array}$$

6  
8  
20

$$\begin{array}{r} 34.2 | 24.80 \quad (.723) \\ 24.01 \\ \hline 779 \\ 686 \\ \hline 1040 \end{array}$$

$$\begin{array}{r} 32.15 | 29.200 \quad (.908) \\ 28.935 \\ \hline 26500 \end{array}$$

$$\begin{array}{r} 32.15 | 29.400 \quad (.914) \\ 28.935 \\ \hline 4650 \\ 3215 \\ \hline 14350 \\ 12850 \\ \hline 1490 \end{array}$$



## Dione.

1877. Sept. 23  $+ \frac{3.46}{3.42}$  1.  $90^\circ$   
 " " 24 (8.3)  $- \frac{3.4}{3.42}$   $90^\circ$  (234)  
 " " " (9.4)  $- \frac{2.7}{3.42}$  79  $52^\circ 12'$   
 " " 25 (10.4)  $+ \frac{1.15}{3.42}$  34  $20^\circ 16'$

## Tethys.

1877. Sept. 25. (10.5)  $\frac{1.65}{2.66}$   $38^\circ 14'$   
 " " 23. (1.4)  $+ \frac{1.15}{2.66} (1.2)$   $26^\circ 15'$   
 " " 27. (8)  $\frac{2.03}{2.66}$   $50^\circ 12'$

## Enceladus.

1877. Sept. 23. (1.4)  $+ \frac{1.5}{2.16}$   $44^\circ 13'$   
 " " 30 Enceladus or Uranus 2.0 diam. of Sat. from the  
 centre preceding.

## Rhea.

1877. Sept. 23. (1.4)  $+ \frac{3.46}{4.77}$   $46^\circ 13'$  (137.5)  
 " " 24. (2.3)  $- \frac{3.4}{4.77}$   $45^\circ 13'$  (213)  
 " " " (9.4)  $- \frac{2.7}{4.77}$   $34^\circ 13'$  (293)  
 " " 25. (8.2)  $- \frac{4.2}{4.77}$   $62^\circ 11'$  (293)  
 " " " (10.2)  $- \frac{4.2}{4.77}$   $62^\circ 11'$  299

## Rhea.

1877. Sept. 25.  $10^h$   $-\frac{3.65}{4.77}$   $50^\circ 130^\circ$   
 " " 27 (sh)  $+\frac{3.55}{4.77}$   $48^\circ 132^\circ (93)$

X Oct. 5. 1877. Hyp. + Lap. preceding Saturn.

" 10. " Lap. Sit. Rhea

" " " Excel. following Saturn.

X " 16 " Lapetus South of Saturn and a little preceding.

Sept. 26. 1877. Titan (?) preceding Sat.

Book 24 finished.

" 30 examined.

" 43 no obs on Sat.

X Jan. 25. 1879. Lap. precedes Saturn  $29^\circ$  by stop. w.  
 Book. 50 examined

|                         |                        |      |      |      |                      |       |
|-------------------------|------------------------|------|------|------|----------------------|-------|
| X Sept. 7. 1878 (Prob.) | Sat. preceding Lapetus | 15.9 | .464 | .47  | $24^\circ 156^\circ$ | (194) |
| " " " "                 | " Hyp.                 | 20.4 |      | 1.   | $90^\circ$           |       |
| X " 8. " "              | " & Lap.               | 18.5 | .440 | .49  | $29^\circ 151^\circ$ | (202) |
| X " 27. " "             | " Lap.                 | 35.0 | 1.   | 1.00 | $19^\circ$           | (284) |
| X " 29. " "             | " " "                  | 32.8 | .956 | .85  | $58^\circ 122^\circ$ | (297) |
| X " 30. " "             | " " "                  | 31.0 | .904 | .81  | $54^\circ 126^\circ$ | (301) |
| Oct. 1. " "             | " fol. Hyp.            | 16.6 | 1.   | 1.   | $90^\circ$           | (306) |
| " 2. " "                | " " "                  | 15.4 | 1.   | 1.   | $90^\circ$           |       |
| X " 4. " "              | " prev. Lap.           | 21.0 | .612 | .55  | $33^\circ 147^\circ$ | (320) |
| X " 6. " "              | " " "                  | 15.0 | .437 | .40  | $24^\circ 156^\circ$ | (329) |
| X " 13. " "             | " fol. Lap.            | 5.2  | .152 | .14  | $8^\circ 172^\circ$  | (15)  |
| X " 20. " "             | " " "                  | 23.5 | .605 | .61  | $38^\circ 142^\circ$ | (37)  |



~~Sat.~~

- X Oct. 21. 1876. (Transit Laps.  $26.53$  /  $.767$   $.70$   $44^\circ 126^\circ$  (41)  
 X " 26. " (Lap. pr. Sat.  $34.50$ )  $.1$   $.90$   $64^\circ 116^\circ$  (64)  
 " 28. " Sat. pr. Hyp.  $6.8$   $.489$   $.44$   $26^\circ 154^\circ$   
 Nov. 1. " Prob. Hyp. fol. Sat.  $14.2$  approx.  $.91$   $65^\circ 115^\circ$   
 " 6. " Rhea + Titan fol. Sat. by sketch.  
 " " " Encel. prob. fol. Sat. " "  
 " 7. " Rhea + Encel. preced. Sat. - the latter quite close to  
 ansa - Hyp. north preced., opp. end of ansa.  
 Nov. 12. "  
 X " 13. " Hyp. Lap. Titan, Dione by sketch preced. Sat. - Tellus north  
 opp. end of ansa - Rhea south north abt. in conjunc. - Encel.  
 + Enceladus fol. Sat.  
 Sept. 14. " Transits Lappetus  
 X " 19. " Sat. preced. Laps.  $34.5$   $.90$   $64^\circ 116^\circ$  (252)  
 " 25. " begins a little below line from ansa in Rhea and a  
 little less than half distance of Rhea (fol.)  
 Same date, sketch makes Lap. fol. Sat.  
 " 27. " "Lappetus  $34.4$  2 or 3 diam. north."  
 " 28. " Laps. fol. Sat.  $32.8$   $.956$   $.87$   $60^\circ 120^\circ$  (293)  
 " 29. " Transit  
 Sept. 30. " Hyp. ~~pr.~~ preced. Sat.  $15.8$   $.1$   $90^\circ$   
 X Oct. 1. " prob. Lap. fol. Sat.  $28.4$   $.828$   $.75$   $49^\circ 131^\circ$  (306)  
 Sept. 19. 1876. prob. Sat. preced. Hyp. about  $17.5$   $.1$   $90^\circ$

## Lapetus.

|           | (0-c) |                           | 1877.  |                |
|-----------|-------|---------------------------|--------|----------------|
| Sept. 24. | -10   | 63°                       | (73)   | preceding Sat. |
| " 25.     | -12.5 | 65°                       | (77.5) | " "            |
| " 27.     | -16   | 66°                       | (82)   | " "            |
| Nov. 2.   |       | 90°                       |        |                |
| " 23.     |       | 16° <del>196°</del> (192) |        | following Sat. |

|                  | (0-c) | Obs. | comp. 1877. |              |
|------------------|-------|------|-------------|--------------|
| Sept. 7. (prob.) | +6    | 204° | (191)       | fol. Sat.    |
| " 8.             | +7    | 209° | (202)       | Sat & Lap.   |
| " 19.            | -8    | 244° | (252)       | fol. Sat.    |
| " 27.            | -18   | 270° | (281)       | fol. Sat.    |
| " 28.            | +7    | 300° | (293)       | " "          |
| " 29.            | +5    | 302° | (297)       | " "          |
| " 30.            | +5    | 306° | (301)       | " "          |
| " 1.             | +5    | 311° | (306)       | " "          |
| Oct. 4.          | +7    | 327° | (320)       | " "          |
| " 6.             | +7    | 336° | (329)       | " "          |
| " 13.            | +3    | 8°   | (5)         | preced. Sat. |
| " 20.            | +1    | 32°  | (37)        | " "          |
| " 21.            | +3    | 44°  | (41)        | Transit Lap. |
| " 26.            | 0     | 64°  | (64)        | preced. Sat. |
| " 28.            |       |      |             |              |
| Nov. 23.         | +4    | 196° | (192)       | fol. "       |
| " 29.            | +6    | 224° | (218)       | " "          |
| Dec. 6.          | -6    | 244° | (250)       | Sat. & Lap.  |
| Jan. 25.         | +12   | 130° | (118)       |              |



19.

Lapetus (1177)

Ho.  
123°

proced. Sat.

Oct 5.

" 16.

Laps. South of Sat. and a little preceding.

Nov. 13, 1878.

" proced. Sat. by sketch. (146°)

393

$$\begin{array}{r} 157 \\ 19 \\ 17 \\ 18 \end{array}$$

By Observatory.

(355.5) Laps. near inf. con. N. of plan. Nov. 25. 1877.

(93) " " west elong.

Dec. 16. "

" at inf. con. N.

July 25. 78.

1899 Laps. reaches west. elong. Aug. 14 - sup.

(174.5) conj. <sup>South</sup> ~~North~~ Sept. 2 - greatest eastern

(261.5) elong. Sept. 21. 1878.

(351.5) Laps. near inf. conj'. North on Oct 11. 78.

(261.5) " " east. elong. Sept. 21. 78.

Laps. " inf. conj'. N. Oct. 11. "

(86.5) " " west. elong. " 31. "

(172.5) " " sup. con. South Nov. 19. "

(263.8) " at <sup>East</sup> ~~west~~ elong. Dec. 9. "

(350°) " near inf. con. North. Dec. 29 "

By Ash. Reg.

(267.5) Nov. 6. 77 Laps. near gr. east. elong.

" 25. 77 " " inf. con. North.

Dec. 16. 77 " at w. elong.

July 25. 78. " at inf. con. N.

Aug. 14.

For Titans page 327. (Year 1877 Obs.)

Ast. Reg.

1052  
4948

Sept. 2. 1878. Lap. at sup. con. South repeated  
in next No.

|                      |                      |                        |                      |
|----------------------|----------------------|------------------------|----------------------|
| 1.036 10.90<br>8.964 | 0.960 9.120<br>9.040 | 1.508 32.20<br>8.492   | 2.520 331.0<br>7.480 |
| .624 4.210<br>9.376  | .664 4.610<br>9.336  | .684 4.830<br>9.316    | .636 4.520<br>9.364  |
| .844 6.980<br>9.156  | 1.360 22.90<br>8.640 | 1.600 39.80<br>8.400   | .368 2.330<br>9.682  |
| .964 9.200<br>9.036  | .976 9.460<br>9.024  | .848 7.050<br>9.152    | .816 6.550<br>9.184  |
| .820 2.090<br>9.680  | 1.916 82.40<br>8.084 | 1.844 69.80<br>8.156   | .968 9.290<br>9.032  |
| .372 2.350<br>9.628  | .356 2.270<br>9.644  | 4.088 122.00.<br>8.912 | 2.484 305.0<br>7.516 |
| 1.672 47.00<br>8.328 | .864 7.010<br>9.136  | .480 3.020<br>9.520    | .896 7.570<br>9.104  |
| .340 2.190<br>9.660  | 2.028 107.0<br>7.972 | 2.176 150.0<br>7.824   | 2.076 119.0<br>7.924 |



|                       |                       |                      |                           |
|-----------------------|-----------------------|----------------------|---------------------------|
| 2.344 221.0<br>7.656  | -.044 -1.110<br>0.044 | .424 2.650<br>9.576  | 2.136 136.0<br>7.164      |
| 1.492 31.00<br>8.508  | .036 1.090<br>9.964   | .016 1.040<br>9.984  | .896 7.170<br>9.104       |
| .604 4.020<br>9.396   | 2.176 150.0<br>7.824  | 1.808 64.30<br>8.192 | .324 2.110<br>9.676       |
| -.016 -1.040<br>0.016 | 2.484 305.0<br>7.516  | .472 2.960<br>9.528  | 1.692 49.20<br>8.308      |
| .020 1.050<br>9.980   | .680 4.790<br>9.320   | 2.280 191.0<br>7.720 | 2.140<br><del>7.860</del> |
| 2.948<br>2            | 1.008                 | .840                 |                           |
| X 1.296<br>8.704      | 2.828<br>7.172        | 1.312<br>8.688       | .740<br>9.260             |
| 2.116<br>7.884        | 2.236<br>7.764        | 2.812<br>7.188       | .820<br>9.180             |
| .476<br>9.524         | .760<br>9.240         | .184<br>9.816        | 2.216<br>7.784            |
| 1.068<br>8.932        | .412<br>9.588         | 1.088<br>8.912       | 1.720<br>8.280            |

|                |                |                |                |
|----------------|----------------|----------------|----------------|
| .568<br>9.432  | 2.132<br>7.868 | .660<br>9.340  | -.012<br>0.012 |
| 1.896<br>8.104 | .212<br>9.788  | 1.052<br>8.948 | 1.052<br>8.948 |

|                              |                               |                               |                               |                                |                               |
|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|
| .0282<br>1410<br>042         | .0282<br>0564<br>846<br>06486 | .0488<br>4392<br>0927         | .0267<br>1068<br>03060        | .0255<br>510<br>03060          | .0255<br>1945<br>0433         |
| .0267<br>2403<br>0507        | .0282<br>0564<br>1128<br>0676 | .0282<br>564<br>0338          | .0282<br>0564<br>2538<br>0817 | .0234<br>0702<br>1638<br>08658 | .0282<br>0546<br>1410<br>0987 |
| .0282<br>2538<br>05358       | .0282<br>0564<br>1128<br>0676 | .0282<br>1692<br>0451         | .0282<br>846<br>0366          | .0255<br>1020<br>0357          | .0282<br>0564<br>1974<br>0761 |
| .0244<br>0488<br>244<br>0512 | .0282<br>0564<br>1128<br>0676 | .0282<br>564<br>564<br>0620   | .0282<br>1974<br>0479         | .0488<br>1464<br>2928<br>1756  | .0282<br>564<br>0338          |
| .0282<br>1410<br>0423        | .0255<br>765<br>0331          | .0282<br>1128<br>0394         | .0282<br>564<br>0338          | .0282<br>1974<br>0479          | .0282<br>1410<br>0423         |
| .0282<br>2538<br>05358       | .0282<br>1974<br>0479         | .0282<br>0846<br>1974<br>1043 | .0255<br>510<br>0306          | .0282<br>846<br>0366           | .0282<br>1692<br>0451         |
| .0255<br>1530<br>0408        | .0282<br>1692<br>0451         | .0282<br>282<br>0310          | .0282<br>1692<br>0451         | .0255<br>1020<br>0357          | .0282<br>1128<br>0394         |
| .0282<br>1410<br>0423        | .0282<br>0564<br>1692<br>0731 | .0267<br>0881<br>1335<br>0934 | .0282<br>0564<br>1410<br>0705 | .0282<br>1128<br>039           | .0282<br>1128<br>039          |
| .0218<br>1090<br>0227        | .0282<br>0564<br>1692<br>0731 | .0282<br>0564<br>1692<br>0731 | .0282<br>846<br>0366          | .0282<br>282<br>0310           | .0282<br>282<br>0310          |
| .0226<br>0904<br>678<br>0971 | .0282<br>0564<br>1692<br>0731 | .0282<br>0564<br>1692<br>0731 | .0282<br>846<br>0366          | .0282<br>282<br>0310           | .0282<br>282<br>0310          |
|                              | .0282<br>0564<br>1692<br>0731 | .0282<br>0564<br>1692<br>0731 | .0282<br>846<br>0366          | .0282<br>282<br>0310           | .0282<br>282<br>0310          |



$$\begin{array}{r} .0282 \\ 1692 \\ \hline .0451 \end{array}$$

$$\begin{array}{r} .0282 \\ .0564 \\ 1410 \\ \hline .0705 \end{array}$$

$$\begin{array}{r} .0282 \\ 564 \\ \hline .0338 \end{array}$$

$$\begin{array}{r} .0282 \\ .0564 \end{array}$$

$$\begin{array}{r} .0282 \\ 282 \\ \hline .02538 \end{array}$$

$$\begin{array}{r} .0267 \\ .0534 \\ 1235 \\ \hline .0667 \end{array}$$

$$\begin{array}{r} .0255 \\ .050 \\ 1275 \\ \hline .0637 \end{array}$$

$$\begin{array}{r} .00282 \\ .02538 \end{array}$$

$$\begin{array}{r} .0282 \\ .0564 \\ 564 \\ \hline .0620 \end{array}$$

$$\begin{array}{r} .0282 \\ .0564 \\ 1128 \\ \hline .0676 \end{array}$$

$$\begin{array}{r} .0255 \\ 510 \\ \hline .0306 \end{array}$$

276.5

$$\begin{array}{r} .0282 \\ 564 \\ \hline .0338 \end{array}$$

$$\begin{array}{r} .0282 \\ .0846 \\ 846 \\ \hline .09206 \end{array}$$

$$\begin{array}{r} .00282 \\ .02256 \end{array}$$

$$\begin{array}{r} .0282 \\ 1128 \\ \hline .0394 \end{array}$$

$$\begin{array}{r} .0282 \\ .0564 \\ 846 \\ \hline .0648 \end{array}$$

$$\begin{array}{r} .0234 \\ .0468 \\ 1572 \\ \hline .06552 \end{array}$$

$$\begin{array}{r} 15.1 \\ 4.2 \end{array}$$

$$\begin{array}{r} 60.4 \\ 7.5 \end{array}$$

$$\begin{array}{r} 67.9 \\ 25.1 \end{array}$$

$$\begin{array}{r} 93 \end{array}$$

$$\begin{array}{r} 17.22 \\ 16.91 \end{array}$$

$$\begin{array}{r} 17.22 \\ 154.98 \end{array}$$

$$\begin{array}{r} 103.32 \\ 172.2 \end{array}$$

$$\begin{array}{r} 291.1 \\ 360 \end{array}$$

$$\begin{array}{r} 69 \end{array}$$

## Hyperion.

See also  
page 129.

Assumed time of Saf. Conj. Hyperion from  
Nature, Vol. 18. page 669 = Sept. 24.84, 1878.  
S. M. J.

$$\text{Cant. time inf. con.} = 24.84 - 0.20 = \text{Sept. 24.64, 1878.}$$

$$\begin{array}{r} 7.42 \\ 17.22 \end{array}$$

## Titan.

$$\begin{array}{r} 24/11.7649 \\ 210 \end{array}$$

$$22.58 = 1.35372$$

$$360 = 2.55630$$

$$15.94 \text{ days} = 1.20258$$

$$\begin{array}{r} 8.58 \\ 24.52 \\ 24 \\ 208 \\ 104 \end{array}$$

$$\text{Oct. 24} - 1.20258$$

$$\text{Oct. 24.29, 1878 Saf. Con.}$$

$$15.94$$

$$\text{Nov. 9.23 " " "}$$

$$15.3$$

$$6.9$$

$$9.23$$

$$15.94$$

$$25.17$$

$$24.3$$

$$0.9$$

$$\begin{array}{r} 24/13.958 \\ 120 \\ 190 \end{array}$$

$$\begin{array}{r} 94 \\ 24 \\ 576 \\ 128 \\ 2256 \end{array}$$

$$\begin{array}{r} \text{Oct. 24} \quad 11.7 \\ 15 \quad 22.6 \\ \text{Nov. 9} \quad 10.3 \end{array}$$

$$\text{Oct. 24.29 1878.}$$

$$\text{Aug. 27.4 1877}$$

$$15.94 \quad 422.89 \quad (26.53 \text{ m.m.})$$

$$\begin{array}{r} 3182 \\ 10409 \\ 9564 \end{array}$$

$$\begin{array}{r} 8450 \\ 7970 \\ 4500 \\ 4722 \end{array}$$

$$2258$$

$$15.94$$

$$6774$$

$$11290$$

$$11.9674$$

$$360.$$

$$348$$

$$252$$

$$90 + \text{Cor.}$$



Hyperion.Titan.

141

90°~~12.63~~

136.04 (11)

12.08

129.39 (14)

63.82 (15)

270°

61.11 (5)

79.06 (6)

64.84 (5)

16205.01 (12.81)

16

45

32

130

128

21

90°

57.29 (7)

15.77 (2)

973.06

8.12

270°

33.74 (4)

27.48 (3)

8.54

469.76

8.72

~~26/341.33 (13.03)~~

26

81

78

33

26

73

27)341.33 (12.64)

27

71

54

173

132

113

108

.0282

.0564

1128

.0676

.0282

.0564

1128

.0676

.0282

.0846

1692

11015

.0282

1974

.0479

.0319

1276

.0446

.0244

2196

.0463

.00282

.02538

.0282

1128

.0394

.0255

765

.0331

.0282

.0564

564

.0620

.0234

1872

.0421

.0282

.0846

212

.0874

.0267

1869

.0453

.0282

212

.0310

.0244

2196

.0463

.0282

1128

.0394

.0282

1692

.0451

.0282

1128

.0394

all from 0<sup>h</sup> to 5<sup>h</sup>" " 11<sup>h</sup> " 12<sup>h</sup>" " 16<sup>h</sup> " 20<sup>h</sup>" " 23<sup>h</sup> " 24<sup>h</sup>

|                |       |                |       |                |        |                |       |
|----------------|-------|----------------|-------|----------------|--------|----------------|-------|
| 2.140<br>7.160 | 138.0 | 2.984<br>7.016 | 964.0 | 1.008<br>8.992 | 10.20  | 0.840<br>9.160 | 6920  |
| 1.064<br>8.936 | 11.60 | 1.036<br>8.964 | 10.90 | 1.168<br>8.832 | 14.70  | 3.992<br>6.008 | 9120  |
| 3.564<br>6.436 | 3660. | .384<br>9.616  | 2420  | -.020<br>0.020 | -1.050 | .092<br>9.908  | 1240  |
| .552<br>9.448  | 3.560 | .584<br>9.416  | 3.840 | 1.304<br>8.696 | 20.10  | 1.556<br>8.444 | 36.00 |
| 1.368<br>8.632 | 23.80 | 1.556<br>8.444 | 36.00 | 1.324<br>8.676 | 21.10  | .348<br>9.652  | 2230  |
| 1.520<br>8.480 | 33.10 | 1.628<br>8.372 | 42.50 | 1.604<br>8.396 | 40.20  | 1.752<br>8.248 | 56.50 |
| .856<br>9.144  | 7.180 | .776<br>9.224  | 5.970 | 1.016<br>8.984 | 10.40  | .860<br>9.140  | 7.240 |
| .836<br>9.164  | 6.850 | .872<br>9.128  | 7.450 | .888<br>9.112  | 7.730  |                |       |
| 1.152<br>8.848 | 14.20 | 1.000<br>9.000 | 10.00 | 1.548<br>8.452 | 35.30  | 1.260<br>8.740 | 16.20 |
| 1.472<br>8.528 | 29.60 | 1.100<br>8.900 | 12.60 | 2.756<br>7.244 | 57.00  | 1.916<br>8.084 | 82.40 |



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1 2 3 4 5  
 Crimson. Red. ~~Light~~ Orange. Yellow. White.  
 6 7 8 9  
 Green Blue. Blue Blue.

$$\begin{array}{r} 2 \overline{) 3663} \\ 1831 \end{array}$$

$$250.4$$

$$\begin{array}{r} 4 \overline{) 30753} \\ 7688 \end{array}$$

$$\begin{array}{r} 4 \overline{) 890} \\ 2225 \end{array}$$

$$\begin{array}{r} 16 \overline{) 2175} (136 \\ 16 \\ \hline 57 \\ 48 \\ \hline 95 \end{array}$$

$$\begin{array}{r} 6 \overline{) 36922} \\ 6154 \end{array}$$

$$\begin{array}{r} + 219 \\ 277 \\ \hline 27 \overline{) 58} \\ -2 \end{array}$$

$$\begin{array}{r} 3 \overline{) 9635} \\ 3212 \end{array}$$

$$\begin{array}{r} 6 \overline{) 490} \\ 82 \end{array}$$

$$\begin{array}{r} 17 \overline{) 124229} (7308 \\ 117 \\ \hline 52 \\ 51 \\ \hline 129 \\ 136 \end{array}$$

$$\begin{array}{r} 17 \overline{) 3089} (182 \\ 17 \\ \hline 138 \\ 136 \\ \hline 29 \end{array}$$

$$\begin{array}{r} 6 \overline{) 4235} \\ 706 \end{array}$$

$$\begin{array}{r} 70982 \\ 36132 \\ \hline 29 \overline{) 107114} \\ 5356 \end{array}$$

$$\begin{array}{r} 330 \\ 11 \\ \hline 319 \\ 64 \\ \hline 383 \\ 6 \\ \hline 2 \overline{) 377} \\ 19 \end{array}$$

$$\begin{array}{r} 16 \overline{) 109409} (6838 \\ 96 \\ \hline 134 \\ 128 \\ \hline 60 \\ 48 \\ \hline 129 \end{array}$$

$$\begin{array}{r} 2 \overline{) 8162} \\ 4081 \end{array}$$

$$\begin{array}{r} 5 \overline{) 37} \\ -7 \end{array} \quad \begin{array}{r} 2 \overline{) 1469} \\ 734 \end{array}$$

$$\begin{array}{r} 72243 \overline{) 1308} \\ 17 \\ \hline 52 \\ 51 \\ \hline 143 \\ 136 \end{array}$$

$$\begin{array}{r} 5 \overline{) 12868} \\ 2574 \end{array}$$

$$\begin{array}{r} 6 \overline{) 13692} \\ 2282 \end{array}$$

$$\begin{array}{r} -121 \\ 76 \end{array}$$

$$\begin{array}{r} 6 \overline{) 22} \\ -4 \end{array}$$

$$\begin{array}{r} 17 \overline{) -45} \end{array}$$

$$\begin{array}{r} 27 \overline{) -56739} (2104 \\ 54 \\ \hline 2739 \end{array}$$

$$\begin{array}{r} 5013 \\ 26607 \\ \hline 17 \overline{) 31623} (1860 \\ 12 \\ \hline 146 \\ 136 \\ \hline 102 \\ 102 \end{array}$$

$$\begin{array}{r} -27 \\ -107 \\ \hline -134 \\ 26 \\ \hline 17 \overline{) -108} \end{array}$$

$$\begin{array}{r} -2779 \\ 219 \\ \hline 1-58 \end{array}$$



Algol.  $+ (355 - .07496) / 145$   
 W. J. and  
 to Schwan, etc.

|               | W. Ep. | W. J. | No. |      |
|---------------|--------|-------|-----|------|
| 7500 to 8000  | 7688   | +222  | 4   | +1   |
| 7000 " 7500   | 7308   | +152  | 17  | -10  |
| 6500 " 7000   | 6838   | +136  | 16  | -21  |
| 6000 " 6500   | 6154   | +82   | 6   | -24  |
| 5500 " 6000   | 5741   | +38   | 4   | -37  |
| 5000 " 5500   | 5259   | +14   | 16  | -25  |
| 4000 " 4500   | 4081   | -54   | 2   | +44  |
| 3000 " 3500   | 3212   | 0     | 3   | +114 |
| 2500 " 3000   | 2574   | -7    | 5   | +155 |
| 2000 " 2500   | 2282   | -4    | 6   | +180 |
| 1500 " 2000   | 1831   | -7    | 2   | +211 |
| 500 " 1000    | 734    | -20   | 2   | +280 |
| 0 " 500       | 214    | -31   | 2   | +308 |
| -500 " 0      | -250   | -6    | 10  | +330 |
| -1000 " -500  | -766   | -8    | 6   | +294 |
| -1500 " -1000 | -1308  | -3    | 17  | +254 |
| -2000 " -1500 | -1860  | -6    | 17  | +210 |
| -2500 " -2000 | -2101  | -2    | 27  | +196 |

Schönfeld,

|              |      |       |
|--------------|------|-------|
| 7500 to 8000 | 7799 | +5.2  |
| 8000 " 8500  | 8374 | -1.77 |
| 8500 " 9000  | 8791 | + .65 |

Table V. Probable Errors.

| $n$ | $\frac{.845}{\sqrt{n(n-1)}}$ | $\frac{.545}{\sqrt{n-1}}$ |
|-----|------------------------------|---------------------------|
| 2   | 1.196                        | 0.845                     |
| 3   | 1.036                        | 0.598                     |
| 4   | 0.946                        | 0.488                     |
| 5   | 0.945                        | 0.422                     |
| 6   | 0.926                        | 0.378                     |
| 7   | 0.913                        | 0.345                     |
| 8   | 0.903                        | 0.319                     |
| 9   | 0.896                        | 0.299                     |
| 10  | 0.891                        | 0.282                     |
| 11  | 0.886                        | 0.267                     |
| 12  | 0.883                        | 0.255                     |
| 13  | 0.880                        | 0.244                     |
| 14  | 0.877                        | 0.234                     |
| 15  | 0.875                        | 0.226                     |
| 16  | 0.873                        | 0.218                     |
| 17  | 0.871                        | 0.211                     |
| 18  | 0.870                        | 0.205                     |
| 19  | 0.868                        | 0.199                     |
| 20  | 0.867                        | 0.194                     |
| 25  | 0.862                        | 0.173                     |
| 30  | 0.860                        | 0.157                     |
| 35  | 0.857                        | 0.145                     |
| 40  | 0.856                        | 0.135                     |
| 45  | 0.854                        | 0.127                     |
| 50  | 0.854                        | 0.121                     |
| 60  | 0.852                        | 0.110                     |
| 70  | 0.851                        | 0.102                     |
| 80  | 0.851                        | 0.095                     |
| 90  | 0.850                        | 0.090                     |
| 100 | 0.849                        | 0.085                     |



1000 Jan. 1. 745 P 3333

1859 July 17

" " "

12<sup>h</sup> 46.2 by Sch.

16<sup>h</sup> 20<sup>m</sup> " Avg.

3 33.8

60  
180  
33.8  
213.8

7584  
.0749  
65256  
30336  
53088  
-568,0416  
+355.  
-213.

+64 -6  
178 -11  
242 -17  
2514  
161216  
65

4/15<sup>2</sup>  
38

225  
152  
201377  
19

84149  
22965  
21107114  
5355.7

228  
-213  
15

12 32

12<sup>h</sup> 47<sup>m</sup> agreeing with Sch.

1000. Jan 1 to = 2378497.7458 by Sch. per.  
2867.34367  
2381365.08947 by Avg.

2.86729167 (Sch. per) x 7534 =

21602.1754  
2402967.4592  
2381365.2831 (Sch.)  
.0895  
1943  
1440  
77720  
7772  
1943  
279.7920

-.0749 x 1000 = -74.9  
355.  
280.

$\Sigma$   
 $- 9.2$   
 $- 4.6$   
 $4.5$   
 $- 7.5$   
 $- 3.2$   
 $- 3.6$   
 $- 0.1$   
 $- 5.4$   
 $- 1.1$   
 $- 7.0$   
 $- 4.5$   
 $(9.5)$   
 $+ 0.2$   
 $- 2.8$   
 $- 1.1$   
 $- 2.0$   
 $- 1.4$   
 $- 2.7$   
 $(8.5)$   
 $4.6$   
 $6.4$   
 $3.8$   
 $4.5$   
 $3.3$   
 $(10.2)$   
 $- 4.0$   
 $- 1.0$   
 $- 4.3$   
 $4.4$

$+ .88$   
 $- .61$

$$a - b = .20$$

$$a - b = -.06$$

$$- 1.4 = 0.1461$$

$$\frac{9.8090}{- .90 = 9.9551}$$

$+ 49 \ 55$

L.C.

$$+ .6 = 9.7752$$

$$\frac{9.5278}{+ .20 = 9.3060}$$

$+ 70 \ 19$

L.C.

$$+ 1.2 = 0.0792$$

$$\frac{9.5937}{+ .47 = 9.6729}$$

$+ 66 \ 52$

5.1

$$- 1.8 = 0.2553$$

$$\frac{9.9995}{- 1.8 = 0.2551}$$

$- 1 \ 41$

3.0

$$+ .8 = 9.9031$$

$$\frac{9.4829}{+ .24 = 9.3860}$$

$+ 72 \ 17$

3.8

L.C.

$$- 2.0 = 0.3010$$

$$\frac{9.9953}{- 2.0 = 0.2993}$$

$- 5 \ 2$

5.3

$$24 \overline{) 20.81} \begin{matrix} .87 \\ 192 \\ 161 \\ 164 \end{matrix}$$

2.84 days

$$\frac{9.50}{14350}$$

$$\frac{2583}{272650} \begin{matrix} 17 \\ 2555 \\ 171.50 \end{matrix}$$

$$1860$$

$$24 \overline{) 1120} \begin{matrix} 42 \\ 960 \end{matrix}$$

$$365 \overline{) 170.50}$$

$$\frac{194.50}{194.92}$$

$$\frac{141.107}{109}$$



26 22 22  
6-11 11-12

- .35      - .12  
+ .26      + .56  
- .52      - .68  
- .33      - .14  
+ .61      - .35  
+ .37      + .19  
- .61      + .84  
- .42      + .01

+1.89      +.74  
+3.13      +2.34  
-2.23      -1.29  
9/5.36      9/3.63  
±.60      ±.40

8/3.47      8/2.89  
-39      36  
48

1.000

1.000

$X \cdot .4 = 1.$

$X = \frac{1}{.4}$

4/5.0  
1.25

4/1.0000  
2.50  
4  
1.000

4/2.00  
5.00

4/3.00  
7.50

2.868  
7.132  
X  
0.000  
2.50  
5.00  
7.50  
10.00  
12.50

$X \cdot .4 = 1 + c.$

3.152

7584  
2534  
-950

5/32995  
7799

12/4492 (1/374  
36  
89  
84  
52

15/+9.7 (6.5  
9.0  
70

36132  
42017  
16/84149 (525  
1.50  
2.41  
3.32  
4.94  
5.80  
6.149  
144

48  
20  
68  
60  
4050.9

15/11266 (791  
105  
136  
135  
16

(8791

26.0  
+5.2

+51.6  
41.9  
+9.7

+19.1  
-40.4  
12/ -21.3 (-1.77  
12  
93  
84  
90

no. B.O.C.

 $X \cdot 4 = 1.2 \text{ c.}$ 

X

61. 211

Diff. mag.

135 412

0.00

1

X

202 721

2.50

2

X

239 863

5.00

3

X

271 (122B)

7.50

4

307

10.00

5

462 1456

12.50

6

475 1494

524 1642

579 1854

 $.4 / 1.0$   
2.50

652

699 2407

2.00

 $\frac{2.50}{.4}$   
1.000

722

766 2732

843 3135

848 3172

879 3324

892 3402

922 3580

929 3612

936 3664

947 3725

959 3767

991 3931

1004 3985

9.976

 $\frac{3.992}{6.000}$   
.665

4.8 9.1

 $\frac{21205}{25}$   
 $\frac{11025}{4410}$   
 $\frac{55125}{3.90}$   
59.02

R.A.

 $\frac{11.25}{25}$   
 $\frac{5640}{2256}$   
 $\frac{6012}{4-42}$  $\frac{7.88}{3940}$   
 $\frac{15776}{19700}$   
 $\frac{32840}{65640}$   
 $\frac{82100}{82100}$  $\frac{427}{425}$   
 $\frac{2445}{22}$   
 $\frac{46.85}{46.85}$  $\frac{80}{80}$   
 $\frac{9}{9}$   
 $\frac{17}{17}$   
 $\frac{47.7}{47.7}$   
 $\frac{12.3}{12.3}$  $\frac{1240}{1240}$   
 $\frac{4}{4}$   
 $\frac{1.8}{1.8}$   
 $\frac{42}{42}$   
 $\frac{9.8}{9.8}$



$$\begin{array}{r} 2.519 \\ 25 \\ \hline 12595 \\ 5038 \\ \hline 62975 \end{array}$$

$$\begin{array}{r} 12.71 \\ 2.97 \\ \hline 15.68 \\ 39 \end{array}$$

$$\begin{array}{r} 1.925 \\ 950 \\ \hline 380 \\ 47.50 \\ \hline 0.7 \end{array}$$

$$\begin{array}{r} 30 \\ 13.2 \end{array}$$

$$\begin{array}{r} 2.0 \\ 5.5 \\ 5.3 \end{array}$$

$$\begin{array}{r} 13.9 \\ 6.9 \end{array}$$

$$\begin{array}{r} 4.0 \\ 4.3 \\ 4.3 \end{array}$$

$$\begin{array}{r} 6.0 \\ 6.5 \\ 10.5 \end{array}$$

$$\begin{array}{r} a \\ b \\ c \\ d \end{array} \begin{array}{r} 4.7 \\ 6.3 \\ 7.0 \\ 8.0 \end{array}$$

$$\begin{array}{r} 7.41 \\ 2705 \\ 1492 \\ \hline 15525 \end{array}$$

$$\begin{array}{r} 3 \\ 20 \\ 17 \\ 2.4 \\ \hline 67 \\ 67 \\ 2242 \\ 57.6 \end{array}$$

$$\begin{array}{r} 3.519 \\ 25 \\ \hline 17945 \\ 7178 \\ \hline 89725 \end{array}$$

$$\begin{array}{r} 1 \\ 33 \\ 34 \\ \hline 4 \\ 4 \\ 44.5 \end{array}$$

$$\begin{array}{r} 6 \\ 34 \\ 1 \\ \hline 36 \\ 14.53 \end{array}$$

$$13.2$$

$$\begin{array}{r} 4.0 \\ 4.0 \\ 4.0 \\ 4.0 \\ 5.0 \end{array} \begin{array}{r} 8.5 \\ 8.5 \\ 8.5 \\ 9.0 \\ 8.0 \end{array} \begin{array}{r} 34.0 \\ 8.5 \end{array}$$

$$\begin{array}{r} 21.0 \\ 4.2 \end{array} \begin{array}{r} 42.5 \\ 8.5 \end{array}$$

$$\begin{array}{r} 3.695 \\ 25 \\ \hline 18475 \\ 7390 \\ \hline 92.375 \end{array}$$

$$\begin{array}{r} 3.03 \\ 25 \\ \hline 1515 \\ 606 \\ \hline 71.75 \end{array}$$

$$\begin{array}{r} 64 \\ 43 \\ 1 \\ \hline 64 \\ 44 \\ 25 \end{array} \begin{array}{r} 32.5 \\ 15.7 \\ 48.5 \\ 11.5 \end{array}$$

$\chi$  Leporis - light yellow - pale green  
pale yel. - garnet - 1851

$\epsilon$  Gemini bril. white - corulean blue

$f$  Eridani 1870.

$\delta$  Tauri <sup>Ep. (1)</sup> bluish white, blue - Bir.

$\tau$  " <sup>Ep. (2)</sup> pale white - violet.

Sheet. No. 1.

- 77 Androm. Ep. (2) - white - blue  
 o Ceti yellow (H very full ruby)  
 0 Fornax Ep. (2)  
 77 Arietis - pale yel. - flushed - dusky.  
 0 Erid. Ep. (2)

|                         |                  |                    |                     |
|-------------------------|------------------|--------------------|---------------------|
| Long. Paris from Wash = | - 5 <sup>h</sup> | 17 <sup>m</sup>    | 33. <sup>s</sup> 22 |
| " Mannheim " "          | - 5              | 42                 | 3.06                |
|                         |                  |                    | <hr/>               |
|                         |                  | 24 <sup>m</sup>    | 29. <sup>s</sup> 28 |
|                         |                  | 24. <sup>m</sup> 5 |                     |

$$\begin{array}{r}
 13^h \quad 7.0 \\
 \underline{24.5} \\
 12 \quad 42.5 \\
 \underline{3.5} \\
 12 \quad 38.7
 \end{array}$$

$$\begin{array}{r}
 8 \quad 27.5 \\
 \underline{29.8} \\
 7 \quad 57.7
 \end{array}$$

$$\begin{array}{r}
 9^h \quad 30.9 \\
 \underline{30.4} \\
 9 \quad 0.5
 \end{array}$$



2.113

$$\begin{array}{r}
 2.64 \\
 25 \\
 \hline
 1340 \\
 536 \\
 \hline
 67.00
 \end{array}$$

$$\begin{array}{r}
 6 \quad 32 \quad 32.47 \\
 1 \quad 7. \\
 \hline
 6 \quad 39 \quad 39.47
 \end{array}$$

$$\begin{array}{r}
 3.36 \\
 25 \\
 \hline
 1640 \\
 672 \\
 \hline
 84.00
 \end{array}$$

$$\begin{array}{r}
 106 \quad 30 \quad 50.8 \\
 1 \quad 24 \\
 \hline
 16 \quad 32 \quad 14.8
 \end{array}$$

$$\begin{array}{r}
 0.32 \quad \cancel{59} \\
 9.813 \\
 \hline
 9.488 \\
 1.579 \\
 \hline
 7.909 \\
 5.818 \\
 \hline
 4 \overline{) 4.182} \\
 \underline{10.46}
 \end{array}$$

$\mu$  mag.  $\log$  Ratio.  
 $-.06$   $0.024$   $0.946$

no. ~~B.A.C.~~

9.976

|               | $\Sigma$       |               | $\Sigma$       |
|---------------|----------------|---------------|----------------|
| 45            | 5.3            | 75            | 3.3            |
| 46            | 3.2            | 76            | 0.7            |
| 47            | do.            | 77            | 1.7            |
| 48            | 5.0            | 78            | 1.0            |
| <del>49</del> | <del>0</del>   | 79            | 1.3            |
| 50            | 6.6            | 80            | 4.6            |
| 51            | 1.9            | 81            | 2.6            |
| 52            | 5.5            | 82            | 2.9            |
| 53            | 3.2            | 83            | 3.4            |
| 54            | 5.3            | 84            | 6.2            |
| 55            | 10.2           | 85            | 3.3            |
| <del>56</del> | <del>3.5</del> | 86            | 7.0            |
| <del>57</del> | <del>3.0</del> | <del>87</del> | <del>2.5</del> |
| 58            | 7.1            | 88            | 2.8            |
| 59            | 4.2            | 89            | 0.5            |
| 60            | 1.0            | 90            | 1.0            |
| 61            | 3.4            | <del>91</del> | <del>6.5</del> |
| 62            | 6.3            | <del>92</del> | <del>3.3</del> |
| 63            | 3.8            | 93            | 7.1 3.3        |
| 64            | 2.8            | 94            | 7.1            |
| 65            | 2.9            |               |                |
| 66            | 7.1            |               |                |
| 67            | do.            |               |                |
| 68            | 2.0            |               |                |
| 69            | 4.9            |               |                |
| 70            | do.            |               |                |
| 71            | 2.2            |               |                |
| 72            | 7.0            |               |                |
| 73            | 1.6            |               |                |
| 74            | 2.3            |               |                |



9.976

9.966

9.984

5.4 10.1 2.52 +.7  
4.7

$$\begin{array}{r} 2.8668 \\ 950 \\ \hline 1433400 \\ 258042 \end{array}$$

$$365 \overline{) 2723.4600} \quad 7$$

$$168.46$$

$$365.46$$

$$167.46$$

$$198.46$$

9.980

$$\begin{array}{r} 60/4/8.15 \\ 24 \overline{) 20.8025} \quad (.8668) \\ \underline{192} \\ 160 \\ \underline{144} \\ 162 \\ \underline{144} \\ 185 \end{array}$$

1.2

$$24 \overline{) 11.02} \quad (.46)$$

$$\begin{array}{r} 60/9.3 \\ 24 \overline{) 1.155} \quad (.006) \\ \underline{144} \\ 35 \end{array}$$

$$\begin{array}{r} 60/3/5.0 \\ 60 \overline{) 9.583} \\ \underline{22.1597} \end{array}$$

$$\begin{array}{r} 60/2/4.3 \\ 60 \overline{) 6.405} \\ \underline{25.1067} \end{array}$$

$$\begin{array}{r} 60/1/0.2 \\ 24 \overline{) 6.17} \quad (.257) \\ \underline{48} \\ 137 \\ \underline{120} \\ 170 \end{array}$$

9.3

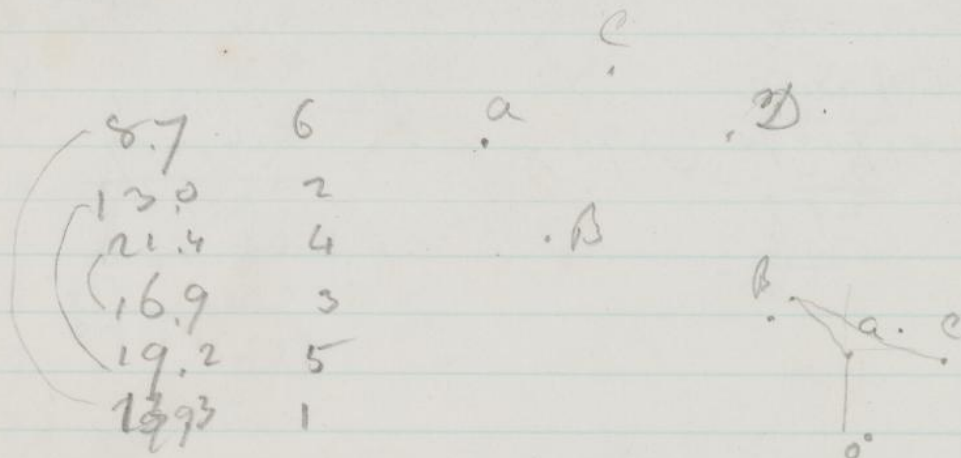
$$\begin{array}{r} 9.3 \\ 18.1 \\ 24 \overline{) 1.135} \quad (.0056) \\ \underline{120} \\ 150 \end{array}$$

$$\begin{array}{r} 60/2/2.5 \\ 24 \overline{) 9.375} \quad (.391) \\ \underline{72} \\ 217 \\ \underline{216} \\ 15 \end{array}$$

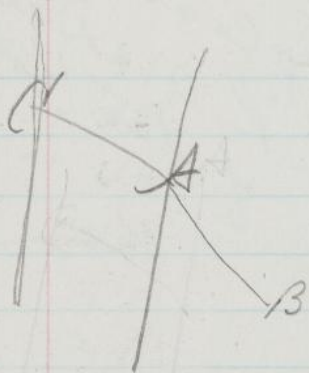
$$\begin{array}{r} \text{Jan. } 21.391 \\ 24.257 \\ \hline 2.866 \\ 2.860 \\ \hline 56 \\ 2.8656 \end{array}$$

$\Sigma$  new lot;  
 5 Brown's  $A = 4.1$  white. = A  
 $B = 10.3$  = D  
 $C = 7.5$  = C ash  
 $D = 7.0$  ashy. = B. ash

|           | $\Sigma$         |        |        |
|-----------|------------------|--------|--------|
| new, hot, | <del>A + B</del> | Dis.   | any,   |
| A, D =    | A + B,           | 11.005 | 236,52 |
| A, C      | A + C,           | 12.457 | 84,50  |
|           | D + C,           | 30.033 | 230,42 |

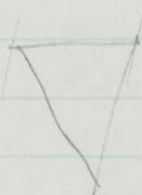






61.65 Pos.

2.514



$$\begin{array}{r}
 0.4004 \\
 9.9995 \\
 \hline
 10.3999 \\
 9.9445 \\
 \hline
 0.4554 \\
 1.1761 \\
 \hline
 1.6315
 \end{array}$$

42.8

o Ceti.  
 p Cass.  
 R. A. + Dec.  
 of stars (not Shurtis)

$$\begin{array}{r} 2.8 \\ 3.3 \\ \hline 6.1 \\ 3.0 \end{array}$$

$$\begin{array}{r} 3.9 \\ 4.1 \\ \hline 8.7 \\ 4.4 \end{array}$$

$$\begin{array}{r} 5.0 \\ 6.0 \\ \hline 5.5 \end{array}$$

$$\begin{array}{r} 6.4 \\ 8.0 \\ \hline 7.2 \end{array}$$

$$\begin{array}{r} 10.0 \\ 4.2 \end{array}$$

$$\begin{array}{r} 4.2 \\ 5.0 \\ 5.0 \\ \hline 14.2 \\ 4.7 \end{array}$$

$$\begin{array}{r} 0.5 \\ 9.5 \end{array}$$

$$\begin{array}{r} 8.9 \\ 10.1 \end{array}$$

$$\begin{array}{r} 4.4 \\ 4.0 \\ 5.1 \end{array}$$

$$\begin{array}{r} 8.1 \\ 9.0 \\ \hline 17.1 \\ 8.6 \end{array}$$

$$\begin{array}{r} 7.1 \\ 7.5 \\ \hline 14.6 \\ 4.3 \end{array}$$

$$\begin{array}{r} 8.5 \\ 8.5 \\ 9.0 \\ \hline 26.0 \\ 3.5 \end{array}$$

$$10.2$$

$$\begin{array}{r} 4.9 \\ 6.0 \\ \hline 10.9 \\ 5.4 \end{array}$$

$$\begin{array}{r} 8.4 \\ 9.0 \\ \hline 17.4 \\ 8.1 \end{array}$$



|               |                |
|---------------|----------------|
| 1             | 9.1            |
| 2             | 9.1            |
| 3             | 4.0            |
| <del>4</del>  | <del>4.5</del> |
| 5             | 7.5            |
| 6             | 7.5            |
| 7             | 3.2            |
| 8             | 3.6            |
| 9             | 0.3            |
| 10            | 5.4            |
| 11            | 1.1            |
| 12            | 7.0            |
| 13            | 7.0            |
| 14            |                |
| 15            |                |
| 16            | 4.5            |
| 17            | 5.1            |
| 18            | 0.2            |
| 19            | 2.8            |
| 20            | 1.4            |
| 21            | 2.0            |
| 22            |                |
| 23            |                |
| 24            |                |
| 25            |                |
| 26            |                |
| 27            |                |
| 28            |                |
| 29            | 1.7            |
| <del>30</del> |                |
| <del>31</del> |                |

|               |                |
|---------------|----------------|
| 32            | 2.6            |
| 33            | 3.9            |
| 34            | 4.6            |
| <del>35</del> | <del>3.0</del> |
| 36            | 6.4            |
| 37            | 3.8            |
| 38            | 4.5            |
| 39            | 3.3            |
| 40            | 4.8            |
| 41            | 4.0            |
| <del>42</del> | <del>1.0</del> |
| 43            | 4.3            |
| 44            | 4.4            |

160

33.

$$\begin{array}{r} 34 \\ 33 \\ \hline 13 \\ 11 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 60.1 \\ 65.5 \\ \hline \end{array}$$

| No.       | B. a. C. | 2.6                | 4.5                |     |
|-----------|----------|--------------------|--------------------|-----|
| ✓ 61      | 218      | $\frac{2.5}{2.5}$  | $\frac{4.5}{4.5}$  | 3.8 |
| ✓ 239     | 863      | $\frac{5.1}{1.27}$ | $\frac{9.0}{2.25}$ | 3.7 |
| 307       |          |                    |                    | 4.7 |
| ✓ 579     | 1854     | 2.6                |                    | 4.9 |
| ✓ 843     | 3135     | $\frac{2.2}{4.5}$  | <del>4.6</del>     | 4.9 |
| 879       | 3324     | 1.2                | +4.6               | 4.9 |
| 892       | 3402     |                    | +4.7               | 4.9 |
| 922       | 3550     | $\frac{2.6}{2.4}$  | $\frac{9.3}{2.3}$  | 4.6 |
| 929       | 3612     | $\frac{5.0}{1.25}$ |                    | 4.9 |
| 959       | 3767     |                    |                    | 2.6 |
| ✓ 1029    | 4123     | 2.2                |                    | 3.5 |
| ✓ 1086    | 4335     | $\frac{2.4}{4.6}$  |                    | 1.9 |
| 1096      | 4366     | 1.15               |                    | 4.9 |
| 1122      | 4454     | 2.5                |                    | 1.9 |
| 1124      | 4493     | $\frac{2.2}{4.7}$  |                    | 4.9 |
| 1321      | 5313     | 1.17               |                    | 5.0 |
| ✓ 1357    | 5643     |                    |                    | 4.9 |
| ✓ 1493    | 6079     | 3.2                |                    | 4.9 |
| ✓ 1773    | 6976     | $\frac{2.4}{5.6}$  |                    | 4.5 |
| 1840      | 7215     | 1.4                |                    | 4.2 |
| ✓ 1959    | 7749     | 2.4                |                    | 5.0 |
| 1999      | 7778     | $\frac{3.0}{5.4}$  |                    | 4.9 |
| 2147      | 8310     | 1.35               |                    | 4.9 |
| (23) 2154 | 8330     |                    |                    | 1.1 |

$$\begin{array}{r} 5.9 \\ 5.6 \\ \hline 11.5 \\ 2.87 \end{array}$$

$$\begin{array}{r} 5.6 \\ 5.0 \\ \hline 10.6 \\ 2.65 \end{array}$$

$$\begin{array}{r} 5.6 \\ 5.2 \\ \hline 10.8 \\ 2.70 \end{array}$$

$$\begin{array}{r} 308.65 \\ 303.4 \\ \hline 5.25 \end{array}$$

.65



4.6 9.3 2.32 - .1  
4.7

5.8 10.9 2.72 +.7  
5.1

5.5 11.3 2.82 - .3  
5.8

6.9 12.5 3.12 +.3  
5.6

6.3 12.1 3.02 +.5  
5.8

4.8 10.0 2.50 - .4  
5.2

5.5 11.3 2.82 - .3  
5.8

5.2 10.6 2.65 - .2  
5.4

4.9 10.6 2.65 - .8  
5.7

5.2 11.4 2.85 - 1.0  
6.2

6.4 12.0 3.00 +.6  
5.6

5.6 11.4 2.85 - .2  
5.8

4.8 10.0 2.50 - .4  
5.2

5.0 10.3 2.57 - .3  
5.3

5.6 10.4 2.60 +.8  
4.8

5.5 11.4 2.85 - .4  
5.9

5.9 12.0 3.00 - .2  
6.1

6.1 12.2 3.05 0  
6.1

5.5 10.9 2.72 +.1  
5.4

5.9 11.1 2.79 +.9  
5.25

~~32.64~~  
12 | 33.43 (2.79  
24  
94  
94  
103

1.2.41

2.6  
2.6 5.2 1.3 0

.076

2.73

2.38  
2.53  
2.91

2.5  
2.4 4.9 1.22 +.1

1.241 =  $\sqrt{}$ 

2.48

12 | 32.64 | 2.72  
24  
86  
84  
24

2.16  
1.2  
12 | 2.28  
1.19

2.5  
1.9 4.4 1.10 +.6

2.6  
2.5 5.1 1.27 +.1

8.0  
32

2.6  
2.2 4.8 1.20 +.4

17.7  
141.6  
6220

2.6  
2.4 5.0 1.25 +.2

8.6362  
8.8108  
0.2446

1.76  
88

5.44  
8.9768  
8.8108  
9.9040

2.2  
2.4 4.6 1.15 -.2

5.28

3.52  
176

8.0  
4.0

8.9816  
62  
8.9878  
8.8108  
9.8930

2.5  
2.2 4.7 1.17 +.3

1.2 +.15  
1.2 +.15  
1.5 - .15  
1.5

704  
528

78  
39

3.2  
2.4 5.6 1.40 +.8

312

(1.2.41)

0.78  
39  
65  
195  
234  
2535

2.4  
3.0 5.4 1.35 -.6



$$w = \log. \tan^2 v \div .4 = 5 \log. \tan v.$$

$$\text{Differentiating } \frac{dw}{dv} = \frac{5 \times .434}{\tan v, \cos^2 v} = \frac{5 \times .434}{\sin v \cos v} = \frac{.434}{\sin .2v}$$

Calling  $w$  the number of degrees corresponding to any arc  $v$ , we have  $w = 57.3v$  and  $dv = .01745 \text{ den.}$

Substituting this value in the above formula gives  $\frac{dw}{dv} = \frac{.076}{\sin .2v}$

.312

.39

.31

.78

.156

.117

.312

.156

.78

0

.039

.273

$$\begin{array}{r} 8541 \\ 8534 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 8.7041 \\ 8.8802 \\ \hline 0.1767 \end{array}$$

$$\begin{array}{r} 2.8672917 \\ 20.0710419 \\ \hline .4591667 \\ 20.5302086 \\ \hline 24 \\ 21208344 \\ 10604172 \\ \hline 127250064 \end{array}$$

$$\begin{array}{r} 60 \\ 43.500 \\ \hline 5.9 \\ 37.6 \end{array}$$

$$\begin{array}{r} 530 \\ 24 \\ \hline 2120 \\ 1060 \\ \hline 12720 \end{array}$$

$$\begin{array}{r} 8534 \\ 7584 \\ \hline 950 \end{array}$$

$$\begin{array}{r} .524 \\ 24 \\ \hline 2096 \\ 10484 \\ \hline 125760 \\ 34.560 \end{array}$$

$$\begin{array}{r} 8534 \\ 8504 \\ \hline 30 \\ 2.8673 - \text{Factor} \\ 86.0190 \\ \hline 21.4592 \\ 85.5598 \\ 61. \end{array}$$

$$610/48.9$$

$$24) 20.815 (.8673917$$

$$\begin{array}{r} 161 \\ 144 \\ \hline 175 \\ 168 \\ \hline 70 \\ 48 \end{array}$$

$$24/11.02 (.4592667$$

$$\begin{array}{r} 24.5598 \\ 30. \\ \hline 6.4402 \\ 24 \\ \hline 17608 \\ 8804 \\ \hline 10.5648 \\ 60 \\ \hline 33.8880 \\ 9.5 \end{array}$$

$$\begin{array}{r} 2.8673 \\ 950 \\ \hline 1433650 \\ 258057 \\ \hline 365/2723.9350(7 \\ 2555 \\ \hline 168.9350 \end{array}$$

$$\begin{array}{r} 1.2 \\ 96 \\ \hline 142 \\ 120 \\ \hline 220 \\ 216 \\ \hline 428 \\ 160 \\ \hline 144 \\ 160 \\ \hline 144 \\ 160 \end{array}$$

$$365/2723.9350(7$$

$$\begin{array}{r} 365.4592 \\ 167.935 \\ \hline 197.524 \end{array}$$

$$\begin{array}{r} 365.4592 \\ 166.9350 \\ \hline 198.5242 \\ 24 \\ \hline 2096 \\ 10484 \\ \hline 125760 \\ 34.560 \end{array}$$

$$\begin{array}{r} .5242 \\ 24 \\ \hline 2096 \\ 10484 \\ \hline 1258060 \\ 34.5440 \end{array}$$

$$\begin{array}{r} 8949 \\ 8534 \\ \hline 415 \\ 2.8673 \\ \hline 143365 \\ 28673 \\ \hline 114692 \\ 36/1189.9295(3 \\ 1095 \\ \hline 94.9295 \\ 4592 \\ \hline 95.3887 \\ 94.3887 \\ \hline 90 \\ 4.3887 \\ 24 \\ \hline 15548 \\ 7774 \\ \hline 9.3288 \\ 60 \\ \hline 203280 \end{array}$$

$$\begin{array}{r} 31 \\ 28 \\ \hline 31 \\ 90 \end{array}$$

$$\begin{array}{r} 12 \quad 3A.7 \\ 3.8 \\ \hline 42.5 \end{array}$$

Computed times  $12^h$   $34.85$

$3.9$   $7.5$

C. J.

$10^h$   $33.89$

$9.2$   $9.5$

C. J.

$9^h$

$20.33$

$19.8$

$14.2$

$44$



In reading Rogers sheets take 3 time stars  
and pole star.

Rogers' Level Correction is  $+.514$

$$o = T - t + m + n \tan \delta + \Delta t$$

.2 Sec. <sup>daily rate,</sup> on 394 signifies good.

.009  
.072

$$\begin{array}{r} -16.42 \\ \hline -16.49 \\ \hline 16.4 \\ \hline .09 \end{array}$$

$$\begin{array}{r} 2.8672917 \\ \hline 950 \\ 1433645850 \\ 258056253 \\ \hline 365 \overline{) 2723.9271150} (7 \\ 2555 \\ \hline 168 \end{array}$$

$$\begin{array}{r} 365 \\ 65 \\ \hline 1825 \\ 2190 \\ \hline 23725 \end{array}$$

$$\begin{array}{r} 166.92711 \\ 365.45924 \\ \hline 198.53206 \\ \hline 24 \\ 212824 \\ 106412 \\ \hline 12.76944 \\ 60 \\ \hline 46.1640 \\ 75 \\ \hline 38.7 \end{array}$$

$$\begin{array}{r} 6 \overline{) 111.0} \\ 188 \end{array}$$

$$\begin{array}{r} 2.8672917 \\ \hline 30 \\ 86.0187510 \\ .45917 \\ \hline 85.55958 \\ 61 \\ \hline 24.55958 \\ 6.44042 \\ \hline 24 \\ 176168 \\ 88084 \\ \hline 10.57008 \\ 60 \\ \hline 34.20 \\ 9.5 \\ \hline 24.7 \end{array}$$

$$\begin{array}{r} 2.8672917 \\ \hline 415 \\ 143364585 \\ 28672917 \\ \hline 114691668 \\ 365 \overline{) 1189.9260555} (3 \\ 1095 \\ \hline 94.45917 \\ 94.38522 \\ \hline 90. \\ 4.38522 \\ 24 \\ \hline 154088 \\ 77044 \\ \hline 9.24528 \\ 60 \\ \hline 14.700 \\ 14.2 \\ \hline 0.5 \end{array}$$

$$\begin{array}{r} 31. \\ 25 \\ \hline 31 \\ 90 \end{array}$$



$$\begin{array}{r}
 60/58.512 \\
 60/41.9752 \\
 24/20.816253333 \quad 2.86734387 \\
 \underline{192} \\
 161 \\
 \underline{144} \\
 176 \\
 \underline{168} \\
 82 \\
 \underline{72} \\
 105 \\
 \underline{96} \\
 93 \\
 \underline{72} \\
 213 \\
 \underline{192} \\
 210 \\
 \underline{192} \\
 180 \\
 \underline{168}
 \end{array}$$

.00001

51d 14h 35m

$$\begin{array}{r}
 60/3/5.0 \\
 24/14.58333(60763 \\
 \underline{144} \\
 183 \\
 \underline{168} \\
 153 \\
 \underline{144} \\
 93 \\
 \underline{72} \\
 210
 \end{array}$$

$$\begin{array}{r}
 2.867344) 51.607639(2 \\
 \underline{734688} \\
 28
 \end{array}$$

$$\begin{array}{r}
 12/51.607639(2 \quad 186 \\
 \underline{5148} \\
 12763 \\
 \underline{12762} \\
 13
 \end{array}$$

2.867091

$$\begin{array}{r}
 \sqrt{5} \\
 42 \\
 13
 \end{array}$$

$$\begin{array}{r}
 51480000 \\
 132120 \\
 72 \\
 \underline{54.612192} \\
 51607639 \\
 \underline{.004553}
 \end{array}$$

$$\begin{array}{r}
 24 \\
 18212 \\
 9106 \\
 \underline{119272} \\
 715632060 \\
 \underline{9379200}
 \end{array}$$

$$\begin{array}{r}
 2 \\
 - 12 \\
 - 31
 \end{array}$$

$$\begin{array}{r}
 79 \\
 \sqrt{5} \\
 14
 \end{array}$$

$$\begin{array}{r}
 2 \quad 41 \frac{3}{4} \\
 67^\circ \quad 9.7
 \end{array}$$

$$\begin{array}{r}
 2 \quad \sqrt{5} \frac{1}{2} \\
 2 \quad \sqrt{5} \frac{1}{2} \\
 69 \quad 36.7
 \end{array}$$

70 54

$$\begin{array}{r} 60/259(4^m 19^s \\ \underline{240} \\ 19 \end{array}$$

$$\begin{array}{r} 4^h 52^m 52^s \\ \underline{4} \\ 48 33^s \\ 7 52 52 \\ \underline{4} \\ 7^h 57^m 19^s \end{array}$$

8422

$$\begin{array}{r} 365 \\ 45 \\ \hline 320 \end{array}$$

31

$$\begin{array}{r} 16^h 24^m 49^s \\ \hline \end{array}$$

1866

Sept. 13.

$$\begin{array}{r} 7^h 57^m 11^s \\ \hline \end{array}$$

12

1800

Jan. 1

$$\begin{array}{r} 17 54 0 \\ \hline 14 3 11 \end{array}$$

$$\begin{array}{r} 366 \\ 6^h 6^m 0^s \\ \hline \end{array}$$

16

$$\begin{array}{r} 365 \\ 17^h 54^m 0^s \\ \hline \end{array}$$

$$\begin{array}{r} 365 \\ 23 7 25 \\ \hline 16. \end{array}$$

$$\begin{array}{r} 365.74583333 \\ \hline \end{array}$$

$$\begin{array}{r} 24106.74583333 \\ \hline \end{array}$$

$$\begin{array}{r} 5.73468777 \\ \hline \end{array}$$

$$\begin{array}{r} 24101.01114556 \\ \hline \end{array}$$

$$\begin{array}{r} 3576 \\ \hline \end{array}$$

$$\begin{array}{r} 525011 \\ \hline \end{array}$$

$$\begin{array}{r} 204 \\ \hline \end{array}$$

$$\begin{array}{r} 297114 \\ \hline \end{array}$$

2.8.62

$$\begin{array}{r} 17.9 \\ 17 76 \\ \hline 140 \\ 139 \\ \hline 800 \\ 792 \\ \hline 800 \end{array}$$

$$\begin{array}{r} .74583333 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \\ 1098 \\ \hline 200 \end{array}$$

$$\begin{array}{r} 23725 \\ \hline 16. \end{array}$$

$$\begin{array}{r} 365.74583333 \\ \hline \end{array}$$

31.

$$\begin{array}{r} 13.33129912 \\ \hline \end{array}$$

$$\begin{array}{r} 571433333 \\ \hline 06 \\ 1233 \\ 30 \\ \hline 333 \end{array}$$

$$\begin{array}{r} 7.951205555 \\ \hline 44 \end{array}$$

$$\begin{array}{r} 7205 \\ \hline 176 \end{array}$$

$$\begin{array}{r} 2955 \\ \hline \end{array}$$

$$\begin{array}{r} 24151.07713245 \\ \hline \end{array}$$

$$\begin{array}{r} 5.73468777 \\ \hline \end{array}$$

$$\begin{array}{r} 24145.34244468 \\ \hline \end{array}$$

$$\begin{array}{r} 0812 \\ \hline \end{array}$$

$$\begin{array}{r} 641424 \\ \hline \end{array}$$

$$\begin{array}{r} 0762 \\ \hline \end{array}$$

$$\begin{array}{r} 66244 \\ \hline \end{array}$$

$$(2.86761)$$

$$\begin{array}{r} .331299123 \\ \hline \end{array}$$

$$\begin{array}{r} .745833 \\ \hline \end{array}$$

$$\begin{array}{r} 17.9 \\ 17 76 \\ \hline 140 \\ 139 \\ \hline 800 \\ 792 \\ \hline 800 \end{array}$$

$$\begin{array}{r} 17.9 \\ 17 76 \\ \hline 140 \\ 139 \\ \hline 800 \\ 792 \\ \hline 800 \end{array}$$



$$\begin{array}{r}
 7 \quad 22 \quad 47 \\
 \hline
 1815 \quad 7 \quad 12 \quad 475 \\
 \hline
 12.783333 \quad 2000. \\
 \hline
 66 \quad 1995 \\
 \hline
 1233 \quad 20 \\
 \hline
 30 \quad 7.211205555 \\
 \hline
 3333 \quad 7.21305555 \\
 \hline
 30 \quad 7.21305555 \\
 \hline
 .11912175
 \end{array}$$

$$\begin{array}{r}
 1815. \quad 18.30054397 \quad 7.21305555 \\
 \hline
 1305 \\
 \hline
 120 \\
 \hline
 1055 \\
 \hline
 96 \\
 \hline
 95 \\
 \hline
 172 \\
 \hline
 2355 \\
 \hline
 2860 \\
 \hline
 195
 \end{array}$$

$$\begin{array}{r}
 364.25416667 \\
 \hline
 3. \\
 266.35054397 \\
 \hline
 5110. \\
 \hline
 5738.55471065 \\
 \hline
 2.86734389 \\
 \hline
 5735.68736676 \\
 \hline
 2.86784368
 \end{array}$$

$$\begin{array}{r}
 5734.68736676 \\
 \hline
 (2.86734368335)
 \end{array}$$

(1815)

$$\begin{array}{r}
 365 \\
 \hline
 18 \\
 \hline
 1260 \\
 \hline
 365 \\
 \hline
 5110
 \end{array}$$

.086400

218<sup>2</sup>

47.524

181925  
9192

$$\begin{array}{r} 6650 \\ -336 \\ \hline \end{array}$$

326

1. 820834536

$$60/5/3 = 0$$

6/0/1.88333333

12 3 3 4 6 4 12 0 3

$$\begin{array}{r} 24 \overline{) 8.03138889} \\ \underline{72} \phantom{00} \\ 83 \phantom{00} \\ \underline{72} \phantom{00} \\ 11 \phantom{00} \\ \underline{96} \phantom{00} \\ 15 \phantom{00} \\ \underline{12} \phantom{00} \\ 38 \phantom{00} \\ \underline{36} \phantom{00} \\ 28 \phantom{00} \\ \underline{24} \phantom{00} \\ 48 \phantom{00} \\ \underline{48} \phantom{00} \\ 0 \end{array}$$

17.665358797

$$\begin{array}{r} 1113F \\ 11136 \end{array}$$

28889  
2886

329

7/7

1.7

365

18

2920

3'65

657°.

17. 665358797

31.

4.

1. 745833333

6 2 5 9 4 1 1 9 2 1 3 0

8. 603 031 661

215/6250.808160469  
62344

160081

15914

94,160

193958

202467  
202567

20046

190

189-66

~~965~~

1570

365

6205

$$\begin{array}{r} 6624 \\ 66365 \\ \hline 6259 \end{array}$$

~~2, 8467991~~  
(2, 86734319287)

(1782)



1866 Feb, 13 y<sup>h</sup> 5y<sup>m</sup> 11<sup>r</sup>

$$\begin{array}{r}
 11.00 \\
 1095 \\
 \hline
 200 \\
 1995 \\
 \hline
 200 \\
 13.331225205 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 7.94940500549 \\
 7944 \\
 \hline
 5405 \\
 5400 \\
 \hline
 500549 \\
 4992 \\
 \hline
 1349
 \end{array}$$

$$\begin{array}{r}
 364.25416667 \\
 237251 \\
 16. \\
 31. \\
 13.331377348
 \end{array}$$

$$\begin{array}{r}
 24) 7.953055555 \\
 792 \\
 \hline
 33055 \\
 3288 \\
 \hline
 17555 \\
 1702 \\
 \hline
 355
 \end{array}$$

$$\begin{array}{r}
 24149.58554402 \\
 \sqrt{.73468777} \\
 \hline
 24143.85085625 \\
 23576
 \end{array}$$

$$\begin{array}{r}
 2.26744719 \\
 2.2671343 \\
 \hline
 1.04
 \end{array}$$

$$\begin{array}{r}
 56785 \\
 56414 \\
 \hline
 371055 \\
 37048 \\
 \hline
 605625 \\
 605398 \\
 \hline
 223
 \end{array}$$

(1866)

1792 Feb. 25. 9<sup>h</sup> 39<sup>m</sup> 12<sup>s</sup>  
1800

$$\begin{array}{r}
 60 \overline{) 12.0} \\
 60 \overline{) 39.2} \\
 24 \overline{) 9.65333333} \quad 56.39122222 \\
 \underline{9.6} \quad 766. \\
 2933 \quad 309.608777778 \\
 \underline{2928} \\
 5333 \\
 \underline{528} \quad 2920. \\
 53 \quad 1. \\
 \underline{52} \quad 1.74583333 \\
 \hline
 3232.35461110 \\
 \underline{368.} \\
 2.86735461 \\
 143
 \end{array}$$

(1000)

$$\begin{array}{r}
 .86734 \\
 \underline{24} \\
 146936 \\
 \underline{173468} \\
 20.81616 \\
 \underline{60} \\
 48.96960 \\
 \underline{60} \\
 58.17600 \\
 \underline{3.4506} \\
 54.72
 \end{array}$$

$$\begin{array}{r}
 .0000125 \\
 \underline{.0002460} \\
 .001440 \\
 \underline{.86400} \\
 3.45600
 \end{array}$$

$$2.8673 = 2d 20h 48m 54.7200.$$

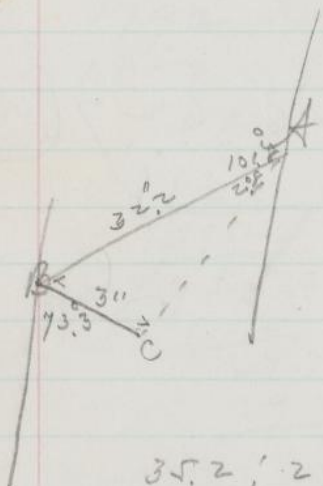


Warren.

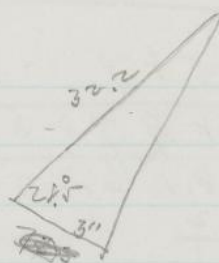
173

$$\begin{array}{r}
 60 \overline{) 587} \\
 60 \overline{) 48.9783333333} \text{ d} \\
 24 \overline{) 20.8163055555} (2.8673460627 \text{ (rev. by W.)} \\
 \underline{192} \\
 161 \\
 \underline{144} \\
 176 \\
 \underline{168} \\
 83 \\
 \underline{72} \\
 110 \\
 \underline{96} \\
 145 \\
 \underline{144} \\
 150 \\
 \underline{144} \\
 65 \\
 \underline{48} \\
 175
 \end{array}$$

$$\begin{array}{r}
 \text{Time rev. by } \Delta \gamma = 2.867 \overline{) 343} \overline{) 887} \\
 \text{" " " W. = 2.867 \overline{) 346} \overline{) 063}
 \end{array}$$



$$\begin{array}{r} 101.8 \\ 73.3 \\ \hline 28.5 \end{array}$$



$$\begin{array}{r} 180 \\ 28.5 \\ \hline 2151.5 \\ 75.8 \end{array}$$

$$35.2; 29.2 = \text{Cum. } 75.8;$$

$$\begin{array}{r} 1.4654 \\ 10.5965 \\ \hline 12.0622 \\ 1.5465 \\ \hline 73.0 \quad 0.5157 \\ 75.8 \\ \hline 148.8 = \\ 2.8 = \\ 28.5 \\ \hline 180.1 \end{array}$$

$$\begin{array}{r} 75.8 \\ 73.0 \\ \hline 20.8 \end{array}$$

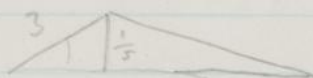
$$\sin 2.8 / 3 =$$

$$\sin 2.8 / 3 = \sin 28.5;$$

$$\begin{array}{r} 101.8 \\ 2.8 \\ \hline 104.6 = \text{Pos. Ang.} \end{array}$$

$$\begin{array}{r} 0.4771 \\ 9.6787 \\ \hline 10.1558 \\ 8.6889 \\ \hline 1.4669 \end{array}$$

$$29.3 = \text{Dist A.C.}$$





9 48 2  
4 3

1862 Mar. 15. 9<sup>h</sup> 5<sup>m</sup> 5<sup>s</sup>  
1800 Jan. 1. 17 54 0

1. 74580000

364.25416667

15.  
22265.

77.41116898

7924) 22721.66533565 (2.86745

68736  
63392

53446  
47544

59025  
55468

35573

31696

38770

7924) 22720.66533565 (2.867322

15848

68726  
63392

53346  
47544

58025  
55468

25573

23772

18013

15848

21655

60) 5.00  
60) 20833.33333333 12d  
24) 9.8640454545454545 6.41116  
196 8981

26  
24

28  
24

40  
24

165  
144

215  
192

235  
216

195  
192

55

565

61

565

2190

22265

Corrected  
for 100.

31

21

18

77

$$\begin{array}{r} 2.74 \\ \hline 10.8 \end{array}$$

$$\begin{array}{r} 180 \\ 146.32 \\ \hline 33.68 \end{array}$$

$$42.89 : 17.17 = \tan 16.84^\circ$$

$$\begin{array}{r} 1.2347 \\ 9.4810 \\ \hline 10.7157 \\ 1.6323 \\ \hline 9.0834 \\ 797 \\ \hline (2) 37.0 \end{array}$$

$$63/6.0$$

$$\begin{array}{r} 16.84 \\ 6.96 \\ \hline 9.88 \end{array}$$

$$\begin{array}{r} 1.2 \\ 9.6 \end{array}$$

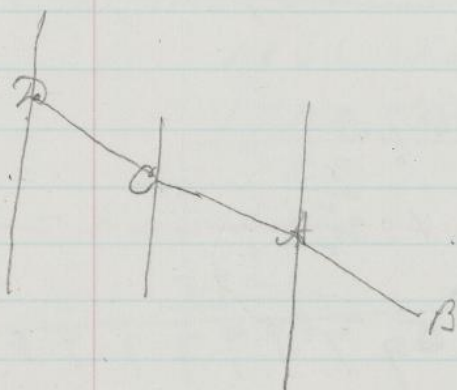
$$\begin{array}{r} 16.96 \\ 16.84 \\ \hline 23.80 \\ 9.88 \\ \hline 146.32 \\ \hline 180.00 \end{array}$$

$$30.8 : 30.0 = \tan 16.32^\circ$$

$$\tan 23.8^\circ : 30.0 = \tan 33.68^\circ$$

$$\begin{array}{r} 1.4771 \\ 9.7440 \\ \hline 11.2211 \\ 9.6059 \\ \hline 41.2 \quad 1.6152 \end{array}$$

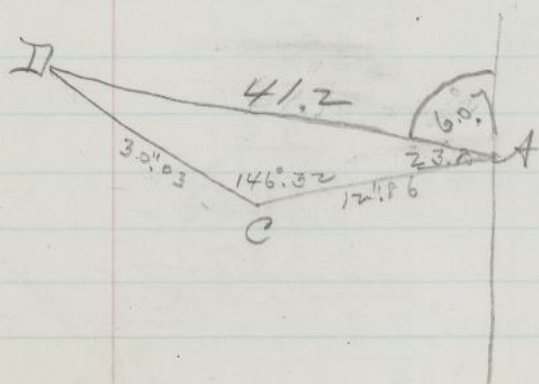
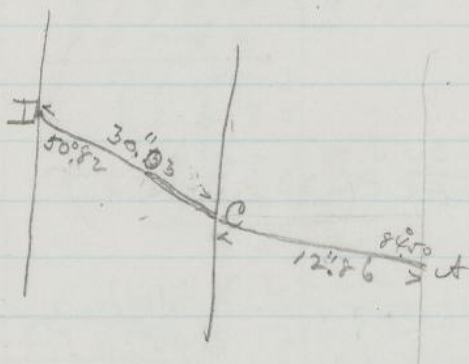




$$\begin{array}{r} 180 \\ 84.5 \\ \hline 95.5 \end{array}$$

$$\begin{array}{r} 180 \\ 84.5 \\ \hline 95.5 \end{array}$$

$$\begin{array}{r} 50.82 \\ 95.5 \\ \hline 146.32 \end{array}$$



$$\begin{array}{r} 84.50 \\ 20.30 \\ \hline 64.20 \end{array}$$

$$\begin{array}{r} 84.50 \\ 23.8 \\ \hline 60.7 \end{array}$$

~~1.0 - 5.9    6.0 - 6.9    7.0 - 7.9    8.0 - 8.9    9.0 - 9.9~~

$$2.8673 \times 1000 = 2867.3$$

1792, Feb. 25. ~~4~~ 56.402222222

766.

309.59 77777778  
2920.

1. 7 4 5 8 3 3 3 2 2

3232.3436111111

286734361111

$$6 \overline{) 53.0}$$

601.8833733377

$$24 \overline{)8.031388888} (-.33474537)$$

172

82

7-

$\frac{1}{17} 3$

96

172

897

$$\begin{array}{r} 108 \\ 108 \\ \hline 216 \end{array}$$

26

1, 20

---

7

6/0/11. C

6/0/57.183 | 3 3 3 3 3 3 3

$24 \overline{) 895305555555} .375$

72

1,75

---

3

---



~~10.0 - 10.9~~ 11.0 - 12.0

$$1866 \text{ Feb. 13. } \gamma^h \text{ } \gamma^m \text{ } 11^s = 13.37304398$$

$$1782 \text{ Nov. 12. } 8^h \text{ } 1 \text{ } 53^m = 12.33474537$$

$$\begin{array}{r} 83 \\ 36.5 \\ \hline 109.5 \\ 2920 \\ \hline 30295 \end{array}$$

$$17.66525463$$

$$31.$$

$$31.$$

$$13.37304398$$

$$30295$$

$$21.$$

$$30409.03229867$$

$$\begin{array}{r} 2183 \\ 8422 \\ \hline \end{array}$$

$$10605 / 30409.03229861 (2.86742464$$

$$\begin{array}{r} 91990 \\ 84840 \\ \hline 71503 \\ 63630 \\ \hline \end{array}$$

$$\begin{array}{r} 78738 \\ 74235 \\ \hline 45032 \\ 42420 \\ \hline \end{array}$$

$$\begin{array}{r} 26129 \\ 21210 \\ \hline \end{array}$$

$$\begin{array}{r} 49198 \\ 42420 \\ \hline 67786 \\ 63630 \\ \hline \end{array}$$

$$41561$$

$$\begin{array}{r} 346969856 \\ 173484928 \\ \hline 20.81819136 \\ 60 \end{array}$$

$$\begin{array}{r} 49.09148160 \\ 60 \\ \hline 5.48889600 \end{array}$$

$$10605 / 30409.03229861 (2.86733034$$

$$\begin{array}{r} 91980 \\ 84840 \\ \hline 71403 \\ 63630 \\ \hline \end{array}$$

$$\begin{array}{r} 72738 \\ 74235 \\ \hline \end{array}$$

$$\begin{array}{r} 35032 \\ 31815 \\ \hline \end{array}$$

$$\begin{array}{r} 32179 \\ 31815 \\ \hline \end{array}$$

$$\begin{array}{r} 36486 \\ 31815 \\ \hline \end{array}$$

$$\begin{array}{r} 46711 \\ 42420 \\ \hline \end{array}$$

180

Excluded.

A.D. P.E.

1

-

5.9

6.0 - 6.9

7.0 - 7.9

A.D. P.E.

A.D.

P.E.

+1.33 A.D. P.E.

A.D. P.E.

+X 6 -1.262 +X

13

4

+X

24

3

+X -2516

5

+X 55 -6.011 +X

8

2

+X

12

3

+X +.29 9

3

+X 20 -1.075 +X

11

3

+X

12

3

+X +.14 15

4

+X 10 -1.144 +X

12

3

+X

12

3

+X +.34 29

8

+X 9 -.713 +X

9

3

+X

12

3

+X +.77

3

+X 12 -.613

12

3

+X

12

3

+X -.25

3

+X 1 +261

1

3

+X

1

3

+X

3

+X 1

1

3

+X

1

3

+X

3

+X 3

3

3

+X

3

3

+X

3

+X 19

19

3

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+X

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+X 22

22

3

+X

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3

+X

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+X 23

23

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23

3

+X

3

+X 57

57

3

+X

57

3

+X

3

+X 238

238

3

+X

238

3

+X

3

+X 26

26

3

+X

26

3

+X

3

+X 264

264

3

+X

264

3

+X

3

+X 13 +153

13

3

+X

13

3

+X

3

+X 29

29

3

+X

29

3

+X

3

+X 21

21

3

+X

21

3

+X

3

+X 10

10

3

+X

10

3

+X

3

+X 45

45

3

+X

45

3

+X

3

+X 118

118

3

+X

118

3

+X

3

+X 28

28

3

+X

28

3

+X

3

+X 164

164

3

+X

164

3

+X

3

+X 22

22

3

+X

22

3

+X

3

+X 186

186

3

+X

186

3

+X

3

+X 52

52

3

+X

52

3

+X

3

+X 6

6

3

+X

6

3

+X

3

+X 58

58

3

+X

58

3

+X

3

+X 58

58

3

+X

58

3

+X

3



| 8.0 - 8.9    | 9.0 - 9.9    | 10.0 - 10.9  | 11.0 - 12.0  |
|--------------|--------------|--------------|--------------|
| A.D. P.E.    | A.D. P.E.    | A.D. P.E.    | A.D. P.E.    |
| +X -07 14 3  | +X 16 +40 4  |              | +X 13 +78 4  |
| +X -86 28 11 | +43 -        | +X 14 +88 4  | +X 81 -71 22 |
| +X +47 16 4  | +X 12 +33 3  | +X 25 +104 6 |              |
| -24          | +X 19 -82 4  | +X 14 +33 3  | +48          |
| +X +39 19 5  | +X 3 +04 3   | +X 22 +76 6  | -71          |
| +X 9 2       | +X 18 -14 25 | +X 21 -99 5  |              |
| +86          | +X 41 +21 10 | +3.01        |              |
| -1.17        | +X 37 -23 9  | -.99         |              |
|              | +X 10 +14 13 |              |              |
|              | -2.47        |              |              |
| 86           | 156 41       | 96 24        | 94 26        |

|              |                        |                        |              |
|--------------|------------------------|------------------------|--------------|
| +X +58 21 6  | +X +48 13 3            | +X +1.43 21 5          | +X +67 36 10 |
| +1.58        | +X +87 -16 5           | +X +.86 22 6           | +X +.89 19 5 |
| -12          | +X +34 12 3            | <del>X +1.8 9</del>    | +X -17 19 5  |
| +X +.85 22 6 | +X -.54 18 5           | +X <del>1.82 8</del> 4 | +1.56        |
| +X +.81 10 3 | +X +0.3 21 6           | +1.08                  | -.17         |
| +X +.68 27 8 | <del>X +1.6 21 4</del> | +3.37                  |              |
| +X +.78 17 6 | +1.72                  |                        |              |
| +X -22 11 4  | -.54                   |                        |              |
| +X -.35 6 2  |                        |                        |              |
| +X +.98 13 4 |                        |                        |              |
| +X 16 5      |                        |                        |              |
| +6.26        |                        |                        |              |
| +X -.69 19 6 |                        |                        |              |
| 162 50       | 108 29                 | 89 27                  | 74 20        |
| 307 95       | 80 22                  | 71 18                  |              |

Mag. B.

| Excluded. | 1 -  | 5.9 |    |
|-----------|------|-----|----|
| A.D.      | P.E. |     |    |
| +19+179   |      |     |    |
| +36+1518  | +23  | 7   |    |
| +14-224   | +9   | 2   |    |
| +20-396   | +16  | 5   |    |
| +37-209   | +14  | 4   |    |
| +15-214   | +13  | 3   |    |
| +17-095   | +12  | 3   |    |
| +13 4     | +17  | 5   |    |
| +11 3     | +12  | 3   |    |
| +16 5     | +16  | 5   |    |
| +21 5     | +11  | 3   |    |
| 219       | 72   | +15 | 4  |
| 24        | 79   | 158 | 44 |
| 243       |      |     |    |

| Excluded. | +14 | 4  |  |
|-----------|-----|----|--|
| +50-364   | +16 | 4  |  |
| +26 7     | +9  | 3  |  |
| +11 3     | +16 | 5  |  |
| +26 7     | +12 | 3  |  |
| +37 10    | +9  | 3  |  |
| +24 6     | +12 | 3  |  |
| +8 2      | +14 | 4  |  |
| +10 3     | +12 | 3  |  |
| +22 6     | +8  | 2  |  |
| +15 4     | +13 | 3  |  |
| +42 11    |     | 37 |  |
| +32 9     |     |    |  |
| +27 7     |     |    |  |
| +5 4      |     |    |  |
| 335       | 93  |    |  |

| 6.0 - 6.9    |      |  |
|--------------|------|--|
| A.D.         | P.E. |  |
| +17 -22 5    | X    |  |
| x 24         |      |  |
| 36           | 18   |  |
| +14 -23 4    |      |  |
| +19 +.15 5   | X    |  |
| +19 +.89 5   | X    |  |
| +15 +.86 4   | X    |  |
| +19 +.26 5   | X    |  |
| 127 +.20 35  | X    |  |
| 103 +.236 28 |      |  |
| -46          |      |  |
| -23          |      |  |
| -.23         |      |  |

| 7.0 - 7.9   |      |  |
|-------------|------|--|
| A.D.        | P.E. |  |
| +23 +.76 6  | X    |  |
| +17 +.75 4  | X    |  |
| +13 +.10 4  | X    |  |
| +27 +.53 8  | X    |  |
| +11 -.03 3  | X    |  |
| +22 -.72 6  | X    |  |
| +14 -.01 4  | X    |  |
| +35 -1.89 9 | X    |  |
| 162         | 44   |  |
| +2.14       |      |  |
| -2.65       |      |  |

|            |    |  |
|------------|----|--|
| +14 -.42 4 |    |  |
| +13 -.20 4 |    |  |
| +15 +.45 3 |    |  |
| +20 -.06 6 |    |  |
| +23 +.86 6 |    |  |
| +25 +.60 7 |    |  |
| +12 +.74 3 |    |  |
| +9 +.44 3  |    |  |
| +14 -.19 4 |    |  |
| +19 +.28 5 |    |  |
| 164        | 45 |  |
| +3.37      |    |  |
| -.87       |    |  |

|            |    |  |
|------------|----|--|
| +11 +.20 3 |    |  |
| +18 +.64 5 |    |  |
| +32 +.71 9 |    |  |
| +12 +.28 5 |    |  |
| 79         | 22 |  |
| +1.83      |    |  |



8.0 to 8.9

A.D. P.E.

9.0 - 9.9

Q.D. P.E.

10.0 - 10.9

Q.D. P.E.

11.0 - 12.0

Q.D. P.E.

$$+29 +1.618 \times$$

$$+17 - .605 \times$$

$$+14 .004 \times$$

$$+18 +1.235 \times$$

$$+22 + .196 \times$$

$$+40 + .8211 \times$$

$$+12 + .013 \times$$

$$+24 + .177 \times$$

$$+37 - .7410 \times$$

$$+12 + .233 \times$$

$$+16 + .505 \times$$

$$+35 + .8610 \times$$

$$+24 + .556 \times$$

$$+9 - 9$$

$$\begin{array}{r} 60 \\ 17 \end{array}$$

$$\begin{array}{r} +1.61 \\ - .60 \\ \hline \end{array}$$

$$\begin{array}{r} +4.15 \\ - .74 \\ \hline \end{array}$$

$$\begin{array}{r} 35 \\ 10 \end{array}$$

$$+ .86$$

$$\begin{array}{r} 10 \\ 24 \end{array}$$

$$\begin{array}{r} 24 \\ 6 \end{array}$$

$$+ .55$$

$$+25 - .347$$

$$+25 - .027$$

$$+28 - .237$$

$$\begin{array}{r} 78 \\ 21 \end{array}$$

$$\begin{array}{r} - .59 \end{array}$$

$$+26 + .597$$

$$+24 + .277$$

$$+33 - .219$$

$$\begin{array}{r} 13 \\ 23 \end{array}$$

$$\begin{array}{r} + .86 \\ - .21 \\ \hline \end{array}$$

$$+25 + .497$$

$$+43 + .6310$$

$$+25 + .1366$$

$$+23 - .476$$

$$\begin{array}{r} 1.1 \\ 6 \end{array}$$

$$\begin{array}{r} +2.48 \\ - .47 \\ \hline \end{array}$$

$$+32 + .1249$$

$$+32 + .1249$$

$$+32 + .1249$$

$$\begin{array}{r} 32 \\ 9 \end{array}$$

$$+1.24$$

Mag. B.

| Excluded      | 1 to 5.9 | 6.0 to 6.9          | 7.0 to 7.9   |
|---------------|----------|---------------------|--------------|
| +23+.296 +46  | 13       | +14-.19 4           | +27-.11 7    |
| +48-.0814 +14 | 4        | +14-.35 4           | +26-.10 7    |
| +10+.013 +21  | 6        | <del>31 +10 9</del> | +21+.44 6    |
| +15-.084 +11  | 3        | +9+.10 3            | +15+.72 4    |
| +8-.447 +16   | 5        | +19-.09 5           |              |
| +6+.165 +22   | 6        | +10+.03 3           | <u>+1.16</u> |
| +21-.129      |          | <u>+1.3</u>         | <u>-.21</u>  |
| +12+.085      |          | <u>-.63</u>         |              |
| +11+.455      |          |                     |              |
| +16+.117      |          |                     |              |
| +23+.147      |          |                     |              |
| +13+.711      |          |                     |              |
| +31+.759      |          |                     |              |
| +24           |          |                     |              |
| +24           |          |                     |              |
| 285           | 130      | 66                  | 89           |
| 109           | 37       | 19                  | 24           |

| 1 <sup>st</sup> sheet | 2 <sup>d</sup> sheet | 3 <sup>d</sup> sheet | 4 <sup>th</sup> sheet | Last sheet |
|-----------------------|----------------------|----------------------|-----------------------|------------|
| 264 93                | 186 55               | 243 79               | 335 93                | A.D. P.E.  |
| 53 15                 | 27 7                 | 158 44               | 135 37                | 285 109    |
| 24 3                  | 130 33               | 103 28               | 164 45                | 130 37     |
| 69 20                 | 202 56               | 162 44               | 79 22                 | 66 19      |
| 86 25                 | 162 50               | 60 17                | 78 21                 | 89 24      |
| 156 41                | 280 27               | 81 50                | 83 23                 | 111 29     |
| 96 24                 | 71 18                | 35 10                | 116 29                | 74 21      |
| 94 26                 | 74 26                | 24 6                 | 32 19                 | 30 8       |
| 842 24                | 932 264              | 966 278              | 1022 279              | 36 10      |
|                       |                      |                      |                       | 821 257    |



| 8.0 to 8.9 | 9.0 to 9.9 | 10.0 to 10.9 | 11.0 to 12.0 |
|------------|------------|--------------|--------------|
| +1.9+.505  | +9+.433    | +1.7+.275    | +36+.1110    |
| +1.9+.235  | +17+.315   | +1.3+.183    |              |
| +1.3-.304  | +20-.195   |              |              |
| +1.9+.504  | +14-.184   | +1.45        | +1.11        |
| +1.5-.174  | +14+.174   |              |              |
| +1.2+.323  |            |              |              |
| +1.4+.954  |            |              |              |
| +2.50      | + .91      |              |              |
| -.47       | -.37       |              |              |

111

29

74

21

30

8

36

10

| 1 to 5.9    | 6.0 to 6.9      | 7.0 to 7.9        | 8.0 to 8.9        | 9.0 to 9.9 | 10.0 to 10.9 | 11.0 to 12.0 |
|-------------|-----------------|-------------------|-------------------|------------|--------------|--------------|
| 53 15       | 24 3            | 69 20             | 86 25             | 156 41     | 96 24        | 94 26        |
| 27 7        | 138 33          | 202 56            | 162 50            | 280 22     | 71 28        | 44 20        |
| 158 44      | 103 28          | 162 44            | 60 17             | 181 50     | 35 10        | 24 6         |
| 135 37      | 164 45          | 79 22             | 78 21             | 83 23      | 116 29       | 32 9         |
| 130 37      | 66 19           | 89 24             | 111 29            | 74 21      | 30 8         | 36 10        |
| 503 140     | 487 128         | 601 166           | 497 142           | 574 157    | 348 89       | 260 71       |
| (35)        | (29)            | (32)              | (28)              | (29)       | (15)         | (8)          |
| 14.4        | 47.8/4.7/188/52 | 17.8/5.1/19.8/5.4 | 23.2/5.9/32.5/8.9 |            |              |              |
| 4.0         | 16.9/4.2/12.8   |                   |                   |            |              |              |
| See Book 65 | 168/0.44        |                   |                   |            |              |              |

Diff. mag.

Excluded.

| 0 - .99      | 1. - 1.99     | 2. to 2.99   | 3 - 3.99     |
|--------------|---------------|--------------|--------------|
| * 1 - 1.261  | * 13 + .104   | * 9 + .293   | * 16 + .404  |
| * 1 - .601   | * 8 + .142    | * 9 - .853   | * 14 - .073  |
| * 3 - 1.07   | * 12 3        | * 29 + .348  | * 16 - .255  |
| * 19 - 1.148 | * 12 + .263   | * 9 + .333   | * 16 + .477  |
| * 22 - .719  | (4) 11 + .503 | * 24 + .393  |              |
| * 23 - .6110 | <u>+1.00</u>  | * 9 2        | <u>+ .87</u> |
| * 57 + .262  | <u>+ .14</u>  | <u>+2.35</u> | <u>- .32</u> |
| 126 58       |               | <u>- .85</u> |              |

44 12 27 7 89 22 62 16

|           |                        |              |             |                      |
|-----------|------------------------|--------------|-------------|----------------------|
| Excluded. | * 13 3                 | * 13 + .524  | * 21 + .586 | * 26 <del>07</del>   |
| 22 6      | * <del>22 6</del>      | * 15 + .304  | * 22 - .146 | * 23 <del>09</del> 6 |
| + .15     | * 16 + .555            | * 13 + .154  | * 16 + .275 | * 18 - .545          |
|           | * 6 + .782             | * 18 + .835  | * 20 - .126 | * 29 - .2911         |
|           | * 8 + .012             | * 13 - .224  | * 20 + .685 | * 16 - .124          |
|           | <u>+ .12</u>           |              |             |                      |
|           | * 18 + <del>1.25</del> | * 8 - .212   | * 11 - .354 | * 10 3               |
|           | <u>+1.96</u>           | <u>+1.79</u> | * 16 + .225 | <u>+1.09</u>         |
|           | +1.46                  | <u>- .43</u> | * 14 + .494 | <u>-1.02</u>         |

83 23  
22 6  
61 17

80 23  
107 30

209 63  
237 70

122 36  
158 41



| 4 - 4.99            | 5 - 5.99   | 6 - 6.99                | 7 - 8.99             | 9.00 -             |
|---------------------|------------|-------------------------|----------------------|--------------------|
| * <del>6+0.7</del>  | * 14+333   | * <del>14+333</del> +96 | (*) 13 <del>14</del> | * 81 <del>22</del> |
| * <del>55-241</del> | * 28-8611  | * <del>25</del>         |                      |                    |
| * 20+25             | * 3-823    | * 12 <del>13</del>      |                      |                    |
| * 15-235            | (*) 10+764 | * 19 <del>23</del> 4    |                      | +0.4               |
| * 19 5              | * 22-996   | * 26 <del>38</del> 7    |                      |                    |
| * 37 9              | * 21-1425  |                         |                      |                    |
| * 10 3              | * 41 10    | <del>+2.65</del>        | <del>+1.78</del>     | <del>+1.78</del>   |
| +2.25               | +1.09      | +1.04                   |                      | +0.4               |
| -4.7                | -4.09      |                         |                      |                    |

|        |        |       |      |       |
|--------|--------|-------|------|-------|
| 165 40 | 139 42 | 96 24 | 13 4 | 81 22 |
| 159 38 | 129 34 |       |      |       |

|                      |          |                      |           |            |
|----------------------|----------|----------------------|-----------|------------|
| * 13+483             | * 21+036 | * 12+343             | * 19 5    | * +6736 10 |
| * 16+88              | * 22 6   | * 19+895             | * 18-22.9 | * 45 11    |
| * 24+586             | * 21 4   | * 27 <del>18</del>   |           |            |
| * 24+1155            | +86      | * 17 <del>18</del> 6 |           |            |
| * 46 <del>10</del>   | +89      | * 28+1084            |           |            |
| * 17 <del>18</del> 4 |          | +3.94                |           |            |
| * 12+0.3             |          | +3.14                |           |            |
| <del>+4.48</del>     |          |                      |           |            |
| +3.95                |          |                      |           |            |

|   |        |        |        |       |       |
|---|--------|--------|--------|-------|-------|
| 6 | 146 36 | 71 19  | 103 29 | 37 14 | 81 21 |
|   | 230 52 | 200 57 |        |       |       |

## Diff. mag.

| Excluded.                    | 0 to .99              | 1 to 1.99            | 2 to 2.99            | 3 to 3.99  |
|------------------------------|-----------------------|----------------------|----------------------|------------|
| +37+179                      | +23+187               | +17+.754             | +17 - 5              | +23+.766   |
| +36+.1518                    | +14 <del>+.1518</del> | +16+.215             | <del>24</del>        | +40+.8211  |
| +3 <del>3</del> <sup>2</sup> | +9-.232               | +13+.104             | +27-.238             | +12+.1.233 |
| +15-.224                     | +14+.444              | +11-.033             | +22+.536             | +14.004    |
| +17-.395                     | +12+.033              | +14 <del>-.234</del> | +17-.425             | 89 24      |
| +11-.203                     | +15+.074              | +16+.155             | +12 <del>-.433</del> |            |
| +16-.215                     | +19+.085              | +11 <del>-.113</del> | +14 <del>-.434</del> |            |
| +21-.095                     | 106+20.29             | 98 <del>-.1628</del> | +19-.395             |            |
| 166 52                       | +13 3                 | +1.21                | +19-.015             |            |
| 13 3                         | 119 32                | <del>14</del>        | +15 <del>-.494</del> |            |
| 153 49                       | +1.00                 |                      | 186 <del>+.652</del> | +2.81      |
| 24 7                         | -23                   |                      | 24+88 7              |            |
| 177 56                       |                       |                      | 162+.2645            |            |

| Excluded. | +14+.274 | +13-.204 | +14-.424             | +24+.277 |
|-----------|----------|----------|----------------------|----------|
| +27-.367  | +16-.294 | +20-.066 | +9+.1343             | +9+.443  |
| +5 4      | +15+.453 | +10+.423 | +11+.863             | +14-.194 |
| 32 11     | +16+.115 | +14+.604 | +23+.206             | +19+.285 |
|           | +12-.093 | +25-.284 | +42 <del>+.68</del>  | 66 19    |
|           | +8-.012  | +13 3    | +11 <del>+.713</del> |          |
|           | +9+.143  | 95 27    | +18+.285             |          |
|           | +12-.053 |          | +32 9                |          |
|           | +12+.743 |          | +18 5                |          |
|           | +12+.073 |          | 178 49               |          |
|           | +8 2     |          |                      |          |
|           | 134 35   | +1.02    | +4.03                | +99      |
|           | +1.78    | -.54     | -42                  | -19      |
|           | -.44     |          | +3.36                |          |



## Diff. Mag.

189

| 4 to 4.99   | 5 to 5.99  | 6 to 6.99 | 7 to 8.99 | 9.00 to - |
|-------------|------------|-----------|-----------|-----------|
| +1.5 +1.235 | +20 +.556  | +22 +.196 | +19 9     |           |
| +17 -.605   | +24 +.016  | +13 4     |           |           |
| +37 -.7410  | +12 +.613  | 35 10     | 19 9      |           |
| +16 +.505   | +29 +.868  |           |           |           |
| +35 -1.899  | +35 +.1710 |           |           |           |
| 123 34      | +24 7      |           |           |           |
|             | 144 40     |           |           |           |

$$\begin{array}{r} +1.73 \\ -3.23 \end{array}$$

$$\begin{array}{r} +3.20 \end{array}$$

$$\begin{array}{r} +.19 \end{array}$$

|           |            |           |           |          |
|-----------|------------|-----------|-----------|----------|
| +25 +.497 | +43 +.6310 | +26 +.597 | +32 +.249 | +50 -4.4 |
| +26 -.027 | +26 +.367  | +33 -.219 | +32 9     | +28 6    |
| +25 -.237 | +37 -.3410 | 59 16     | 64 12     | 78 20    |
| +28 7     | +24 6      |           |           |          |
| 104 28    | +25 6      |           |           |          |
|           | +25 7      |           |           |          |
|           | +22 6      |           |           |          |
|           | +15 4      |           |           |          |
|           | 217 56     |           |           |          |

$$\begin{array}{r} +.49 \\ -.25 \end{array}$$

$$\begin{array}{r} +1.99 \\ -.34 \end{array}$$

$$\begin{array}{r} +.59 \\ -.21 \end{array}$$

$$\begin{array}{r} +1.24 \end{array}$$

$$\begin{array}{r} -47 \end{array}$$

| Excluded   | 0 to .99     | 1 to 1.99    | 2 to 2.99                            | 3 to 3.99                            |
|------------|--------------|--------------|--------------------------------------|--------------------------------------|
| +23+.296   | +46-.7713    | +19-.095     | +14 <sup>-04</sup> <del>-.04</del> 4 | +14-.194                             |
| +48-.0814  | +11+.013     | +10+.033     | +21 <del>-.04</del> 6                | +27-.117                             |
| +10+.013   | +9+.103      |              | +15 <sup>+58</sup> <del>-.04</del> 4 | +19 <sup>+36</sup> <del>-.04</del> 5 |
| +15-.084   | +16+.125     |              | +19+.504                             | +26-.107                             |
| +8-.447    |              |              | +22-.176                             | +13-.304                             |
| +6+.165    |              |              |                                      | +9+.433                              |
| +21-.129   |              |              |                                      | +21 <del>-.04</del> 6                |
| +12+.085   |              |              |                                      | +15-.174                             |
| +11+.455   |              |              |                                      | +14-.354                             |
| +16+.1177  |              |              |                                      | +12+.323                             |
| +23+.1470  | <u>+ .23</u> | <u>+ .03</u> | <u><del>+.122</del></u>              | +247                                 |
| +13+.1711  | <u>- .77</u> | <u>- .09</u> | <u><del>-.26</del></u>               | <u>+1.69</u>                         |
| +31+.759   |              |              | <u>- .21</u>                         | <u>-1.22</u>                         |
| +247       |              |              | <u>+1.08</u>                         | <u><del>+1.55</del></u>              |
| <u>247</u> |              |              |                                      | <u>+1.11</u>                         |
| 261 102    | 82 24        | 29 8         | 91 24                                | 194 54                               |

| 1 <sup>st</sup> sheet | 2 <sup>d</sup> sheet | 3 <sup>d</sup> sheet | 4 <sup>th</sup> sheet | Last sheet |
|-----------------------|----------------------|----------------------|-----------------------|------------|
| 126 58                | 67 74                | A.D. P.E.            | 32 11                 | A.D. P.E.  |
| 44 12                 | 80 23                | <del>177</del> 56    | 134 35                | 261 102    |
| 277                   | 209 63               | 119 32               | 95 27                 | 82 24      |
| 89 22                 | 122 36               | 98 24                | 175 49                | 29 8       |
| 62 16                 | 146 36               | 162 45               | 66 19                 | 29 24      |
| 165 40                | 71 19                | 89 24                | 104 28                | 91 54      |
| 139 42                | 103 29               | 123 34               | 217 56                | 194 23     |
| 96 24                 | 37 14                | 144 40               | 59 16                 | 84 12      |
| 13 4                  | 81 21                | 35 10                | 64 18                 | 44 12      |
| 87 22                 | <u>932</u>           | 19 9                 | 73 20                 | 36 10      |
| 842 247               | 264                  | 966 278              | 102 279               | 821 257    |



4 to 4.99    5 to 5.99    6 to 6.99    7 to 8.99    9.00 -

+19+225    +17+225    +36+1.1110

+17+315    +14+184

+20+195    +13+1.183

+14+954

+14+174

~~11.66~~

-19

+1.43

+1.45

-18

+1.11

84

23

44

12

36

10

| 0 to .99 | 1 to 1.99 | 2 to 2.99 | 3 to 3.99 | 4 to 4.99 | 5 to 5.99 | 6 to 6.99 |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 44 12    | 27 7      | 89 22     | 62 16     | 165 40    | 139 42    | 96 164    |
| 61 12    | 80 23     | 209 63    | 122 36    | 146 36    | 71 19     | 103 29    |
| 119 32   | 91 22     | 162 45    | 89 24     | 123 34    | 144 40    | 35 10     |
| 134 35   | 95 24     | 172 49    | 66 19     | 104 22    | 217 56    | 59 16     |
| 82 24    | 29 2      | 91 24     | 194 54    | 84 23     | 44 12     | 36 10     |
| 440 120  | 329 93    | 729 203   | 533 149   | 622 161   | 615 169   | 329 89    |
| (32)     | (23)      | (43)      | (29)      | (22)      | (27)      | (15)      |
| 14.3/3.8 | 4.1/16.9  | 4.7/18.4  | 5.2/22.2  | 5.8/22.8  | 6.3/21.9  | 5.9       |

4 to 8.99    9.00 to -10.99

13 4    81 22

37 14    81 21

19 9    -

64 18    73 20

133 45    235 63

222 75    456 176

## Distance.

| Excluded.              | 0 - 2.9         | 3.0 - 4.9               | 5.0 - 9.9           |
|------------------------|-----------------|-------------------------|---------------------|
|                        | A.D. P.E.       | A.D. P.E.               |                     |
| * 20-64 *              | 29 +.348X       | * +.5012 3X             | * -.0714 3 X        |
| * <del>21-1.07</del> * | 24 +.213X       | * +.1415 4X             | * <del>1.16</del> 5 |
| * 1-1.141 *            | 37 9            | * <del>1.16</del> 9 2   | * +.3314 3 X        |
| * 1-.711               | +1.33           | + .39                   | * +.2611 3 X        |
| * 3-.611               |                 |                         | * -.2516 4 X        |
| * 19+.268              |                 |                         | * +.4718 5 X        |
| * 22 9                 |                 |                         | * +.0412 3 X        |
| * 23 10                | <del>1.16</del> | ( <del>1.64</del> )     | +1.10               |
| * 57 28                | <del>1.16</del> | + .39                   | - .32               |
| 242 84                 | +1.88           | +1.03 - <del>1.16</del> |                     |
| 41 10                  |                 |                         |                     |
| 201 74                 |                 |                         |                     |
|                        | 90 20           | 36 9                    | 101 26              |
|                        |                 |                         | 89 23               |

| Excluded. |       |              |           |
|-----------|-------|--------------|-----------|
| 22 6 *    | 19 5  | * +.2720 6 * | 16 +.875  |
| + .15 *   | 18 5  | * +.3015 4 * | 13 +.523  |
|           | +1.19 | * +.9819 6 * | 13 +.584  |
|           | +1.12 |              | 21 -.546  |
|           | +1.6  |              | 18 +1.585 |
|           |       |              | 22 -.126  |
|           | +1.81 | +1.55        | 10 +.853  |
|           | +1.31 |              | 27 +.818  |
|           |       |              | 17 -.226  |
|           |       |              | 13 +.014  |
|           |       |              | 8 +1.082  |
|           |       |              | 2 +6.30   |
|           |       |              | - .88     |
|           | 37 10 | 54 16        | 206 59    |
|           |       |              | 193 56    |



19.9

10.0 - 29.9

20.0 - 39.9

40. - 59.9

60. -

$$\begin{array}{r}
 * +.88 \cancel{+1.04} \quad \cancel{X} \\
 * +1.04 \quad 25 \quad 6X \\
 +.43 \quad 13 \quad X \\
 +.33 \quad X \\
 * -.85 \quad 12 \quad 3X \\
 * +.76 \quad 19 \quad 4X \\
 -.23 \quad X \\
 + \quad 9 \quad 3 \\
 + \quad 9 \quad 3 \\
 + \quad 22 \quad 6 \\
 +3.44 \quad \cancel{.56} \\
 -1.08 \quad +2.56 \\
 * \quad 10 \quad 3 \\
 \hline
 120 \quad 32 \\
 14 \quad 4 \\
 \hline
 106 \quad 28
 \end{array}$$

$$\begin{array}{r}
 * 16+.40 \quad 4X \\
 * 6+.10 \quad 2X \\
 * 28+.14 \quad 11X \\
 * 9-.86 \quad 3X \\
 * 19-.82 \quad 5X \\
 * 13+.29 \quad 4X \\
 * 8+.33 \quad 2 \\
 * 3-.99 \quad 3 \quad X \\
 * 21-.24 \quad 4 \\
 \hline
 (+2.26 - 1.33) +.93 \\
 -2.67 \\
 -2.44 \\
 \hline
 -2.91
 \end{array}$$

$$\begin{array}{r}
 14 \quad 4 \\
 \hline
 \cancel{+2.56} \\
 +.88
 \end{array}$$

$$\begin{array}{r}
 * 13+.78 \quad 4X \\
 * 81-.71 \quad 2X \\
 * 10-.25 \quad 4X \\
 * 12+.64 \quad 7 \\
 \hline
 +.23 \\
 +.14 \\
 +.42 \\
 \hline
 +.33 \\
 +.78 \\
 -.71 \\
 -1.42 \\
 \hline
 -2.13
 \end{array}$$

$$\begin{array}{r}
 +.34 \quad \checkmark \\
 * +1.43 \quad 12 \quad 3 \\
 -.14 \quad \checkmark \\
 * -.17 \quad 21 \quad \checkmark \\
 * +.14 \quad 16 \quad \checkmark \\
 * +.83 \quad 19 \quad \checkmark \\
 * +.68 \quad 13 \quad 4 \\
 * +.78 \quad 18 \quad \checkmark \\
 * +.07 \quad 11 \quad 4 \\
 -.35 \quad 16 \quad \checkmark \\
 * +.49 \quad 6 \quad 2 \\
 * +.86 \quad 12 \quad 3 \\
 * +.65 \quad 16 \quad \checkmark \\
 * +6.27 \quad 10 \quad 3 \\
 * -.66 \quad 22 \quad 6 \\
 * \quad 11 \quad 3 \\
 * \quad 45 \quad 11 \\
 * \quad 232 \quad 64
 \end{array}$$

$$\begin{array}{r}
 * +.48 \quad 16 \quad 4 \\
 +.89 \\
 * -.29 \quad 13 \quad 3 \\
 * -.12 \quad 19 \quad \checkmark \\
 * -.12 \quad 20 \quad \checkmark \\
 * +.55 \quad 16 \quad \checkmark \\
 \hline
 +1.92 \\
 -.41
 \end{array}$$

$$\begin{array}{r}
 * 46+.55 \quad 0 \\
 * 17+.50 \quad \checkmark \\
 * 8-.21 \quad 2 \\
 * 14+.24 \quad \checkmark \\
 * 18 \quad 9 \\
 \hline
 +1.27 \\
 -.21
 \end{array}$$

$$\begin{array}{r}
 * 26-.057 \\
 * 23-.096 \\
 * 21+.036 \\
 * 36+.67 \quad 0 \\
 * 29 \quad 11 \\
 * 21 \quad 6 \\
 * 22 \quad 6 \\
 * 10 \quad \checkmark \\
 * 22 \quad 7 \\
 \hline
 +.70 \\
 -.14
 \end{array}$$

$$\begin{array}{r}
 84 \quad 22
 \end{array}$$

$$\begin{array}{r}
 103 \quad 29
 \end{array}$$

$$\begin{array}{r}
 216 \quad 64 \\
 \hline
 194 \quad 58
 \end{array}$$



## Distance.

| Excluded.                                                                                                                                                                                                         | 0 to 2.9                                                                                                                                             | 3.0 to 4.9                                                                                                                                                                                                                                                                             | 5.0 to 9.9                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $  \begin{array}{r}  37 + .179 \\  + 36 + .1518 \\  + 15 - .224 \\  + 17 - .395 \\  + 11 - .203 \\  + 16 - .215 \\  + 21 - .095 \\  \hline  153 \quad 49 \\  24 \quad 14 \\  \hline  177 \quad 56  \end{array}  $ | $  \begin{array}{r}  9 \\  + 17 + .754 \\  + 16 + .444 \\  + 14 + .538 \\  + 27 + .443 \\  + 13 + .367 \\  \hline  115 + .367 \\  31  \end{array}  $ | $  \begin{array}{r}  23 \\  + 23 + .766 \\  + 40 + .8211 \\  + 16 + .215 \\  + 13 + .0324 \\  + 16 + .505 \\  + 15 + .264 \\  \hline  123 \quad 34 \\  + 2.58  \end{array}  $                                                                                                          | $  \begin{array}{r}  + 18 + .235 \\  + 20 + .186 \\  + 13 - .234 \\  + 35 + .8610 \\  + 12 + .233 \\  + 13 + .0844 \\  + 15 \quad 4 \\  + 15 \quad 4 \\  + 14 + .3684 \\  + 23 - .237 \\  + 9 \quad 2 \\  + 158 \quad 45 \\  + 13 \quad 4 \\  \hline  145 \quad 41  \end{array}  $ |
| $  \begin{array}{r}  27 \quad 7 \\  + 5 \quad 4 \\  \hline  32 \quad 11 \\  - .36  \end{array}  $                                                                                                                 | $  \begin{array}{r}  14 \\  + 15 + .453 \\  + 42 - .0911 \\  + 8 + .072 \\  \hline  79 \quad 20 \\  65 \quad 16 \\  + .52 \\  - .09  \end{array}  $  | $  \begin{array}{r}  + 24 + .246 \\  + 20 - .066 \\  + 12 + .863 \\  + 23 - .016 \\  + 9 + .603 \\  + 25 + .207 \\  + 11 + .643 \\  + 18 + .715 \\  + 32 + .749 \\  + 12 \quad 3 \\  \hline  186 \quad 51 \\  14 \quad 4 \\  \hline  200 \quad 55 \\  + 4.02 \\  - .07  \end{array}  $ | $  \begin{array}{r}  + 16 - .294 \\  + 8 - .052 \\  + 12 \quad 3 \\  \hline  36 \quad 9 \\  - .34  \end{array}  $                                                                                                                                                                  |



# Distance.

195

10.0 to 19.9

20.0 to 39.9

40.0 to 59.9

60 -

$$\begin{array}{r}
 +14-.434 \\
 +19-.439 \\
 +17-.065 \\
 +12-.163 \\
 +16-.015 \\
 +11 \quad 3 \\
 +14 \quad 4 \\
 \hline
 103 \quad 33
 \end{array}$$

$$\begin{array}{r}
 -1.09
 \end{array}$$

$$\begin{array}{r}
 +25+.497 \\
 +26+.1347 \\
 +9-.343 \\
 +10 \quad 3 \\
 \hline
 70 \quad 20 \\
 25 \quad 7 \\
 \hline
 95 \quad 27
 \end{array}$$

$$\begin{array}{r}
 +1.83 \\
 -.34
 \end{array}$$

$$\begin{array}{r}
 +24+.556 \\
 +17-.235 \\
 +12+.013 \\
 +11-.033 \\
 +24+.177 \\
 +.14+.154 \\
 +12-.743 \\
 +14+.074 \\
 \hline
 128.0035 \\
 37.10 \\
 \hline
 165 \quad 45 \\
 +.95 \\
 -1.00
 \end{array}$$

$$\begin{array}{r}
 +26+.597 \\
 +13-.204 \\
 +26+.1367 \\
 +25-.216 \\
 \hline
 25 \quad 7 \\
 +33+.429 \\
 +14 \quad 4 \\
 \hline
 162 \quad 44 \\
 137 \quad 37 \\
 +2.37 \\
 -.41
 \end{array}$$

$$\begin{array}{r}
 +50+.6314 \\
 +11-.023 \\
 +43-.2310 \\
 +25-.4877 \\
 +28-.2877 \\
 +22+.446 \\
 +15-.194 \\
 +23+.286 \\
 +32 \quad 9 \\
 +13 \quad 3 \\
 +9 \quad 3 \\
 +14 \quad 4 \\
 +19 \quad 5 \\
 \hline
 304 \quad 81 \\
 +1.35 \\
 -1.29
 \end{array}$$

$$\begin{array}{r}
 +22+.196 \\
 +29+.618 \\
 +24 \quad 4 \\
 +22-.726 \\
 +17-.605 \\
 +35-.1899 \\
 \hline
 149 \quad 44 \\
 24 \quad 4 \\
 \hline
 125 \quad 34 \\
 135 \quad 32 \\
 +1.80 \\
 -3.21
 \end{array}$$

$$\begin{array}{r}
 +14-.424 \\
 +37+.1110 \\
 +16+.275 \\
 +24+.147 \\
 +12+.1243 \\
 +32+.289 \\
 +11 \quad 5 \\
 \hline
 153 \quad 43 \\
 +2.04 \\
 -.42
 \end{array}$$





# Distance

197

| 10.0 to 19.9 | 20.0 to 39.9          | 40.0 to 59.9 | 60 -             |
|--------------|-----------------------|--------------|------------------|
| +11 +.01 3   | +27 -.11 7            | +14 -.19 4   | +26 7            |
| +9 +.10 3    | +46 -.77 13           | +22 -.17 6   | <del>15</del> 4  |
| +14 +.95 4   | +19 +.50 5            | +14 +.17 4   | +14 4            |
| +13 +.18 3   | +19 +.23 5            |              | <del>31</del> 9  |
|              | +14 -.04 4            |              | <del>24</del> 7  |
|              | +21 -.05 6            |              | -.10             |
|              | +13 -.30 4            |              | -.35             |
| +2.24        | +36 -.17 10           |              | <del>1.75</del>  |
|              | +20 +.11 5            | +17<br>-.36  | <del>1.45</del>  |
|              | +17 -.19 5            |              |                  |
|              | +14 +.27 4            |              |                  |
|              | <del>+24 -.18 4</del> |              |                  |
|              | 15 +.11 4<br>-1.81    |              |                  |
| 47           | 13                    | 50           | 14               |
|              | <del>270</del> 75     |              | <del>15</del> 24 |
|              | 285 79                |              | 40 11            |

| 0 to 2.9  | 3 to 4.9 | 5.0 to 9.9 | 10.0 to 19.9               | 20.0 to 39.9       | 40.0 to 59.9                 |
|-----------|----------|------------|----------------------------|--------------------|------------------------------|
| 90 20     | 36 9     | 101 26     | 106 28                     | 123 39             | 14 4                         |
| 37 10     | 54 16    | 206 59     | 232 64                     | 84 22              | 103 29                       |
| 115 31    | 123 34   | 145 41     | 103 33                     | 165 45             |                              |
| 65 76     | 200 55   | 36 9       | 95 27                      | 137 37             | 30 8                         |
| 36 10     | 35 9     | 67 19      | 47 13                      | 285 79             | 50 14                        |
| 343 87    | 448 123  | 555 154    | 597 169                    | 794 272            | 458 124                      |
| (16)      | (25)     | (35)       | (38)                       | (42)               | (21)                         |
| 21.4/5.4  | 17.9/4.9 | 15.9/4.4   | 15.7/4.4                   | 18.9/4.6           | 21.8/5.9                     |
|           |          |            | 583 165<br>(37)<br>155 045 | 222<br>(42)<br>853 | 47.1 128<br>(22)<br>214 .058 |
| 6.96 7.97 | 171 47   |            |                            | 6.47               | 18.3                         |
| (2.8)     | 194 58   |            |                            | (26)               | 1070                         |
| 248 .070  | 138 38   |            |                            | 247                |                              |
|           | 153 43   |            |                            |                    |                              |
|           | 40 24    |            |                            |                    |                              |
|           | 688 199  |            |                            |                    |                              |
|           | 128      |            |                            |                    |                              |
|           |          | 6.64       | 18.9                       |                    |                              |
|           |          | (27)       |                            |                    |                              |
|           |          | 246        | 0.70                       |                    |                              |

$$\begin{array}{r}
 a.D. \quad P.E. \\
 8.42 \quad 2.47 \\
 9.52 \quad 2.64 \\
 \hline
 17.74 \quad 5.11
 \end{array}$$

(1000) ~~84~~  $2.867.3 = 2867^d \text{ } ^h 12^m 0^s$

$$\begin{array}{r}
 24 \\
 7.260 \\
 \hline
 12.0
 \end{array}$$

1800 Jan. 1. 74583333

$8^h 1^m 53''$

$$\begin{array}{r}
 6/53.0 \\
 60/1.8833333333 \\
 24/8.03138888889(33464120 \\
 \quad 72 \\
 \quad \quad 83 \\
 \quad \quad 72 \\
 \quad \quad \quad 111 \\
 \quad \quad \quad 96 \\
 \quad \quad \quad \quad 153 \\
 \quad \quad \quad \quad 144 \\
 \quad \quad \quad \quad \quad 98 \\
 \quad \quad \quad \quad \quad 88 \\
 \quad \quad \quad \quad \quad \quad 28 \\
 \quad \quad \quad \quad \quad \quad 24 \\
 \quad \quad \quad \quad \quad \quad \quad 48 \\
 \quad \quad \quad \quad \quad \quad \quad 48 \\
 \quad \quad \quad \quad \quad \quad \quad \quad 08
 \end{array}$$

$$\begin{array}{r}
 2.867.3 \\
 2555 \\
 \hline
 312.3 \\
 2.74583333 \\
 309.55416667 \\
 306. \\
 \hline
 3.55416667 \\
 29. \\
 \hline
 Feb. 25.44583333 \\
 24 \\
 178333332 \\
 8916666.6 \\
 \hline
 10.69999999 \\
 60 \\
 \hline
 459.99999520
 \end{array}$$

12.7 cns. - W. Equat. - Red, glass &c left out of all.  
 "Distances" takes in all Dec.

"Diffs. Mag." " " " "

"Mag. B." omits also stars not Shurt's.

$$\begin{array}{r}
 223 \\
 80 \\
 \hline
 1023
 \end{array}$$

$$\begin{array}{r}
 239 \\
 44 \\
 \hline
 279
 \end{array}$$



$$\begin{array}{r}
 7 \quad 52 \quad 52 \\
 4 \quad 19 \\
 \hline
 12^h \quad 11^m \quad 52^s \\
 7 \quad 57 \quad 11 \\
 \hline
 4^h \quad 14^m \quad 41^s
 \end{array}$$

$$\begin{array}{r}
 15) 24(1.6 \\
 \underline{90}
 \end{array}$$

$$\begin{array}{r}
 610/41.00 \\
 610/14.683333333333
 \end{array}$$

$$2.51$$

$$617696064915$$

$$\begin{array}{r}
 184 \\
 156 \\
 \hline
 28
 \end{array}$$

$$.4$$

$$1 \quad 24^5$$

$$\begin{array}{r}
 0.3842 \\
 0.7684 \\
 \hline
 1.1528
 \end{array}$$

$$1.75$$

$$1.75$$

$$24$$

$$1.15$$

$$30408.03829161$$

$$1.769635$$

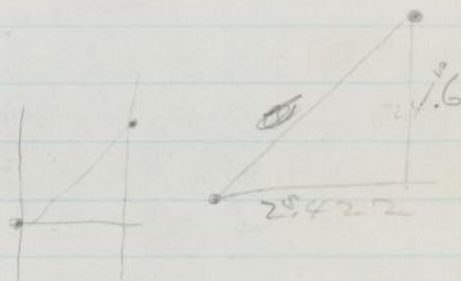
$$0.5883$$

$$10.3842$$

$$0.5883$$

$$38.7$$

$$9.7959$$



$$\begin{array}{r}
 1.6 \quad 0.2041 \\
 \hline
 0.4082
 \end{array}$$

$$2.422^2 = 0.7684$$

$$2/1.1766$$

$$0.5883$$

$$\text{Cos. Dec. } 9.7108$$

$$2.51 \quad 0.3991$$

$$\begin{array}{r}
 7 \quad 52 \quad 52 \\
 4 \quad 19 \\
 \hline
 12 \quad 11 \quad 52 \\
 7 \quad 57 \quad 11 \\
 \hline
 4 \quad 14 \quad 41
 \end{array}$$

$$\begin{array}{r}
 610/41.00 \\
 610/14.6833333333 \\
 24/4.12447222222222 \quad (.176863426
 \end{array}$$

$$\begin{array}{r}
 184 \\
 168 \\
 \hline
 164 \\
 144
 \end{array}$$

$$\begin{array}{r}
 207 \\
 192 \\
 \hline
 152
 \end{array}$$

$$\begin{array}{r}
 152 \\
 144 \\
 \hline
 82
 \end{array}$$

$$\begin{array}{r}
 82 \\
 72 \\
 \hline
 102 \\
 96
 \end{array}$$

$$\begin{array}{r}
 62 \\
 48 \\
 \hline
 142
 \end{array}$$

$$\begin{array}{r}
 30408.03829861 \\
 .17686343
 \end{array}$$

$$10605/30408.21516204 \quad (2.86734702$$

$$\begin{array}{r}
 21210 \\
 21982 \\
 \hline
 64420
 \end{array}$$

$$\begin{array}{r}
 71421 \\
 63630 \\
 \hline
 77915
 \end{array}$$

$$\begin{array}{r}
 77915 \\
 74235 \\
 \hline
 36801
 \end{array}$$

$$\begin{array}{r}
 36801 \\
 31215 \\
 \hline
 49866
 \end{array}$$

$$\begin{array}{r}
 49866 \\
 42420 \\
 \hline
 74462
 \end{array}$$

$$\begin{array}{r}
 74462 \\
 74235 \\
 \hline
 22704
 \end{array}$$

$$\begin{array}{r}
 22704 \\
 21210 \\
 \hline
 1494
 \end{array}$$

$$\begin{array}{r}
 .000047 \\
 2.867300000000
 \end{array}$$



2867.34702

1866

28673.

(1000)

24

138808

69404

8.32848

19.70880

42.52800

86400

000,047

604800

345600

4060800

2.8673

24

7.2

60

12.0

1792, Feb. 25. 9<sup>h</sup> 39<sup>m</sup> 12<sup>s</sup>

56.4022222

366

309.59777778

2920.

2557.74583333

306.

3.55416667

2867.30000000

2.8673

2557.74583333

309.55416667

306.

3.55416667

29.

25.44583333

24

178333332

19166666

10.69999992

60

41.99999520

60

59.999971200

2557

1.74583333

2.8673

8422

57346

57346

114692

229384

24148.4006

1.74583333

365.

363.25416667

(8422)

10.4250

93912

12<sup>m</sup> 48<sup>s</sup> diff.

1866 Feb. 13. 37304398

31.50824074

363.25416667

16.

23725.

24148.76240741

24148.4006

.36180741

.36180741

24

144722964

72361482

8568337784

60

41.00267040

X (233.00)

202.

(7924)

$$\begin{array}{r}
 9^h \quad 4^m \quad 2^s \\
 \underline{4} \quad \quad \quad 3 \\
 13 \quad 51 \quad 2^s
 \end{array}$$

$$\begin{array}{r}
 60 \overline{) 2.00} \\
 60 \overline{) 51.6333333333} \\
 24 \overline{) 13.8505555555} \quad (57710648 \\
 \underline{120} \\
 185 \\
 \underline{160} \\
 25 \\
 \underline{155} \\
 144 \\
 \underline{115} \\
 96 \\
 \underline{195} \\
 192
 \end{array}$$

$$\begin{array}{r}
 2.8673 \\
 \underline{7924} \\
 114692 \\
 \underline{57346} \\
 258057 \\
 \underline{200711} \\
 22720.4852
 \end{array}$$

$$\begin{array}{r}
 185 \\
 \underline{160} \\
 25 \\
 \underline{155} \\
 144 \\
 \underline{115} \\
 96 \\
 \underline{195} \\
 192
 \end{array}$$

$$\begin{array}{r}
 18.57710648 \\
 2^s. \\
 31. \\
 22265. \\
 363.25416667 \\
 15. \\
 \underline{22720.83127315} \\
 22720.4852 \\
 .34607315
 \end{array}$$

$$\begin{array}{r}
 8^h \quad 35^m \quad 53^s \\
 \underline{31} \\
 8 \quad 4 \quad 53 \\
 60 \overline{) 53.0} \\
 60 \overline{) 4.8833333333} \\
 24 \overline{) 8.81388889} \quad (.36724537 \\
 \underline{72} \\
 161 \\
 \underline{144} \\
 173 \\
 \underline{168} \\
 58 \\
 \underline{48} \\
 108 \\
 \underline{96} \\
 128 \\
 \underline{120} \\
 88 \\
 \underline{72} \\
 168
 \end{array}$$

(-2183)

$$\begin{array}{r}
 2.8673 \\
 \underline{2183} \\
 86019 \\
 229384 \\
 28673 \\
 \underline{57346} \\
 6259.3159
 \end{array}$$

$$\begin{array}{r}
 1782. Nov. 12. 36724537 \\
 17.63275463 \\
 31. \\
 1.74583333 \\
 4. \\
 6205. \\
 6259.37858796 \\
 6259.3159 \\
 .06268796 \\
 24
 \end{array}$$

$$\begin{array}{r}
 25075184 \\
 \underline{12537592} \\
 1250451104 \\
 60 \\
 3027066240 \\
 90.27 \quad X
 \end{array}$$



$$\begin{array}{r}
 (2183) \\
 .000047 \\
 \hline
 15281 \\
 8732 \\
 \hline
 +.102601
 \end{array}$$

$$\begin{array}{r}
 (7924) \\
 .000047 \\
 \hline
 55468 \\
 31696 \\
 \hline
 .372428
 \end{array}$$

$$\begin{array}{r}
 (8422) \\
 .000047 \\
 \hline
 58954 \\
 33688 \\
 \hline
 .395834
 \end{array}$$

$$\begin{array}{r}
 203 \\
 (-1000) \\
 .000047 \\
 \hline
 .047 \\
 214
 \end{array}$$

$$\begin{array}{r}
 1440 \\
 .000047 \\
 \hline
 10080 \\
 5760 \\
 \hline
 .067680
 \end{array}$$

$$\begin{array}{r}
 .1026 \\
 1440 \\
 \hline
 41040 \\
 4104 \\
 1026 \\
 \hline
 1477440
 \end{array}$$

$$\begin{array}{r}
 .3724 \\
 1440 \\
 \hline
 148960 \\
 14896 \\
 3724 \\
 \hline
 536.2560
 \end{array}$$

$$\begin{array}{r}
 .3958 \\
 1440 \\
 \hline
 158320 \\
 15832 \\
 3958 \\
 \hline
 569.9520
 \end{array}$$

$$\begin{array}{r}
 1440 \\
 .047 \\
 \hline
 10080 \\
 5760 \\
 \hline
 67.680
 \end{array}$$

$$\begin{array}{r}
 (2183) \\
 -90.27 \\
 +147.74 \\
 \hline
 +57.47
 \end{array}$$

$$\begin{array}{r}
 (7924) \\
 -210.35 \\
 536.26 \\
 \hline
 +325.91
 \end{array}$$

$$\begin{array}{r}
 (8422) \\
 -233.0 \\
 589.9 \\
 \hline
 +336.9
 \end{array}$$

$$\begin{array}{r}
 (-1000) \\
 -62.8 \\
 +67.68 \\
 \hline
 +4.88
 \end{array}$$

2.867347

Obs.  
7 53  
9 18

Aug. 7.  
12 12  
13 51

Jan 2.  
8 19 +26  
11 41 +113

$9^4 \quad 39^m \quad 12^m$

60/12.

60/39.2

$\frac{1}{24} \cdot 6 = 3$

$$\begin{array}{r} 53 \\ \times 4 \\ \hline 212 \\ \times 40 \\ \hline 2120 \\ \hline 21200 \\ \hline \end{array}$$

(1000)

1792 Feb. 25. 402 222 22  
1800 Jan. 1. 745 833 33

25.40222222

3. 59777778

306.

1.

 $2\sqrt{5}$ 

1. 7 4 5 4 3 3 3 3

2867.34361111

2.8643

04361111

1446

17 4 4 4 4 4 4 0

174 44 4 4 4

4 3 6 1 1 1 1

X 6 <sup>in</sup> 2,79999840



2. 86734702  
2. 86734389

deduced  
Arg.

2334668

2 378497  
6574  
2 371923

2 378497  
6258  
2 372239

365  
2920  
2921

365  
18  
2920  
365  
6570

1  
1  
1  
6574

365  
17  
2555  
365  
6205  
6209  
31  
6258

$$\text{Avg.} = 2.86734389$$

$$\begin{aligned} 1782 \text{ Nov. } 12.33464120 &= 2372238.33464120 \\ 1800. \text{ Jan. } 1. &+c = 2378497.74583333 \\ &6259.41119213 \end{aligned}$$

$$2183 / 6259.41119213 (2.86734365$$

$$\begin{array}{r} 2371192 \\ 730 \\ \hline 315 \\ \hline 2372237 \end{array}$$

$$\begin{array}{r} 4366 \\ 18934 \\ \hline 17464 \\ 14701 \\ \hline 13098 \\ 16031 \\ \hline 15281 \end{array}$$

$$\begin{array}{r} 7501 \\ \hline 6549 \end{array}$$

$$\begin{array}{r} 9529 \\ \hline 8732 \end{array}$$

$$\begin{array}{r} 7972 \\ \hline 6549 \end{array}$$

$$\begin{array}{r} 14238 \\ \hline 13098 \end{array}$$

$$\begin{array}{r} 11330 \\ \hline 10915 \end{array}$$

$$(-2183)$$

$$\begin{array}{r} 1782 \\ 445 \end{array}$$

$$\begin{aligned} 1792, \text{ Feb. } 25.9^h 39^m 12^s &= 2375630.40222223 \\ &2378497.74583333 \\ \hline &2867.34361110 \end{aligned}$$

$$\begin{array}{r} 2375575 \\ 5540222223 \\ \hline 2375630.40222223 \end{array}$$

$$\begin{array}{r} 2375575 \\ 55 \\ \hline 2375630 \end{array}$$



$$1815, \text{Sept. 14. } y^h 12^m 47^s = 2384234.30054398$$

$$\begin{array}{r} 2378497.74583333 \\ \hline 5736.55471065 \\ +1. \end{array}$$

$$2001/5737.55471065(2.26734368$$

$$\begin{array}{r} 2382879 \\ 1095 \\ \hline 260.30054398 \\ 2384234.30054398 \end{array}$$

$$1831, \text{Dec. 27. } y^h 43^m 40^s$$

$$\begin{array}{r} 23828723 \\ 1095 \\ \hline 360.32160880 \end{array}$$

$$\begin{array}{r} 2390179.32160880 \\ 2378497.74583333 \\ \hline 11681.57577547 \end{array}$$

$$1831, \text{Dec. 27. } y^h 18^m$$

$$\begin{array}{r} 23828723 \\ 1095 \\ \hline 360.2917 \\ .0125 \end{array}$$

$$\begin{array}{r} 2390179.3042 \\ 2378497.7458 \\ \hline 11681.5584 \end{array}$$

$$4074/11681.5584(2.26734374$$

$$\begin{array}{r} 35335 \\ 32592 \\ \hline 274435 \end{array}$$

$$\begin{array}{r} 29918 \\ 28518 \\ \hline 14004 \end{array}$$

$$\begin{array}{r} 12222 \\ 17820 \\ \hline 16296 \end{array}$$

$$\begin{array}{r} 16296 \\ 15240 \\ \hline 1056 \end{array}$$

$$\begin{array}{r} 30180 \\ 28518 \\ \hline 16620 \end{array}$$

208

$$\begin{array}{r} 9^h \ 26^m \\ 1 \quad 9 \\ \hline 10^h \ 35^m \end{array}$$

1846. Sept. 18. 10<sup>h</sup> 35<sup>m</sup>

$$\begin{array}{r} .4167 \\ .0243 \\ \hline .4410 \end{array}$$

$$\begin{array}{r} 2394567 \\ 730 \\ 1 \\ \hline 260.4410 \\ \hline 2395558.4410 \end{array}$$

$$\begin{array}{r} 2378497.74583333 \\ 2395558.4410 \\ \hline 5950/17060.6952(2.8673 \\ 11900 \\ \hline 51606 \\ 47600 \\ \hline 40069 \\ 35700 \\ \hline 43695 \\ 41650 \\ \hline 20452 \\ 17850 \\ \hline 26020 \\ 23800 \\ \hline 22200 \\ 17850 \\ \hline 43500 \\ 41650 \\ \hline 18500 \\ 17850 \\ \hline \end{array}$$



$$\begin{array}{r} 9 \quad 48 \quad 2 \\ 4 \quad 3 \end{array}$$

1862 Mar. 18.  $13^h 51^m 25^s$

$\sqrt{12} = .0354$  day,  
 $13^h .5417$  "

1862. Mar. 18.  $5771$  "

1800 Jan 1.  $\text{tc} = 2378497.44583333$

1862 Mar. 18  $\text{tc} = 2401218.5771$

$7924 \overline{) 22720.8313} (2.867343$   
 $15848$   
 $68728$   
 $63392$   
 $53363$   
 $47544$   
 $58191$   
 $55468$   
 $27233$   
 $23772$   
 $34610$   
 $31696$   
 $29140$   
 $23772$   
 $53680$   
 $47544$   
 $61360$

2400411

$\overline{776}$

2401218

1866. Feb. 13.

$$\begin{array}{r}
 4 \quad 52 \quad 52 \\
 4 \quad 19 \\
 \hline
 12^h \quad 12^m \\
 12^h = .5000 - \\
 12^m = .0083 \\
 \hline
 .5083
 \end{array}$$

~~2400411~~

2401872

730

43

2402646

2402646.5083

2378497.7458

8422) 24148.7625 (2.86734397

16844

73047

56716

50532

61842

55954

28885

25266

36190

33688

25020

26844

51760

75798

59620

2.8673

24

34692

17346

20.8152

60

44.9120

60

54.7200

2.8673 = 2<sup>d</sup> 20<sup>h</sup> 48<sup>m</sup> 54.7

58.7

40

- .066 E



.7083  
 .0375  
 .7458

|                      |              |
|----------------------|--------------|
| Argelander's period. | = 2.86734389 |
| (2183) 1782          | = 2.86734365 |
| (1000) 1792          | = 2.86734361 |
| (2001) 1815          | = 2.86734368 |
| (4074) 1831          | = 2.86734374 |
| (5950) 1846          | = 2.86734373 |
| (7924) 1862          | = 2.86734368 |
| (8422) 1866          | = 2.86734297 |

.0340  
 .8333  
 .8673

2.867.3  
 2.867.3  
 2.867.3  
 237.9859

11 1

2.867.3  
 83

86019  
 229384  
 237.9859

6259.3159  
 2378497.7458  
 2372238.4299  
 3346  
 .0953  
 11440  
 38120  
 3812  
 953  
 1372320  
 34  
 +103.

2.867.3  
 22378497.7458  
 2375630.4458  
 4022  
 .0436  
 1440  
 17440  
 1744  
 436  
 62.7840  
 9  
 +54

2.867.3  
 2.867.3  
 2.867.3  
 5737.4673  
 2378497.7458  
 2384235.2131  
 .3005  
 .0874  
 1440  
 34960  
 3496  
 874  
 1258560  
 10.  
 -136.

2.867.3  
 11469.2  
 212.1802  
 11681.3802  
 2378497.7458  
 2390179.1260  
 .3042  
 .1782  
 1440  
 71280  
 17128  
 256.6080  
 -258.

2.867.3  
 17203.8  
 143.365  
 17060.435  
 2378497.7458  
 2395558.1808  
 4410  
 .2602  
 1440  
 104080  
 10408  
 2602  
 374.6880  
 69

2.867.3

$$\begin{array}{r}
 2867.3 \\
 \hline
 20071.1 \\
 2649.3152 \\
 \hline
 2378497.7451 \\
 2401218.2310 \\
 \hline
 .5771 \\
 .3461 \\
 \hline
 1440 \\
 138440 \\
 13844 \\
 3461 \\
 \hline
 498.3840 \\
 243 \\
 \hline
 -255.
 \end{array}$$

$$\begin{array}{r}
 2.8673 \\
 924 \\
 \hline
 114692 \\
 57346 \\
 \hline
 258057 \\
 2649.3852
 \end{array}$$

$$\begin{array}{r}
 2867.3 \\
 \hline
 22938.4 \\
 1146.92 \\
 63.0806 \\
 \hline
 2378497.7458 \\
 2402646.1464 \\
 \hline
 .5083 \\
 .3619 \\
 \hline
 1440 \\
 144760 \\
 14476 \\
 3619 \\
 \hline
 521.1360 \\
 259 \\
 \hline
 262.
 \end{array}$$

$$\begin{array}{r}
 2401872 \\
 1095 \\
 \hline
 2402967.4592 = 1867. \text{ Jan. } 0.11^h 1.2 = \text{Ep. H} \\
 2378497.7451 \\
 \hline
 2.8673 \cdot 24469.7134 (8.534) \\
 229384 \\
 \hline
 153131 \\
 143365 \\
 \hline
 97663 \\
 86019 \\
 \hline
 116444 \\
 114692 \\
 \hline
 .1752 \\
 1440 \\
 \hline
 70080 \\
 7008 \\
 \hline
 1752 \\
 252.2880
 \end{array}$$

$$\begin{array}{r}
 100.72 \\
 3600
 \end{array}$$

$$\begin{array}{r}
 1072 \\
 60 \\
 \hline
 1012
 \end{array}$$

$$\begin{array}{r}
 24/76 \\
 48 \\
 220 \\
 216 \\
 \hline
 40 \\
 20
 \end{array}$$

$$\begin{array}{r}
 97663 \\
 86019 \\
 \hline
 116444 \\
 114692 \\
 \hline
 .1752 \\
 1440 \\
 \hline
 70080 \\
 7008 \\
 \hline
 1752 \\
 252.2880
 \end{array}$$

$$\begin{array}{r}
 3000 \\
 2.8672916 \\
 \hline
 8534
 \end{array}$$

$$\begin{array}{r}
 8534 \\
 .0000083 \\
 \hline
 25602 \\
 68772 \\
 \hline
 .0708322 \\
 .1752 \\
 \hline
 .2466(322 \\
 1440 \\
 \hline
 98400 \\
 88400 \\
 \hline
 2460 \\
 354.2400 \\
 252. \\
 \hline
 102
 \end{array}$$

$$1800 + (2.867343887 \times)$$

$$1800 + 252 + (2.8673 \times 8.534) = \text{Ep. G}$$

$$1800 + 252 + (2.8672916 \times 8.534) + 102 = \text{Ep. G}$$

$$1800$$

$$+ 2.867343$$



$$\begin{array}{r} 60/1.2 \\ 24/11.02 \quad (.4592) \\ \underline{96} \\ 122 \\ \underline{120} \\ 220 \\ \underline{216} \\ 40 \end{array}$$

$$\begin{array}{r} 60/48.9 \\ 24/20.81 \sqrt{.4673} \\ \underline{192} \\ 166 \\ \underline{175} \\ 165 \\ \underline{70} \end{array}$$

$$\begin{array}{r} 48254.72 \\ 2.86730000 \end{array}$$

$$\begin{array}{r} 6/54.7 \\ .91 \end{array}$$

$$\begin{array}{r} 72 \\ 86400 \\ \underline{288} \\ 432 \\ \underline{576} \\ 67208 \end{array}$$

$$\begin{array}{r} 54.72 \\ 540 \end{array}$$

$$\begin{array}{r} 102.0000 \\ 45.34 \\ \underline{16660} \\ 17060 \end{array}$$

$$\begin{array}{r} 000088 \\ 8673 \end{array}$$

$$\begin{array}{r} 60/72 \\ 576 \\ \underline{240} \\ 83 \end{array}$$

$$\begin{array}{r} 2.8673083 \\ 729167 \end{array}$$

$$\begin{aligned} \text{Ref.} &= 1800 \text{ Jan } 17^{\text{h}} 54^{\text{m}} + F(2.86737) - \text{Obs.} \\ &= 1800 \text{ Jan } 17^{\text{h}} 54^{\text{m}} + 252.3 \\ &\quad \begin{array}{r} 4 \quad 12 \\ \underline{22 \quad 6} \end{array} \end{aligned}$$

$$\begin{array}{r} 12 \\ 4 \\ \underline{96} \\ 102 \end{array}$$

$$252 + 12 \frac{F}{1000}$$

$$\begin{array}{r} 867343847 \\ 867291611 \\ \hline 100005236 \\ 0000522 \end{array}$$

$$\begin{array}{r} 1440 \\ 2088 \\ 2088 \\ \underline{552} \\ 564966 \\ 545 \\ 075168 \\ (C-0) \end{array}$$

$$\text{Schm. Ep.} = 1800 +$$

$$+ (354 + .07522)$$

$$\begin{array}{r} 252 \\ 75168 \end{array}$$

Jupiter's semi-diam. in secs. = polar semi. diam.  
from British N.A. x 1.039

Semi diam. of Mars. = D VP from Ann. Eph. - D  
representing semi diam. from Table, and Representing phase.

~~1490~~  
12966

.7083  
.0375  
.7458

1800 Jan. 1. 7458  
1867 " 0. 8672

~~7 52 52~~  
74 53  
19  
12 12

.8333  
.0333  
.0006  
.8672

2401872  
1  
730  
43

1440/.90006  
2640  
560  
.0013  
.5013

2402646.5013  
2378497.7458  
8422/24148.7625 (2.86734297  
16844

8422  
2113  
10605

73047  
67376  
56716  
50532

61842  
58954

28885  
25266

36190  
33688

25020  
16844

81760  
75798  
59620



|       |          | 5af.6.           | 5af.7 |        |
|-------|----------|------------------|-------|--------|
| 1782. | Nov. 12  | -34 <sup>m</sup> | +193  | (2153) |
| 1792  | Feb. 25. | -9               | +54   | (1000) |
| 1815  | Sept. 18 | -10              | -136  | (2001) |
| 1831  | Dec. 27. | -1               | -258  | (4074) |
| 1846  | Sept. 18 | +69              | -306  | (5950) |
| 1862  | Mar. 18. | +243             | -255  | (7924) |
| 1866  | Feb. 13  | +259             | -262  | (8422) |

$$\begin{array}{r}
 2402646.5083 \\
 2372238.3346 \\
 \hline
 10605 \overline{) 30408.1737} \quad 2.867343 \\
 \underline{21210} \\
 91981 \\
 \underline{84540} \\
 74417 \\
 \underline{68630} \\
 57873 \\
 \underline{54235} \\
 36387 \\
 \underline{31515} \\
 45720 \\
 \underline{42420} \\
 33000 \\
 \underline{31515} \\
 11850
 \end{array}$$

$$\begin{array}{r}
 28673 \overline{) 365.25} \quad 127.4 \\
 \underline{28673} \\
 78520 \\
 \underline{78520} \\
 0 \\
 211740 \\
 \underline{200711} \\
 110290 \\
 \underline{110290} \\
 0
 \end{array}
 \quad 509.6$$

216

$$\begin{array}{r} 2183 \\ 7924 \\ \hline 10107 \end{array}$$

$$\begin{array}{r} (1782) \quad 2401218.5771 \\ \quad \quad 2372238.3346 \\ \hline (1862) \quad 10107 \overline{) 28980.2425} \quad (2.86734367) \text{ periods} \\ \quad \quad \quad 20214 \end{array}$$

$$\begin{array}{r} 87662 \\ 80856 \\ \hline 68064 \\ 60642 \\ \hline 74222 \\ 70749 \\ \hline 34735 \\ 30321 \\ \hline 44140 \\ 40428 \\ \hline 37120 \\ 30321 \\ \hline 67990 \\ 60642 \\ \hline 73480 \\ 70749 \end{array}$$

$$\begin{array}{r} 2183 \\ 8422 \\ \hline 10605 \end{array}$$

$$\begin{array}{r} 2402646.5083 \\ 2372238.3346 \\ \hline 30408.1737 \quad (2.86734311) \\ \quad \quad 21210 \\ \quad \quad \quad 91981 \\ \quad \quad \quad 84840 \\ \hline \quad \quad \quad 71417 \\ \quad \quad \quad \quad 63630 \\ \hline \quad \quad \quad \quad 77873 \\ \quad \quad \quad \quad 74235 \\ \hline \quad \quad \quad \quad 36387 \\ \quad \quad \quad \quad 31815 \\ \hline \quad \quad \quad \quad 45720 \\ \quad \quad \quad \quad 42420 \\ \hline \quad \quad \quad \quad 33000 \\ \quad \quad \quad \quad 31815 \\ \hline \quad \quad \quad \quad 111850 \\ \quad \quad \quad \quad 10605 \\ \hline \quad \quad \quad \quad 12450 \end{array}$$



$$6/4A.9.$$

$$24 \overline{) 20.815} \quad (.86729167 \text{ } \textcircled{60})$$

$$\begin{array}{r} 166 \\ 144 \\ \hline \end{array}$$

$$\begin{array}{r} 175 \\ 168 \\ \hline \end{array}$$

$$\begin{array}{r} 229 \\ 216 \\ \hline \end{array}$$

$$\begin{array}{r} 28 \\ 160 \\ 144 \\ \hline 160 \end{array}$$

$$2.86729167 \text{ Sch. per.}$$

$$\begin{array}{r} 1146916668 \\ 860187501 \\ \hline \end{array}$$

$$\begin{array}{r} 1438645135 \\ 2293833336 \\ \hline \end{array}$$

$$\begin{array}{r} 24469.46711178 \\ 2402967.4592 \\ \hline \end{array}$$

$$\begin{array}{r} 2378497.9921 \\ 2378497.7458 \\ \hline \end{array}$$

$$\begin{array}{r} 2463 \\ 1440 \\ \hline \end{array}$$

$$\begin{array}{r} 98520 \\ 9852 \\ \hline \end{array}$$

$$\begin{array}{r} 2463 \\ 354.6720 \\ \hline \end{array}$$

$$2.86729167 \text{ Sch. per.}$$

$$2.8673436 \text{ Arg. per.}$$

$$\begin{array}{r} .00005260 \\ 1440 \\ \hline \end{array}$$

$$\begin{array}{r} 2880 \\ 200 \\ \hline \end{array}$$

$$\begin{array}{r} 74800 \text{ per year.} \\ 749 \end{array}$$

$$.00002.$$

$$(355 - .07498)$$


$$\begin{array}{r} 1074960 \\ 44946 \\ \hline \end{array}$$

$$\begin{array}{r} 54 \\ 58.494 \\ 58.5 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \quad 32 \\ 3 \quad 41 \\ \hline 16 \quad 20 \end{array}$$

2.422

$$\begin{array}{r} 0.3842 \\ 1.1761 \\ \hline 1.5603 \end{array}$$



$$3.1206$$

$$24 = 1.3802$$

$$\begin{array}{r} 2.7604 \\ 3.1206 \\ \hline \end{array}$$

$$\begin{array}{r} 2/5.8810 \\ 2.9405 \\ 9.8110 \end{array}$$









$$\begin{array}{r} 28.56 \overline{) 22.536.79} \\ \underline{19992} \phantom{.79} \\ 25380 \\ \underline{25704} \phantom{.79} \end{array}$$

$$28.56 \overline{) .81000} (.03$$

$$\underline{.8568}$$

$$-.53 + .21b - .04c = +.93 + .49b + .06c$$

$$+.28b = -.10c - 1.46$$

$$-.10c = 1.46 + .28b$$

$$c = -14.60 - 2.80b$$

$$-.53 + .21b - .04c = -21.60 - .32b - 28.52c$$

$$+28.48c = -.53b - 21.07$$

$$c = -.02b - .74$$

$$-.79 - .03b = -.02b - .74$$

$$-.01b = +.05$$

$$b = 5.00$$

IV

2.2

$$\begin{array}{r}
 9 \\
 \hline
 91 \\
 522 \overline{) 91} \\
 \hline
 41 \\
 242 \\
 \hline
 22 \\
 11 \\
 11 \\
 52 \\
 67 \\
 2 \\
 52 \\
 54 \\
 67 \\
 2 \\
 4 \\
 10 \\
 21 \\
 17 \\
 +
 \end{array}$$

$$\begin{array}{r}
 11 \\
 \hline
 11 \\
 9 \\
 -
 \end{array}$$

$$\begin{array}{r}
 141 \\
 \hline
 01 \\
 94 \\
 \hline
 652 \overline{) 16141} \\
 \hline
 108 \\
 1132 \overline{) 16141} \\
 \hline
 1132 \\
 481 \\
 16141
 \end{array}$$

$$\begin{array}{r}
 141 \\
 \hline
 2962 \\
 \hline
 9955 \\
 1035 \\
 2195 \\
 9955
 \end{array}$$

358





$$\begin{array}{r}
 60/58.512 \\
 60/41.9752 \\
 24/20.8162.5333(5673438.9 \\
 \hline
 192 \\
 \hline
 161 \\
 \hline
 144 \\
 \hline
 176 \\
 \hline
 168 \\
 \hline
 82 \\
 \hline
 72 \\
 \hline
 105 \\
 \hline
 96 \\
 \hline
 93 \\
 \hline
 72 \\
 \hline
 213 \\
 \hline
 192 \\
 \hline
 213 \\
 \hline
 192 \\
 \hline
 210 \\
 \hline
 216
 \end{array}$$

$$\begin{array}{r}
 47 \\
 2371192 \\
 \hline
 730 \\
 2371923 \\
 \hline
 315 \\
 2372238
 \end{array}$$

Stars not Struve's.

$$\begin{array}{r}
 1.23 \\
 \hline
 .29
 \end{array}$$

$$\begin{array}{r}
 4.6 \\
 \hline
 4.9
 \end{array}$$

$$\begin{array}{r}
 3.5 \\
 \hline
 1.34
 \end{array}$$

$$\begin{array}{r}
 1.3 \\
 \hline
 4.5
 \end{array}$$

$$\begin{array}{r}
 1.7 \\
 \hline
 1.53
 \end{array}$$

$$\begin{array}{r}
 2.1 \\
 \hline
 1.6
 \end{array}$$

$$\begin{array}{r}
 6.7 \\
 \hline
 5.34
 \end{array}$$

$$\begin{array}{r}
 6.7 \\
 \hline
 1.36
 \end{array}$$

$$\begin{array}{r}
 3.1 \\
 \hline
 1.86
 \end{array}$$

$$\begin{array}{r}
 4.2 \\
 \hline
 4.2
 \end{array}$$

$$\begin{array}{r}
 4.2 \\
 \hline
 4.2
 \end{array}$$

$$\begin{array}{r}
 4.2 \\
 \hline
 4.2
 \end{array}$$

$$\begin{array}{r}
 4.2 \\
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 4.2
 \end{array}$$

$$\begin{array}{r}
 4.2 \\
 \hline
 4.2
 \end{array}$$

$$\begin{array}{r}
 4.2 \\
 \hline
 4.2
 \end{array}$$

$$\begin{array}{r}
 3.8 \\
 \hline
 6.0
 \end{array}$$

$$\begin{array}{r}
 1.6 \\
 \hline
 1.15 \\
 \hline
 .42
 \end{array}$$

$$\begin{array}{r}
 8.7 \\
 \hline
 7.46 \\
 \hline
 1.24
 \end{array}$$

$$\begin{array}{r}
 2.5 \\
 \hline
 3.3 \\
 \hline
 2.66 \\
 \hline
 .64
 \end{array}$$

$$\begin{array}{r}
 3.3 \\
 \hline
 2.71 \\
 \hline
 .71
 \end{array}$$

$$9.5$$

$$\begin{array}{r}
 1.7 \\
 \hline
 .96 \\
 \hline
 .74
 \end{array}$$

$$\begin{array}{r}
 3 \\
 \hline
 27
 \end{array}$$

$$6.1$$

$$\begin{array}{r}
 3.726 \\
 \hline
 .44
 \end{array}$$

$$3.7$$



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