Miscellaneous Observations

Observatory Apr 20 1896

Dear Prof. Rogers,

I enclose the list of books sent by express to you. The following is a list of the sheets you wanted which are also in the package.

1 Comparison of computed and tabular values of $Z'-Z'$ $z+\lambda+\theta$ for 1900 from 1875.
2 Your computation of $Z'-Z'$ for 1899 " "
3 Ivy " " " " " "
4 Approximate count of stars in Carrington's Catalogue.
5 Dr Elkin's 24 North Polar Stars in 4 groups in order of declination see "Transactions of Ast. Ob. Yale University" Vol I pt III
6 North Polar Chart with Dr. Elkins 24 Stars 1880.0 plotted upon it.

Total number of books 18 of sheets 6 including copy of Chart.

Sincerely yours
Anna Winlock.

List of Record Books selected by Prof Rogers Apr 16th 1896 to be sent to Waterville

12 L1 to L12 all books relating to "Investigation of Errors of Circle"
1 M 22 "Constants 1879"
1 M 23 " "
1 M 26 " List 1880"
1 M 33 "General Record"
1 M 42 Notation of Record Books

and

1 Carrington's Catalogue of North Polar Stars

18 Books

Note See if A33 A40 A41 are in Waterville They contain readings of level for Fundamental Stars

Series J probably in Waterville. They contain "Chronographic Records and may possibly contain also level readings".

May 5 1881

(R)	42 Leo		(R)	l Leo		(R)	ι Ceph.ei		(R)	Br 1508		(R)	β Ursa Maj		(R)	α Ursa Maj	
	10 39 17			10 43 2			22 45 26			10 50 28			10 54 32			10 56 25	
	+31 18			+11 10			+114 25			+78 24			+57 2			+62 28	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
10	38	50.6	10	42	38.4	22	44	30.3	10	48	50.0	10	54	3.3	10	55	40.8
		53.0			40.5			35.2			0.4			7.0			45.3
		55.4			42.7			40.2			10.8			10.9			49.5
		57.9			44.9			45.1			20.6			14.6			54.1
		0.3			46.8			50.4			31.9			18.4			58.5
		2.7			51.0			0.4			52.3			25.9			
		7.6			53.1			5.3			2.4			29.9			7.4
		10.0			55.3			10.2			12.8			33.6			11.9
		12.3			57.3			15.1			22.9			37.4			16.2
		14.8			59.5			20.2			33.1			41.1			20.8
		17.2			1.5			25.1			43.3			45.0			25.4
		19.7			3.6			30.3			53.0			48.6			29.6
		22.0			5.8			35.3			3.6			52.6			34.0
		24.5			7.9			40.3			14.0			56.4			38.6
		29.2			12.0			50.2			24.7			3.9			52.1
		31.7			14.3			55.4			45.2			7.8			56.5
		34.2			16.3			0.2			55.3			11.5			0.8
		36.5			18.4			5.2			5.2			15.3			5.4
		39.0			20.6			10.3			15.8			19.1			9.9

May 5 1881

May 7 1881

May 5.

May 7.

(R)	δ Leo 11 7 40 +21 11		(R)	π Capricorni 23 4 5 +10 5 15		(R)	δ Crateris 11 13 20 −14 6		(R)	Gr 1771 11 14 50 +6 41		(R)	λ Draco 11 24 25 +69 59		(R)	δ Leo 10 2 4 +12 33	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
11	7	24.3	23	2	38.9	11	13	1.0	11	14	38.5	11	23	24.0	10	1	39.6
		26.5			46.8			3.0			40.6			30.0			41.9
		28.7			54.4			5.3			42.6			36.1			43.6
		31.0			2.0			7.4			44.9			42.1			45.9
		33.2			9.9			9.5			46.9			48.1			47.9
		37.6			26.2			18.9			51.0			0.3			52.2
		39.7			34.0			16.0			53.0			6.2			54.4
		41.9			41.4			18.0			55.1			12.3			56.5
		44.1			49.4			20.2			57.2			18.2			58.6
		46.4			57.1			22.3			59.3			24.3			0.8
		48.7			4.8			24.4			1.4			30.3			2.8
		50.9			13.0			26.5			3.4			36.5			4.8
		53.0			20.8			28.7			5.6			42.2			7.0
		55.3			28.7			30.8			7.7			48.4			9.0
		59.8			44.3			35.0			11.9			0.5			13.5
		2.0			52.0			37.1			13.9			6.6			15.5
		4.1			0.0			39.3			15.9			12.7			17.6
		6.4			7.8			41.5			18.0			18.7			19.7
		8.6			15.6			43.6			20.0			24.8			21.8

(B) ζ Leo 10 9 57 +24 1			(B) γ Leo 10 13 18 +20 27			(B) μ Urs Maj 10 15 7 +42 6			(R) 36 Urs Maj 10 23 3 +56 35			(R) 9 H Draco 10 25 1 +76 19			(R) 37 Urs Maj 10 27 33 +57 42		
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
10	9	40.7	10	13	1.6	10	14	46.2	10	22	23.9	10	24	—	10	26	52.1
		43.0			3.8			49.2			27.6			—			55.9
		45.1			6.0			52.0			31.8			—			59.7
		47.5			8.0			54.8			35.1			—			3.4
		50.0			10.4			57.6			38.9			—			7.5
		54.2			15.0			3.0			46.4			28.5			15.2
		56.5			16.8			5.9			50.2			36.9			19.0
		58.8			19.1			8.5			53.9			43.5			22.9
		1.1			21.4			11.5			57.7			54.5			26.8
		3.4			23.8			14.4			1.4			3.5			30.8
		5.8			25.9			17.2			5.1			12.0			34.5
		7.8			27.9			19.1			8.8			20.8			38.4
		10.1			30.4			22.8			12.7			29.8			42.2
		12.4			82.5			25.6			16.3			38.0			46.2
		16.8			86.9			30.8			23.8			—			53.8
		19.0			39.0			33.7			27.9			—			57.7
		21.6			41.2			36.5			31.5			—			1.7
		23.8			43.5			39.3			35.2			—			5.5
		25.9			458			42.0			39.1			—			9.4

May 7-1881

(R)	31 Cephei 22 B2 48 +76 58		(R)	42 Leo 10 39 17 +31 18		(R)	l Leo 10 43 2 +11 10		(R)	ι Cephei 22 45 26 +114 25		(R)	46 Leo 10 46 41 +34 51		(R)	Br 1508 10 50 28 +78 24	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
	31	30.0		38	50.1		42	38.0			—		46	13.9		48	19.3
		37.0			52.4			40.0			—			16.4			0.0
		44.0			55.0			42.1			—			18.9			9.7
		51.4			57.4			44.2			—			21.4			20.2
		58.4			59.8			46.3			—			23.8			30.4
														28.8			
		12.4			4.6			50.5		45	0.2			28.8			50.8
		19.4			7.0			52.5			5.1			31.5			1.2
		26.7			9.4			54.7			10.0			34.0			11.7
		33.9			11.9			56.8			15.0			36.5			22.2
		40.8			14.3			58.9			19.8			39.0			31.9
		47.8			16.7			1.0			24.8			41.6			42.0
		54.6			19.0			3.1			29.9			44.0			52.6
		1.8			21.5			5.2			34.9			46.7			2.8
		8.9			24.0			7.4			40.0			49.0			13.0
		28.3			28.9			11.6			—			54.1			33.9
		30.4			31.2			13.6			—			56.6			44.1
		37.4			33.6			15.8			—			59.2			54.3
		44.5			36.1			17.8			—			1.8			4.7
		51.7			38.7			19.9			—			4.2			15.0

(R)	Ursæ Majoris 10 54 32 +57 2		(R)	Ursæ Majoris 10 56 25 +62 23		(R)	8 Leonis 11 7 40 +21 10		(R)	π Cephei 23 4 5 +105 15		(R)	α Crateris 11 13 20 −14 6		(R)	Gr. 1771 11 14 50 +6 41	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
10	54	2.7	10	55	40.3	11	7	23.8	23	2	38.2	11	13	0.6	11	14	38.0
		6.7			45.0			26.0			46.5			2.6			40.0
		10.3			49.2			28.2			54.2			4.8			42.2
		14.3			53.8			30.5			3.7			6.9			44.2
		18.0			57.8			32.7			9.7			9.0			46.4
		25.8			7.0			37.1			25.5			13.4			50.5
		29.2			11.4			39.4			33.2			15.5			52.6
		33.0			16.0			41.6			40.9			17.5			54.7
		36.8			20.4			43.8			49.0			19.6			56.8
		40.6			24.7			46.1			58.8			21.8			59.0
		44.5			29.0			48.2			4.5			23.9			0.9
		48.2			33.5			50.4			12.6			26.1			3.0
		52.0			37.9			52.8			20.3			28.3			5.1
		56.0			42.4			54.8			27.8			30.4			7.2
		3.4			51.7			59.2			44.3			34.5			11.4
		7.3			56.0			1.5			51.8			36.7			13.4
		11.0			0.2			3.7			59.5			38.9			15.5
		14.9			4.8			5.9			7.2			41.0			17.5
		18.6			9.2			8.1			15.3			43.0			19.7

May 7 1881 May 9 1881

May 7 . May 9

(R)	λ Draco		(B)	24 Aphei		(B)	ζ Leo		(B)	γ' Leo		(R)	u Urs Maj		(R)	31 Leo	
	11 24 25			22 7 29			10 9 57			10 13 18			10 15 7			10 21 2	
	+69 59			+108 14			+24 1			+20 27			+42 6			+37 19	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
11	28	—	22	6	—	10	9	40.6	10	13	1.4	10	14	46.2	10	20	33.5
		—			—			42.8			3.6			48.9			36.1
		—			—			45.0			5.8			51.7			38.6
		—			—			47.3			8.0			54.4			41.3
		—			—			49.6			10.2			57.3			43.9
		59.4			56.9			54.0			14.6			2.7			49.0
		5.5			8.2			56.4			16.8			5.5			51.7
		11.9			9.7			58.7			19.0			8.4			54.8
		17.8			16.2			0.9			21.1			11.1			58.8
		23.9			22.9			3.2			23.5			13.9			59.5
		29.8			29.4			5.4			25.7			16.7			2.1
		35.9			36.0			7.7			27.9			19.4			4.8
		42.0			42.4			9.9			30.0			22.1			7.3
		47.8			49.4			12.1			32.1			25.0			9.9
		—			—			16.6			36.6			30.7			15.0
		—			—			18.8			38.9			33.3			17.6
		—			—			21.3			41.0			36.1			20.3
		—			—			23.4			43.2			39.0			22.9
		—			—			26.8			45.4			41.9			25.5

(R)	86 Ursæ Majoris		(R)	94 Draconis		(R)	37 Ursæ Majoris		(R)	31 Cephei		(R)	42 Leonis		(R)	ℓ Leonis	
	10 23 3			10 25 1			10 27 33			22 32 48			10 39 17			10 43 2	
	+ 56 35			+ 76 19			+ 57 42			+ 106 58			+ 31 18			+ 11 10	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
10	22	23.7	10	24	—	10	26	51.7	22	31	30.4	10	38	50.0	10	42	37.7
		27.4			—			53.6			37.4			52.4			39.8
		31.1			—			59.6			44.5			54.7			41.9
		34.9			—			3.3			51.4			57.2			44.0
		38.6			—			7.3			58.6			59.7			46.0
		46.1			27.6			14.9			12.9			4.5			50.3
		49.9			36.8			18.8			19.9			6.9			52.4
		53.7			45.3			22.5			26.7			9.4			54.5
		57.3			54.0			26.6			33.9			11.8			56.6
		1.3			2.6			30.8			41.0			14.0			58.7
		4.9			11.5			34.0			48.3			16.5			0.8
		8.8			20.3			38.2			55.2			19.0			3.0
		12.4			29.0			42.0			2.3			21.4			5.0
		16.1			37.6			45.8			9.4			23.8			7.1
		23.5			—			53.6			23.4			28.6			11.4
		27.4			—			57.4			30.4			31.0			13.5
		31.1			—			1.2			37.5			33.4			15.7
		35.0			—			5.2			44.6			35.9			17.7
		38.8			—			9.0			52.0			38.3			19.8

May 9 1881

(R)	ι Cephei 22 45 26 +114 25	(R)	46 Leo 10 46 41 +34 51	(R)	Br 1508 10 50 28 +78 24	(R)	β Ursæ Maj 10 54 32 +57 2	(R)	α Ursæ Maj 10 56 25 +62 23	(R)	χ Leo 10 58 24 +7 59
h	m s	h	m s	h	m s	h	m s	h	m s	h	m s
22	—	10	46 13.9	10	48 48.1	10	54 2.4	10	55 40.0	10	58 30.4
	—		16.2		59.0		6.4		44.6		32.5
	—		18.8		9.3		10.2		49.0		34.7
	—		21.2		19.7		14.1		53.6		36.8
	—		23.8		30.3		17.8		57.8		38.9
	45 0.1		28.8		50.5		25.4		6.8		43.0
	5.0		31.4		1.0		29.0		11.2		45.0
	10.0		33.9		11.0		32.9		15.6		47.3
	14.9		36.3		21.6		36.6		20.1		49.3
	20.1		38.8		31.5		40.5		24.7		51.4
	25.0		41.4		42.2		44.4		29.0		53.4
	30.1		44.0		52.4		48.1		33.4		55.6
	35.0		46.4		2.5		52.0		37.9		57.7
	40.1		49.0		12.9		55.7		42.4		59.7
	—		54.0		33.4		3.4		51.3		4.0
	—		56.5		43.9		6.6		55.7		6.0
	—		59.0		53.7		10.8		0.1		8.0
	—		1.6		4.0		14.7		4.7		10.1
	—		4.0		14.5		18.5		9.1		12.2

(R)	δ Leo		(R)	π Capricorni		(R)	ζ Crateris		(R)	91 Tr 1771		(R)	4 Cass		(R)	λ Draco	
	11 7 40			23 4 5			11 13 20			11 14 50			23 19 35			11 24 25	
	+21 11			+10 5 15			−14 6			+6 41			+118 22			+69 59	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
11	7	23.6	23	2	38.5	11	13	0.4	11	14	38.0	23	18	44.0	11	23	22.9
		26.0			46.4			2.5			40.0			48.3			29.0
		28.1			54.2			4.6			42.0			52.6			35.1
		30.3			2.0			6.8			44.0			56.7			41.1
		32.5			10.0			8.9			46.1			1.3			47.3
		37.0			25.8			13.0			50.4			9.8			59.3
		39.2			33.6			15.2			52.5			14.2			5.3
		41.4			41.1			17.3			54.6			18.4			11.4
		43.6			49.2			19.6			56.6			23.2			17.5
		45.8			57.0			21.7			58.7			27.3			23.4
		48.1			4.7			23.8			0.7			—			29.3
		50.3			12.6			26.0			2.9			—			35.4
		52.5			20.4			28.0			5.0			—			41.3
		54.8			28.5			30.1			6.8			—			47.7
		59.0			44.3			34.4			11.2			—			59.7
		1.4			52.2			36.6			13.2			—			5.7
		3.5			59.7			38.7			15.4			2.3			11.4
		5.8			7.8			41.0			17.4			6.5			17.7
		8.0			15.7			43.0			19.5			10.8			23.8

May 23 — 1881

(R)	β Leo. 11 42 53 +15 15		(R)	β Virginis 11 44 30 +2 26		(R)	γ Urs Maj 11 47 35 +54 21		(R)	Gr. 1852 11 59 12 +77 34		(R)	β Caes. 10 2 44 +121 31		471 Draco 12 6 40 +78 16	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
11	42	47.2	11	44	18.0	11	47	9.8	11		—	10	2	15.5	12		—
		49.4			20.0			13.6			—			19.6			—
		51.5			22.1			16.9			—			23.4			—
		53.7			24.2			20.2			—			27.4			—
		55.8			26.4			24.0			—			31.3			—
		0.0			30.6			31.0	58		—			89.0	6		13.4
		2.1			32.6			34.7	59		0.6			43.2			24.4
		4.2			34.7			38.1			9.1			47.2			34.8
		6.5			36.6			41.8			19.4			51.0			44.5
		8.7			38.7			45.6			28.3			55.0			53.4
		10.8			40.8			49.0			38.2			59.0			5.2
		12.9			43.0			52.4			47.8			3.0			15.6
		15.0			45.0			56.0			57.6			6.7			25.4
		17.2			47.0			59.5			8.0			10.9			35.9
		21.4			51.2			6.7			—			18.8			—
		23.6			53.2			10.4			—			22.5			—
		25.8			55.1			13.7			—			26.5			—
		27.9			57.4			17.3			—			30.4			—
		30.0			59.5			21.0			—			34.5			—

(R)	δ Ursæ Maj. 12 9 39 +57 41			(R)	γ Virginis 12 18 30 −0 1			(R)	6 Canum Ven. 12 20 0 +39 40			(R)	δ Corvi 12 23 37 −15 30			R	β Corvi 12 28 2 −22 44			(R)	γ Virginis 12 35 32 −0 47		
h	m	s		h	m	s		h	m	s		h	m	s		h	m	s		h	m	s	
12	9	5.0		12	13	37.5		12	19	43.0		12	23	30.0		12	27	54.7		12	35	26.4	
		8.7				39.6				45.5				31.9				56.8				28.3	
		12.8				41.7				48.0				34.2				59.0				30.5	
		16.6				43.8				50.7				36.2				1.3				32.6	
		20.5				45.9				53.4				38.5				3.6				34.6	
		28.2				50.1				58.9				42.8				8.0				38.8	
		32.0				52.1				1.7				44.8				10.2				40.7	
		36.1				54.1				4.2				47.0				12.5				43.0	
		40.0				56.1				6.8				49.2				14.7				44.9	
		43.6				58.3				9.5				51.4				16.9				47.0	
		47.6				0.3				12.4				53.5				19.0				49.1	
		51.4				2.4				15.0				55.6				21.4				51.2	
		55.1				4.4				17.8				57.7				23.9				53.2	
		59.2				6.4				20.4				0.0				26.0				55.3	
		7.0				10.6				25.9				4.1				30.5				59.4	
		10.8				12.7				28.5				6.4				32.6				1.4	
		14.5				14.9				31.0				8.5				34.9				3.5	
		18.5				16.9				33.8				10.6				37.0				5.6	
		22.3				18.8				36.4				12.8				39.3				7.6	

May 23 1881

(R) Ellis. Proj

α 12 48 42
+56 37

h m s
12 48 —
25.8
29.2
33.2
36.8

44.0
48.0
51.9
55.5
59.3
3.0
6.7
10.9

—
—
—
—
—

July 1, 1881 Observation of Comet b 1881 and of Comparison stars. W.V.B. Observer.

	f Draco.			μ Herculis		36 Camel. Lc.			22 H. Camel. Lc		
	17 32 26			17 42 48		6 0 53			6 5 44		
	+68 13			+27 47		+65 44			+69 22 110° 38′		
Tan δ	+2.50			+0.53		∓2.22			−2.66 z = −69° 15′		
	δ1					δ1			δ1		
	31 27.5	32 6.7	32 39.8	41 57.2	42 11.2	0 13.8	0 28.3	0 59.6	4 47.5	5 10.5	5 45.6
	32.2	12.3	45.4	59.6	13.6	16.7	33.3	1 3.3	51.7	16.2	51.4
	34.3	17.9	51.2	1.9	15.9	20.5	38.4	8.5	57.3	21.9	57.2
	38.2	23.5	56.6	4.2	18.3	23.0	43.2	13.7	5 1.0	27.9	6 3.2
	41.5	29.1	2.1	6.5	20.5	27.6	48.2	18.4	5.6	33.6	8.9
			7.7		22.9			23.7			14.7
	31m 34.74s		13.4		25.2	0m 20.32		28.7	4m 56.62s		20.8
		38 35.6	18.8	42 34.5	27.5		1 48.7	33.5		6 43.1	26.6
		41.3	24.6	36.9	29.9		53.9	38.7		49.1	32.3
	δ2	46.8		39.2			58.8		δ2	55.7	
	34 42.7	52.3		41.5			2 3.7		7 46.6	7 1.5	
	47.9	58.2		43.9			9.0		50.9	7.7	
	52.5								55.1		
	56.0								59.6		
	35 1.0	33 2.37	33 2.19	42 20.54	42 20.56		1m 18.55s	1 18.67	5.2	6 8.72	6 8.97
Tm + TS	34m 52.02s		33m 2.28s		42 20.55	0m 20.32s		1m 18.61s	7m 53.48s		6m 8.85s
R.A.			32 29.72		41 51.59			0 54.45			5 45.63
Corr.					+.05						
T − R.A.			+32.56		+28.91			+24.16			+23.22

Assume $i = 4' 58''$

Circ. read.	52′ 22.″12	54′ 8.″15				53′ 4.″70			29′ 46.″22	28′ 26.″30	
Tm − TS	+87.54	−109.72							+72.23	−106.63	
log Tm − TS	1.94221	2.04080 n							1.85852	2.02789	
log cos δ	9.56949	9.56949							9.54702 n	9.54702 n	
log 15 tan i	0.11804	0.11804							11071	11071	
	1.62974	1.72788 n							1.51645 m	1.68562	
Rin	+42.44	−53.44							+32.84	+48.49	
	53 4.86	53 2.71							29 13.38	29 14.79	
									110 53 35.0	53 32.6	
	53 23										
	11										
	680										
☉	+ 29 45.0								68 43 7 11	68 45 57	
Z	26	27	30 55								
B+π+	−.00 398	−.00 398							−.00 398	−.00 398	
μ + log sin p	1.48690	1.43640							2.16435	2.16389	
	1.43292	1.43242							2.16037	2.15986	
	+27.10	+27.17							+2′ 24.67	+2 24.50	
	− 1.44	− 2.25							+ 1.1	+ 2.0	
68	30 10.7	30 9.9									
68	12 44.8										

		tan δ	T − R.A.	n tan δ − (ΔT + m)
μ Herculis	17h 42m + .53	+ 28.91	−.95	27.96
5 Lyra mod. 1840	+ .83	+ 29.65	−1.49	28.16
	+ .68	+ 29.28		+28.06

		tan δ	T − R.A.	n tan δ − (ΔT + m)		
f Draco.	17h 32m	+2.50	+3.56	−4.50	28.06	
36 Camel.	6 1	−2.22	+24.16	+4.00	28.16	
22 Camel.	6 6	−2.66	+23.22	+4.79	28.01	
36 Draco.	18 13	+2.08	+31.84	−3.74	28.10	
					28.08	
					28.06	
					28.07	

$O = +3.28 + 1.82\,n$ $\quad n = +1.80$
$-5.12 - 2.90$ $\quad +1.76$
$-6.06 - 3.34$ $\quad +1.80$
$+2.56 + 1.40$ $\quad +1.83$
-1.80

$\Delta T + m = -28.^{s}07$

110	56 08	56 01	
110	34 33.1	34 33.1	
	−17 27.7	−17 27.1	
		27.3	

R_{eq} $\quad -17\ 25.9 \quad -17\ 25.1$
25.5

Rejected - Rine and include plane in R_{eq}.

	36 Draconis.			5 Lyrae med.		Comet (b) 1881			
	18 13 13			18 40 26		6 22 52			
	+64 24			+39 29		+109 19			
	+2.08			+0.83		-2.86			
	S.					S.			
	12 30.0	13 0.5	13 28.9	40 32.5	40 48.5	21 22.2	21 58.0	22 35.6	
	33.5	5.1	33.5	35.2	51.4	25.9	3.8	41.4	
	37.0	9.9	38.2	37.9	54.0	31.9	10.2	47.9	
	41.0	14.6	43.1	40.6	56.7	36.5	16.5	54.2	
	44.4	19.2	47.9	43.2	59.3	42.5	22.8	23 0.3	
			52.6		41 2.0			6.8	
			57.5		4.6	21m 31.80		12.2	
	12m 37.18	14 16.3	14 2.1	41 15.3	7.3		23 38.1	19.3	
		21.3	7.0	18.0	10.0		44.2	26.3	
		26.1		20.7		S2	50.9		
		30.9		23.5		24 52.5	57.0		
		35.5		26.2		56.3	3.2		
						2.3			
						7.9			
		13m 47.94	13 47.87	40 59.31	40 59.31	15.8	23 0.47	23 0.33	
Tm + TS	12m 37.18		13m 47.90		40m 59.31	25 2.96		23m 0.40	
R.A			13 16.06		40 29.66		n Tm S	+5.15	
Corr.							ΔT+m	-28.07	
T - R.A.			+31.84		+29.65		R.A	22m 37.38	

Circle Readings	43' 34".37					46' 10".70	43' 58".30			
Tm - T)						+ 8860	- 12256			
log (Tm-T) S)						1.94763	2.08835			
Corr C						9. 51955m	9. 51955m			
log (Tm-T) + C)						.11071	11 271			
log R.A.						1.57768	1.71861			
Corr. Circle Red.						- 3781	+ 5231			
S.						45 32.89	45 50.61			
					109	37 15.6	36 57.7			
2 (approx)					63	3 36	2 23			
(B+H+J)						- .00398	- .00398	- .00398	- .00398	
log (L+G 2)						1.94759	1.94727	2.13095	2.13053	
Sum						1.54361	1.94329	2.12697	2.12655	
log R						+ 1 278	+ 1 278	+ 2 13.9	+ 2 13.8	
2R						+ 1.4	+ 2.6	+ 1.4	+ 2.6	
Sum						+ 1 29.2	+ 1 304	+ 2 15.3	+ 2 16.4	
S'					109	38 44.6	38 28.1	39 31.7	39 15.1	
Corr						- 17 26.4	- 17 26.4	- 17 26.4	- 17 26.4	
S					109	21 18.2	21 1.7	22 5.3	21 48.7	
					70	38 41.8	38 58.3	37 54.7	38 11.3	
Red. for hour. motion								+ 7.2	- 10.0	
before Tm & after Tm						+ 7.2	- 10.0	38 1.9	38 1.3	
					70°	38' 49.0	38' 48.3			

July 6. 1881 Observation of Comet (b) 1881 and of Comparison Stars. W.V.B. Observer.

36 Camelop. L.C. 60 54 +65° 4.4′ 114°16′ | 22 H. Camelop. L.C. 6 5 44 +69 22 110° 38′ | Gr. 2533 18 12 00 +42 7 | η Serpentis 18 15 13 −2 36

δ		δ															
59 48.4	0 31.1	1 1.7	5 0.2	5 12.8	5 48.6			12 6.0	12 22.5			15 24.3	15 36.8				
51.6	36.1	6.7	5.0	19.3	54.2			8.8	25.3			26.3	38.8				
56.4	41.4	11.6	9.0	24.7	6 0.3			11.6	28.5			28.5	40.8				
0 1.1	46.6	16.8	14.2	30.7	6.1			14.3	31.3			30.4	42.9				
4.4	51.3	21.4	17.2	36.9	11.9			17.2	33.9			32.6	45.0				
		26.7			17.7				36.6				47.1				
59m 56.38		31.6	5m 9.12		23.3				39.6				49.1				
1 51.6		36.6		6 46.9	29.5			12 50.3	42.2			57.4	51.0				
56.7		41.7		52.6	36.1			53.1	48.1			59.4	53.0				
2 1.6			δ2	58.5				56.0				16 1.5					
6.5			7 55.7	4.7				59.0				3.6					
11.9			8 0.1	10.7				13 1.8				5.6					
			4.1														
			8.0														
1m 21.48	1m 21.64		12.8	6 11.78	6 11.86			12 33.81	12 33.89			15 44.96	15 44.94				
T 59m 56.38	1m 21.56	8m 4.14		6m 11.82					12m 33.85				15m 44.95				
R.A	0 54.64			6 45.84					12 00.04				15 13.14				
T-R.A	26.92			25.98					33.81				31.81				

53′ 17.50			29′ 40.45	28′ 22.75													
+85.18			+62.70	−112.32													
1.93034			1.79727	2.05046 n													
9.61373 n			9.54702 n	9.54702 n													
0.11071			0.11071	0.11071													
1.65478 n			1.45500	1.70819													
−45.16			−28.61	+51.07													
52 32.34			29 11.94	29 13.82													
114 30 16.01		110	53 36.41	53 34.53													
72 10 43.9		68	47 6.88	45 48.5													
−.00660			−.00660	−.00660													
2.24838			2.16799	2.16752													
2.24178			2.16139	2.16092													
+ 2 54.5		Ref	+2 25.01	+2 24.85													
+ 1.5		Rem	+ 0.7	+ 2.3													
− 1.3		Ref	+2 25.7	+2 27.2													
+2 54.7			− 1.3	− 1.3													
114 33 10.7		Sum	+2 24.4	+2 25.9													
65 26 49.3		110	56 0.8	56 0.4													
65 44 15.1		69	3 59.2	3 59.6													
17 26.8			21 28.3	21 25.3													
17 25.1		Rem.	17 26.1	17 25.7													
+.7			17 25.1	17 25.1													
			+ 1.0	+.6													

		Sem δ	T−R.A	n tan δ	−(ΔT+m)
Gr. 2533	18h 12m	+0.90	+33.81	−1.99	+31.82
η Serpen.	18 15	−0.05	+31.81	+0.11	31.70
109 Herc.	18 19	+0.40	+32.67	−0.88	31.79
ω Aquil.	19 12	+0.20	+32.35	−0.44	31.91
		+0.36	+32.66		+31.805

		tan δ	T−R.A.	n tan δ	−(ΔT+m)
36 Camel.	6h 1	−2.22	+26.92	+4.91	+31.83
22 H. Camel.	6 6	−2.66	+25.98	+5.88	31.86
23 H. Camel.	6 26	−5.50	+18.98	+12.16	31.14 ✓
24 H. Camel.	6 43	−4.37	+22.23	+9.66	31.89
					+31.860

0 = −5.74 −2.58 n
−6.68 −3.02 n
−13.68 −5.86 n
−10.43 −4.73 n

n = −2.22
−2.21
−2.33 ✓
−2.21
−2.21

ΔT+m = −31.83

109 Herculis
18 18 41
+21 43

23 H. Camel. L.C.
6 25 55
+79 41 12

24 H. Camel. L.C.
6 42 43
+77 7 24

ω Aquilæ
19 12 18
+11 23

					δ_1						δ_1								
	18	51.8	19	5.3	23	39.6	24	20.6	25	28.6	40	3.0	41	32.1	42	28.4	12	29.0	12	41.7
		54.0		7.3		46.2		31.8		46.8		8.5		41.9		37.0		30.1		43.8
		56.3		9.3		53.1		42.7		52.0		16.4		50.7		46.2		33.2		45.9
		58.5		11.5		59.7		54.9	26	3.3		20.5	42	0.2		56.2		35.3		48.0
	19	0.7		13.9		7.3	25	6.5		15.5		27.4		10.2	43	5.2		37.4		50.0
				16.2						26.0						14.1				52.1
				18.3	23m	53.18				38.8	40m	15.16				23.7				54.2
		27.3		20.5			27	23.7		49.7			44	0.8		32.8	13	2.7		56.3
		29.6		22.7				35.3	27	1.6				9.4		42.3		4.8		58.5
					δ_2						δ_2									
		31.7				47.4						19.0						6.9		
		34.0			28	59.2		58.3			45	39.3		28.3				8.9		
		36.2				7.1		9.8				43.8		38.3				11.2		
						15.5						50.0								
						24.7						59.9								
	19	14.01	19	13.89		34.3	26	15.10	26	13.51		7.6	43	5.09	42	5.10	12	49.95	12	50.06
			19m	13.95	28m	16.22			26	14.31	45m	52.12			43m	5.10			12m	50.00
			18	41.28					25	58.33					42	42.87			12	17.65
				32.67						18.98						22.23				32.35

					48′	42.″32	47′	28.″35			15′	21.″67	13′	43.″86					
						+141.13		−121.91				+169.94		−167.02					
					2.14962		2.08604m				2.23030		2.22277m						
					9.25295		9.25295m				9.34806m		9.34806m						
					0.11071		0.11071				0.11071		0.11071						
					1.51328m		1.44970				1.68907m		1.68154						
						−32.61		+28.16				−48.87		+48.03					
					48	9.71	47	56.61			14	32.80	14	31.88					
				100	34	38.64	34	51.84		103	8	15.55	8	16.47					10
				58	06	08	04	54		60	32	48	31	10					5
						−.00660		−.00660				−.00660		−.00660					
						1.96485		1.96439				2.00694		2.00646	2.00034		1.99986		
1.98835		1.95779			+1	32.3	+1	32.1			+1	41.6	+1	41.5	+1	40.1	+1	40.0	
+1	30.9	+1	30.8		+	1.9	+	1.4			+	3.4	+	3.3	+	3.4	+	3.3	
+	1.9	+	1.4		−	1.3	−	1.3			−	1.3	−	1.3	−	1.3	−	1.3	
−	1.3	−	1.3		+1	32.9	+1	32.2			+1	43.7	+1	43.5	+1	42.2	+1	42.0	
+1	31.5	+1	30.9	100	36	11.5	36	24.0		103	9	59.3	10	00.0	9	57.8	9	58.5	10
36	10.1	36	22.7	79	23	48.5	23	36.0		76	50	00.7	50	00.0	50	2.2	50	1.5	
23	49.9	23	37.3	79	41	22.2	41	22.2		77	7	24.0	7	24.0	7	24.0	7	24.0	10
41	22.2	41	22.2		17	33.7	17	46.2			17	28.3	17	24.0	17	22.8	17	22.5	
17	32.3	17	44.9								17	25.1			17	25.1	17	25.1	
															−	2.3		−2.6	

Comet (b) 1881

19 21 0
+77 5 2

δ

21	46.8	19	5.6	20	4.6
	56.5		14.8		15.4
22	5.4		24.8		24.6
	16.0		35.1		33.8
	25.2		45.6		44.9
					53.8
22	5.78			21	3.1
		21	44.1		13.7
			53.6		23.7
		22	3.3		
			14.1		
			23.0		
		20	44.40	20	44.18

$22^{m}\ 5^{s}.78$

$20^{m}\ 44^{s}.29$
+ 10.32
− 31.83

RA = $19^{h}\ 20^{m}\ 22^{s}.78$

55′ 38″.35
+ 81.49
1.91110
9.32261 n
0.11071
1.34442 n
− 22.10
55 16.25
102 27 32.10

59 12 54
−.00660
1.98888 1.97728
+1 36.4 +1 34.9
+ 0.7 + 0.7
− 1.3 − 1.3
+1 35.8 +1 34.3
102 29 7.9 29 6.4
17 25.1 17 25.1
102 11 43.8 11 41.3
77 48 17.2 48 18.7

May 24 – 1881

(R)	γ Cephei 23 34 30 +103 02		(R)	χ Ursæ Maj 11 39 50 +48 26		(R)	β Leon 11 42 53 +15 15		(R)	β Virginis 11 44 30 +2 26		(R)	γ Ursæ Maj 11 47 38 +54 21		(R)	Gr. 1852 11 57 12 +77 34	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
23		—	11	39	26.8	11	42	48.6	11		—	11	47	—	11	58	—
		—			29.9			50.7			—			—			—
		—			33.0			53.0			—			18.3			—
		—			36.0			55.0			—			21.8			—
		—			39.0			57.2			—			25.4			—
		—			45.3			1.6			—			32.5			52.3
	24	0.7			48.4			3.5		44	33.9			36.0			1.7
		10.2			51.5			5.7			36.0			39.5			11.5
		19.1			54.7			7.9			37.9			43.0			21.6
		27.9			58.0			9.9			40.0			46.5			30.6
		37.6			1.1			12.0			42.0			50.4			40.0
		46.9			4.5			14.1			44.1			54.1			49.9
		56.2			7.7			16.2			46.2			57.6			59.5
		5.7			10.2			18.4			48.2			1.0			9.1
		—			16.6			22.8			—			8.3			—
		—			19.5			24.8			—			11.8			—
		—			22.9			27.0			—			15.1			—
		—			26.0			29.0			—			18.4			—
		—			29.8			31.0			—			22.1			—
														2			

(R)	β Cass. 0 2 44 +121 31			(R)	44 Draco 12 6 40 +78 16			(R)	S Mus. Min 12 9 39 +57 41			(R)	η Virginis 12 18 30 −0 1			(R)	G Comæ Ber 12 20 0 +39 40			(R)	M Virg 12 23 37 −15 50		
h	m	s		h	m	s		h	m	s		h	m	s		h	m	s		h	m	s	
0	2	16.5		12	5	15.4		12	9	6.5		12	13	38.8		12	19	44.0		12	23	31.3	
		20.4				25.9				10.6				41.0				46.6				33.1	
		24.1				35.9				14.0				42.9				49.5				35.4	
		27.9				46.1				18.0				45.0				52.2				37.5	
		32.0				56.0				21.9				47.1				54.9				39.7	
		40.0				16.1				29.6				51.2				0.3				44.0	
		44.0				27.0				33.7				53.4				3.1				46.2	
		48.1				36.3				37.5				55.3				5.5				48.4	
		52.0				47.0				41.3				57.5				8.3				50.4	
		55.9				57.0				45.3				59.5				10.8				52.7	
		59.8				7.2				49.2				1.7				13.7				54.8	
		3.7				17.0				53.0				3.6				16.3				56.9	
		7.7				27.3				56.8				5.8				19.0				59.0	
		11.9				37.8				0.7				7.8				21.8				1.0	
		19.6				57.7				8.5				11.9				26.9				5.4	
		23.4				8.0				12.4				13.9				29.8				7.5	
		27.4				18.4				16.4				15.9				32.3				9.7	
		31.4				28.8				20.2				18.0				35.2				11.8	
		35.4				38.6				24.0				20.0				37.7				14.0	

May 24 - 1881

(R)	β Corvi		(R)	γ Virginis		(R)	γ Leon.		(R)	ε Virginis		(R)	δ Virginis	
	12 28 2			12 35 32			0 49 25			12 ~~46~~ 9			13 3 50	
	−22 44			−0 47			+119 56			+11 37			−4 33	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
12	28	9.4	12	35	27.7	0	48	56.1	12	56	5.0	13	3	37.3
		11.5			29.8			0.4			7.0			39.4
		13.8			31.8			4.5			9.2			41.4
		16.0			33.9			8.6			11.4			43.6
		18.3			36.0			12.7			13.5			45.6
		22.7			40.2			21.0			17.6			49.7
		25.0			42.2			25.0			19.8			51.9
		27.3			44.2			29.4			21.9			53.9
		—			46.2			33.5			24.0			55.8
		31.8			48.2			37.8			26.0			58.0
		34.0			50.4			41.7			28.2			0.0
		36.2			52.4			46.0			30.4			2.1
		38.4			54.4			50.0			32.5			4.1
		40.7			56.7			54.0			34.5			6.3
		46.0			0.7			2.5			38.8			10.5
		47.6			2.8			6.6			40.9			12.6
		49.7			4.8			10.7			42.9			14.5
		51.3			6.9			14.9			45.0			16.7
		53.0			8.8			19.2			47.0			18.7

May 26 - 1881

(R)	γ Cephei 23 34 30 +103 02			(R)	χ Ursa Maj 11 39 38 +48 26			(R)	β Leo 11 42 53 +15 15			(R)	γ Ursa Maj 11 47 [illegible] +54 21			(R)	Gr. 1852 11 59 12 +77 34			(R)	β Coma 0 2 44 +124 31		
	h	m	s		h	m	s		h	m	s		h	m	s		h	m	s		h	m	s
	23	33	0.6		11	39	28.9		11	42	50.7		11	47	13.2		11		—		0	2	19.1
			9.8				82.0				53.0				16.8				—				23.0
			18.7				86.0				55.0				20.3				—				27.0
			27.6				88.0				57.1				24.0				—				30.7
			36.7				41.1				59.3				27.5				—				34.6
			55.0				47.5				3.6				34.5			58	53.9				42.7
			3.9				50.5				5.8				38.2				3.5				46.4
			13.8				53.8				8.0				41.5				12.9				50.4
			22.6				56.8				10.0				45.3				22.0				54.1
			31.6				0.0				12.1				48.8				32.0				58.3
			40.6				3.0				14.3				52.3				41.8				2.2
			50.0				6.4				16.5				55.8				51.3				6.2
			59.4				9.4				18.5				59.3				1.0				10.0
			8.4				12.5				20.7				2.9				11.5				14.4
			27.0				18.5				25.0				10.1				—				—
			36.0				21.8				27.0				13.6				—				—
			44.9				24.9				29.0				17.1				—				—
			54.0				28.0				31.4				20.8				—				—
			3.6				31.2				33.6				24.1				—				—
			1868				35.00				55.020												
			45.10				24.88				29.200												
			31.890				59.94 6				12.111												
			31.700				59.987				12.189												
			31.795				59.964				12.150												
			34 03				2				2												
			01.82				59.94				12.13												

May 26-1881

(R)	ε Corvi 12 3 54 −21 36		(R)	44 Draco 12 6 40 +78 16		(R)	S Ules Maj 12 9 38 +54 41		(R)	η Virginis 12 13 50 −0 1		(R)	6 Com. Ber. 12 20 0 +39 40		(R)	S Corvi 12 23 37 −15 50	
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
	3	50.0	12	6	—	12	9	8.2	12	13	41.0	12		—	12	23	33.4
		52.3			—			12.3			43.1			—			35.5
		54.5			—			16.6			45.2			—			37.7
		56.9			—			20.3			47.3			—			39.8
		59.0			—			24.0			49.3			—			42.0
		3.4		6	18.3			31.9			53.5		20	2.0			46.3
		5.7			28.7			35.7			55.5			5.1			48.2
		8.0			38.0			39.7			57.7			7.7			50.6
		10.1			48.0			43.5			59.8			10.4			52.8
		12.4			58.5			47.2			1.8			13.0			54.9
		14.7			8.5			51.2			3.8			15.9			57.0
		16.9			18.3			55.1			5.9			18.5			59.2
		19.0			29.2			58.8			8.0			21.0			1.8
		21.1			39.1			2.8			10.1			23.9			3.6
								1									
		25.7			—			10.5			14.1			—			7.9
		28.0			—			14.4			16.2			—			9.9
		30.2			—			18.1			18.1			—			12.0
		32.4			—			22.1			20.3			—			14.0
		34.5			—			25.9			22.4			—			16.2

6 58.51
−.03
58.48

(12) β Corvi
12 28 2
−22 44

h	m	s
12	27	58.0
		0.2
		2.5
		4.8
		7.0
		11.4
		13.8
		16.0
		18.2
		20.5
		22.7
		24.9
		27.1
		29.4
		33.8
		36.1
		38.4
		40.6
		43.0

(12) γ Virginis
12 35 32
−0 47

h	m	s
12	35	30.0
		32.0
		34.2
		36.2
		38.2
		42.4
		44.5
		46.5
		48.6
		50.7
		52.8
		55.9
		56.9
		59.0
		3.0
		5.0
		7.1
		9.2
		11.4

(12) γ Cassiopeiae
0 49 25
+ 119 56

h	m	s
12	48	58.7
		2.9
		7.0
		11.4
		15.6
		28.6
		27.6
		31.9
		35.9
		40.0
		44.4
		48.4
		53.0
		56.7
		5.0
		9.3
		13.4
		17.5
		21.5

(12) Σ Virginis
12 56 9
+ 11 37

h	m	s
12	56	7.2
		9.3
		11.6
		13.6
		15.7
		20.0
		22.0
		24.0
		26.2
		28.3
		30.5
		32.6
		34.6
		36.8
		40.9
		43.1
		45.1
		47.3
		49.4

List of Stars observed for Longitude between H.C.O and Manchester Observatory.

May 27 - 1880

	β Ursæ Majoris		δ Ursæ Majoris		χ Ursæ Majoris		No obs. δ Leonis	ν Leonis	
	10 55		10 56		11 3		11 7	11 31	
	+57 2		+62 24		+45 9		+ 11 13	-0 8	
h	m	s	h	m	s	h	m	s	
10	53	—	10	55	—	11	2	2.8	Chf
		—			—			5.7	
		—			—			8.6	
		47.3			—			11.5	
		51.2			—			14.5	
		58.2			40.2			20.3	
		2.6			44.5			23.1	
		6.3			49.0			26.2	
		10.0			53.4			29.0	
		13.9			57.9			32.0	
		17.6			2.3			35.0	
		21.4			6.8			37.9	
		25.1			11.2			40.8	
		29.0			15.6			43.8	
		36.8			24.5			49.6	
		40.5			29.0			52.5	
		44.1			33.5			55.5	
		47.9			38.0			58.4	
		51.8			42.4			1.3	
								8.620	
								55.546	
								32.088	
								32.011	
								32.045	

	χ Ursæ Maj 11 39 +48 28		β Virginis β Virginis 11 44 +2 28		δ Virginis 11 59 +9 26		α Corvi 12 2 −24 2		ε Corvi 12 4 −21 55		44 Draco 12 6 +78 19
h	m s	h	m s	h	m s	h	m s	h	m s	h	m s
11	—	11	43 41.9	11	58 20.9	12	1 26.0	12	3 10.1	12	5 40.0
	—		43.9		23.0		28.2		12.3		43.4
	—		46.0		25.1		30.4		14.6		46.8
	—		48.0		27.2		32.8		16.8		50.4
	—		50.0		29.3		35.0		19.1		53.7
											57.3
39	8.0		54.2		33.4		39.5		23.5		0.9
	11.1		56.2		35.5		41.9		25.7		3.9
	14.2		58.3		37.6		44.0		28.0		7.0
	17.4		0.4		39.7		46.3		30.1		10.6
	20.5		2.4		41.8		48.6		32.3		14.3
	23.7		4.4		44.0		50.8		34.6		17.8
	26.7		6.5		46.0		53.1		36.9		20.8
	29.9		8.6		48.0		55.3		39.0		24.0
	33.0		10.7		50.2		57.6		41.4		27.9
											31.3
	39.3		14.8		54.3		2.9		45.8		34.7
	42.4		16.9		56.5		4.3		48.0		37.9
	45.5		18.9		58.6		6.7		50.2		41.5
	48.6		21.0		0.7		9.0		52.5		44.7
	51.8		23.0		2.8		11.0		54.7		48.0
											51.3
			45.596		25.100		30.480		14.580		54.8
			18.892		58.580		6.62		50.24		58.1
			2.438		41.840		43.550		32.410		1.7
			2.411		41.800		46.567		32.389		
			2.418		41.820		46.558		32.399		46.860
											3.84
											20.86
											38.01
											54.78
											20.910

May 27 - 1880

γ Corvi 12 9 −18 51			b Can Ven 12 20 +39 43			ν Corvi 12 23 −15 49			γ Corvi 12 26 −15 30			K Draco 12 28 +70 29		
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
12	8	52.1	12	19	6.9	12	22	53.4	12	25	7.3	12	27	89.0
		54.2			9.6			55.6			9.5			41.2
		56.3			12.2			57.7			11.6			43.2
		58.5			14.9			59.9			13.6			45.3
		0.6			17.6			2.0			15.8			47.4
														49.3
		5.0			23.0			6.2			20.0			51.4
		7.0			25.7			8.4			22.2			53.4
		9.1			28.3			10.6			24.4			55.5
		11.4			30.9			12.7			26.6			57.5
		13.4			33.5			14.8			28.7			59.8
		15.7			36.2			17.0			30.9			1.5
		17.9			39.0			19.0			33.0			3.8
		20.0			41.7			21.3			35.1			5.9
		22.0			44.3			23.4			37.3			8.0
														9.7
		26.3			49.9			27.7			41.6			12.0
		28.6			52.5			29.9			43.6			14.0
		30.8			55.1			32.0			45.9			16.2
		33.0			57.9			34.1			48.0			18.1
		35.1			0.5			36.3			50.1			20.2
														22.1
														24.1
														26.4
														28.5

May 31 - 1880

O Virginis 11 59 +9 26				α Corvi 12 1 −24 2				ε Corvi 12 4 −21 55				4 H Bravo 12 6 +78 19				γ Corvi 12 9 −18 51				γ Virginis 12 14 +0 2			
h	m	s		h	m	s		h	m	s		h	m	s		h	m	s		h	m	s	
11	58	20.5		12	1	25.7		12	3	9.8		12	5	38.2		12	8	51.5		12	13	0.8	
		22.5				28.0				12.0				41.9				53.7				2.9	
		24.7				30.3				14.2				45.3				55.9				5.0	
		26.9				32.4				16.4				48.7				58.0				7.0	
		28.9				34.7				18.7				51.8				0.1				9.0	
														55.4									
		33.0				39.2				23.0				59.0				4.4				13.2	
		35.0				41.5				25.4				2.2				6.6				15.3	
		37.2				43.7				27.7				5.7				8.9				17.3	
		39.4				46.0				29.9				8.9				11.0				19.3	
		41.5				48.0				32.0				12.3				13.2				21.4	
		43.5				50.5				34.2				15.4				15.3				23.4	
		45.6				52.8				36.5				18.6				17.5				25.5	
		47.7				55.0				38.8				22.3				19.6				27.6	
		49.8				57.2				41.0				26.0				21.8				29.8	
														29.2									
		54.0				1.8				45.4				32.4				26.0				33.9	
		56.1				4.0				47.7				36.0				28.2				35.9	
		58.0				6.4				49.9				39.2				30.4				38.0	
		0.3				8.6				52.0				42.5				32.5				40.0	
		2.4				11.0				54.4				46.4				34.7				42.0	
														49.5									
														52.8									
														56.3									
														0.0									

May 31-1880

	6 Can Ven 12 20 +39 43		ν Corvi 12 23 −15 49		γ Corvi 12 26 −15 30		21 Cass Ll 0 37 +105 42		12 Can Ven 12 50 +39 0		2 Virginis 12 56 +11 38	
h	m s		h	m s	h	m s	h	m s	h	m s	h	m s
12	19 6.2		12	22 53.0	12	25 7.0	0	35 55.5	12	49 35.3	12	55 27.0
	9.0			55.2		9.0		2.8		37.9		29.2
	11.6			57.3		11.1		10.7		40.6		31.4
	14.3			59.3		13.2		18.4		43.3		33.5
	17.0			1.5		15.5		25.9		45.9		35.7
	22.3			6.0		19.7	0	36 41.4		51.2		39.8
	25.0			8.0		21.8		43.8		53.9		42.0
	27.8			10.2		24.0		46.4		56.5		44.0
	30.4			12.3		26.0		48.8		59.2		46.2
	33.1			14.4		28.3		51.6		1.9		48.4
	35.7			16.7		30.5		54.2		4.5		50.4
	38.4			18.8		32.6		56.7		7.1		52.5
	41.1			20.9		34.9		59.3		10.0		54.6
	43.9			23.0		36.9		1.5		12.5		56.7
	49.2			27.3		41.2		4.7 6.9		17.9		0.8
	51.9			29.5		43.4		9.5		20.4		3.0
	54.6			31.6		45.4		11.6		23.2		5.0
	57.2			33.8		47.6		14.5		25.7		7.2
	0.0			36.0		49.8		17.0		28.5		9.3
								19.3				
								21.9				
								24.4				
								26.8				
								29.6				
								32.1				
								34.5				
								37.1				
								39.9				
								42.4				
								58.0				
								5.4				
								12.7				
								20.7				
								28.2				

No Observation

44 H Cephei LC ? 0 2 +101 0		43 Comae 13 6 +43 21		Br 366 LC 2 34 +112 43		47 H Cephei LC 2 50 +101 58		B Ursa Min 14 51 +74 40		δ Librae 14 54 −8 1	
h	m s	h	m s	h	m s	h	m s	h	m s	h	m s
0	1 9.7	13	6 35.0	2		2	47 47.1	14	50 32.2	14	53 49.2
	12.8		37.8				58.0		35.0		51.3
	17.3		40.7				3.9		37.5		53.1
	20.7		43.4				19.9		40.0		55.3
	24.2		46.2				30.3		42.5		57.5
	28.0								44.9		
	31.4		51.9				52.0		47.6		1.5
	35.0		54.8				55.8		50.3		3.5
	38.7		57.6				59.2		53.3		5.8
	42.6		—				2.5		55.5		7.7
	46.0		33.3 Eq				6.0		58.0		10.0
	49.9		6.0				9.9		0.7		12.0
	53.4		8.8				13.9		3.0		14.0
	56.5		11.8				17.5		6.0		16.1
	0.4		14.5				20.7		8.5		18.1
	3.7		20.1				24.0		11.1		
			20.1				26.8		13.4		22.4
	25.9		23.2				31.0		16.2		24.4
	36.4		25.9				35.0		19.0		26.6
	47.2		28.8				38.4				28.7
	58.4		31.6				42.0				30.8
	8.9						45.8		34.5		
							49.3		42.3		
							52.6		50.0		
							56.5		58.0		
							59.9		6.0		
							3.6 Eq				
							7.0				
							10.2				
							13.8				
							17.5				

May 31 – 1880

	β Bootis 14 57 +40 53		β Librae 15 10 −8 55		ω Bootis 15 20 +37 49		γ Ursæ Min 15 21 +72 17		ν 1 Bootis 15 26 +41 16		φ 15 33 +40 45
h	m s	h	m s	h	m s	h	m s	h	m s	h	m s
14	56 35.8	15	8 29.0	15	19 8.9	15	20 24.4	15	25 47.2	15	32 41.4
	38.5		31.2		11.4		26.9		50.0		44.0
	41.2		33.3		13.9		29.0		52.9		46.7
	44.0		35.4		16.6		31.5		55.5		49.6
	46.8		37.4		19.2		33.5		58.2		52.3
							35.9				
	52.2		41.6		24.5		38.0		3.8		57.7
	55.0		43.7		27.0		40.5		6.5		0.5
	57.7		45.8		29.7		42.8		9.2		3.3
	0.5		47.9		32.3		45.0		12.0		5.9
	3.2		49.9		34.9		47.0		14.6		8.6
	6.0		51.0		37.5		49.3		17.6		11.4
	8.6		54.0		40.0		51.4		20.3		14.0
	11.4		56.0		42.8		53.9		23.0		16.8
	14.1		58.2		45.3		56.2		25.7		19.5
							58.8				
	19.5		2.4		50.6		0.7		31.2		25.0
	22.3		4.5		53.2		2.9		34.0		27.9
	25.0		6.5		55.8		5.3		36.6		30.4
	27.7		8.5		58.4		11.9		39.5		33.2
	30.5		10.7		1.2		18.6		42.2		35.9
							25.3				
	41.76		33.260		14.009		32.3				
	25.00		6.520		55.840		38.8				
	3.130		49.890		34.920		45.7				
	3.189		49.778		34.889						
	3.160		49.834		34.905		29.06				
							40.44				
							51.56				

	ζ Cor Bor seq 15 35 +37 3		54 Camel LC 3 37 +109 3		μ Serpentis 15 43 − 3 3		ε Serpentis 15 45 + 4 51		ζ Ursæ Min 15 49 +78 11		5 Scorpii for 15 53 − 22 15	
h	m s	h	m s	h	m s	h	m s	h	m s	h	m s	
15	34 8.0	8	36 45.3	15	42 37.1	15	44 5.8	15	46 27.4	15	52 28.2	
	5.7		47.4		39.0		7.8		37.7		30.4	
	8.3		49.7		41.3		10.0		47.8		32.7	
	11.0		51.7		43.4		12.0		58.0		34.9	
	13.5		54.2		45.5		14.2		8.2		37.1	
			56.3								41.	
	18.6		58.5		49.5		18.3		28.2		41.5	
	21.3		0.7		51.6		20.3		31.6		43.7	
	23.8		2.5		53.8		22.3		34.9		46.0	
	26.5		4.7		55.7		24.4		38.0		48.3	
	29.0		7.0		57.9		26.5		41.4		50.5	
	31.5		8.6		0.0		28.8		45.1		52.8	
	34.0		11.1		2.1		30.8		48.4		55.0	
	36.7		13.1		4.0		32.8		52.0		57.2	
	39.3		15.4		6.1		34.9		55.5		59.5	
			17.3						58.8			
	44.5		19.2		10.3		39.0		1.9		4.0	
	47.0		21.4		12.3		41.0		5.0		6.3	
	49.7		24.0		14.4		43.3		8.3		8.4	
	52.3		26.0		16.5		45.3		11.7		10.6	
	54.8		27.8		18.5		47.3		15.0		12.9	
			30.0						18.3			
			32.0						21.7			
			34.0						25.0			
			36.4						28.6			
									31.5			
									34.7			
									38.7			
									42.0			
									45.4			
									48.8			
									8.7			
									18.7			
									29.1			
									39.9			
									48.8			
									4782			

May 31 1880

June 2 1880

β Scorpii Jpr
15 58
+19 27

h	m	s
15	57	42.0
		44.0
		46.1
		48.6
		50.7
		55.0
		57.3
		59.5
	1	1.7
		3.9
		6.0
		8.0
		10.5
		12.8
		17.1
		19.3
		21.4
		23.6
		25.8

h	m	s			
0	2	24.0	0	7	18.0
		26.7			20.1
		31.1			22.2
		33.4			24.3
					26.5
		88.0			
		40.5			30.7
		42.8			33.0
		45.0			35.1
		47.4			37.2
		49.8			39.3
		52.2			41.5
		54.6			43.7
		56.9			45.8
					47.8
		1.6			
		3.9			52.0
		6.3			54.3
		8.6			56.3
		11.0			58.5
					0.7
		28.70			22.22
		6.28			56.36
		47.48.0			39.294
		47.469			38.349
		47.479			38 317
		47.46			37.30

June 3 1880

ε Serpentis 15 45 +4 51			ζ Ursæ Min 15 49 +78 11			δ Scorpii 15 53 −22 15			β Scorpii 15 58 −19 27			φ Herculis 16 5 +45 6			δ Ophiuchi 16 8 −3 22		
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
15	44	6.6	15	46	27.4	15	52	29.2	15	57	42.9	16	5	37.3	16	7	20.0
		8.7			38.9			31.4			45.0			39.7			22.0
		10.8			48.7			33.8			47.8			42.7			24.0
		13.0			0.1			35.8			49.5			45.7			26.8
		14.9			8.5			38.0			51.7			48.5			28.0
		19.0			39.5	Et		42.6			56.0						32.3
		21.2			48.6			44.8			58.0						34.4
		23.2			58.2			47.0			0.2						36.5
		25.7			9.1			49.1			2.5						38.6
		27.5			19.5			51.5			4.8						40.8
		29.6			28.8			53.8			7.0						42.5
		31.6			39.4			55.8			9.1						44.7
		33.7			49.8			58.1			11.4						46.7
		35.9						0.5			13.5						48.8
					9.8												
		39.9			20.0			5.0			17.8						52.8
		42.0			29.5			7.0			20.2						55.0
		44.0			39.8			9.2			22.4						57.0
		46.2			49.0			11.3			24.4						59.1
		48.0						13.5			26.7						1.3

June 3-1880

19 Ursæ Min. 16 14 +76 11																							
h	m	s																					
16	14	9.5																					
		18.0																					
		26.6																					
		34.2																					
		53.0																					
		1.9																					
		9.6																					
		18.2																					
		27.0																					

γ Ursæ Min. 16 18 +48 31																							
h	m	s																					
16	16	10.9																					
		13.6																					
		16.6																					

ζ Ursæ Min. 16 21 +76 3																							
h	m	s																					
16	19	21.3																					
		29.4																					
		38.2																					
		46.4																					
		55.5																					
		11.9																					
		19.8																					
		28.8																					
		37.3																					
		46.3																					
		54.6																					
		3.6																					
		—																					
		—																					
		2																					
		37.8																					
		46.0																					
		54.0																					
		3.0																					
		11.9																					

γ Herculis 16 39 +39 10																							
h	m	s																					
16	37	58.4																					
		1.2																					
		8.9																					
		6.5																					
		9.3																					
		14.6																					
		17.2																					
		19.9																					
		22.5																					
		25.2																					
		28.0																					
		30.8																					
		33.3																					
		35.9																					
		41.0																					
		43.9																					
		46.6																					
		49.2																					
		51.8																					

α Camel. Ho. 4 42 +113 42																							
h	m	s																					
4	41	40.3																					
		46.0																					
		51.3																					
		56.5																					
		1.9																					

α Andem. 0 2 +28 25			γ Pegasi 0 7 +14 31			i Cet 0 13 −9 31			S Andem 0 33 +30 11			α Cass 0 33 +55 51			γ Cass 0 42 +57 9		
h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
0	1	24.1	0	0	18.0	0	12	33.0	0	32	—	0	33	52.9	0	42	3.0
		26.3			20.2			35.2			—			56.6			6.7
		28.7			22.4			37.4			—						
		31.0			24.5			39.4			—						
		33.3			26.7			41.5			—						
		38.2			31.0			45.8			—						
		40.5			33.0			47.9			—						
		42.9			35.2			50.0			—						
		45.2			37.8			52.0			28.9						
		47.4			39.5			54.0			31.2						
		49.9			41.4			56.2			34.0						
		52.4			43.6			58.4			36.0						
		54.7			45.8			0.3			38.5						
		56.8			47.9			2.6			40.7						
		1.7			52.3			6.6			45.4						
		4.0			54.4			8.7			47.9						
		6.3			56.5			11.0			50.3						
		8.8			58.7			13.0			52.7						
		11.0			0.8			15.0			55.0						
		28.68			22.38			12,37.30									
		6.36			56.34			10.46									
		47.520			39.460			54.080									
		47.555			39.411			54.133									
		47.537			39.435			54.106									
		47.52			39.42			54.09									

June 3 1880

γ Cass 0 49 +60 2			β Androm 1 3 +34 57			Blaris UC 1 13 +88 40		
h	m	s	h	m	s	h	m	s
0	48	25.0	1	2	—	1	9	14.4
		29.0			—			20.3
		33.3			—			25.0
		37.4			—			44.5
		41.5			22.5			48.3
								53.9
		49.9			27.3		10	14.0
		51.2			29.9			19.1
		52.6			32.5			25.6
		54.0			35.0			42.8
		55.3			37.5			48.5
		57.0			40.0			55.1
		58.2			42.4		11	14.5
		59.5			45.0			19.0
		0.9			47.5			24.0
		2.0						41.9
		3.7			52.9			47.7
		5.1			55.2			53.9
		6.6			57.6		12	13.3
		7.9			0.1			18.5
		9.3			2.6			23.7
		10.6						38.3
		11.9						45.5
		13.4						53.4
		15.0					13	8.9
		16.2						18.1
		17.5						23.8
		18.9						42.6
		20.4						47.5
		21.7						53.9
		23.0					14	10.5
								16.5
		31.4						22.4
		35.4						40.0
		39.4						48.0
		43.7						52.0
		48.0					15	7.6
								13.2
								19.7
								40.8
								45.5
								51.5
							16	8.9
								15.0
								19.8
								36.8
								43.2
								49.5
							17	7.5
								13.0
								20.5
								34.2
								43.4
								48.3
							18	7.4
								13.3
								18.0
								36.9
								42.1
								48.6
							19	7.5
								13.4
								19.8
								37.4
								42.5
								47.7
							20	6.0
								12.4
								17.4

20 36.0
43.0
48.9
21 4.8
12.3
18.3

Observations of Kruger stars No. 5 & No 12. for Professor Hall

1880 Dec. 9

	No 5 h m s	No. 12 m s	Δ		No 5 m s		No 12 m s	Δ
2	10 18.0	11 48.3	30.3	10 29.3	10 16.0	11 46.6	11 46.2	30.2
	22.0	52.4	30.4	31.7	19.6	48.6	50.1	30.5
	26.0	55.8	29.8	34.2	23.4	51.2	53.6	30.2
	27.6	57.7	30.1	37.2	27.2	54.1	55.5	30.3
	33.2	12 3.6	30.4	40.2	31.0	56.8	56.0	30.0
	36.8	7.3	30.5		34.6		59	30.3
	40.5	11.0	30.5		38.3		12 3.6	30.3
	44.5	15.0	30.5		42.2		7.3	30.1
	48.5	18.2	29.7		45.7		10.0	30.3
T_m	2	10 33.333	12 3.478		10 30.889		12 1.133	
S'					10 34.52		11 51.46	
S^2								
$T_m - S'$					− 3.63		+ 9.67	
$T_m - S^2$								

Circle Readings					54 1.98		35 14.06	
I	II				− 2.66		+ 7.02	
					53 59.32		35 21.08	
Δ							18 38.24	

Dec.	Results.		
	Δα	Δδ	
Dec. 9	1 30.24		
" 16	30.22	18 38.24	
" 22	30.28	37.40	
" 23	30.22	37.92	
" 28	30.17	38.12	
" 30	30.20	36.43	
Jan 1	30.13	35.26	
" 3	30.10	37.89	

1880 Dec. 22

	No 5 h m s	No 12 m s		Δ		No 5 m s		No 12 m s	Δ
2	9 39.9	10 13.6	11 6.4	11 43.6	30.0	9 46.0	10 13.2	11 3.0	30.0
	42.5	17.3	9.7	47.6	30.3	49.0	16.7	6.7	30.3
	45.3	21.0	12.1	51.3	30.3	51.6	20.4	9.8	30.3
	47.7	24.7	14.6	55.0	30.3	54.7	24.3	12.2	30.3
	50.2	28.4	17.6	58.9	30.5	57.4	28.2	15.3	30.1
		32.4		12 2.6	30.2		32.5	17.3	29.7
		36.1		6.3	30.2	10 32.6	35.6	12 48.5	30.5
		39.8		10.2	30.4	36.0	39.4	51.7	30.4
		43.6		13.9	30.3	37.9	43.4	54.6	30.1
						42.9		57.6	
						43.6		0.7	
T_m	2	10 28.544	11 58.822				10 28.169	11 58.378	
S'		9 45.12	11 12.08				9 51.74	11 59.80	
S^2			12 51.14				10 38.20	12 54.62	
$T_m - S'$		+ 43.42	+ 46.74				+ 36.45	− 1.42	
$T_m - S^2$			− 52.32				− 10.01	− 56.24	

Circle Readings		53 28.34		34 48.46	36 1.10		53 34.05	54 8.50	35 24.17	36 3.7
I	II	+ 31.81		+ 33.94	− 37.99		+ 26.70	− 7.33	− 1.03	− 40.84
		54 0.15		35 22.40	35 23.11		54 0.75	54 1.17	35 23.14	35 22.93
Δ		18 37.75			18 37.04		18 37.61			18 38.24

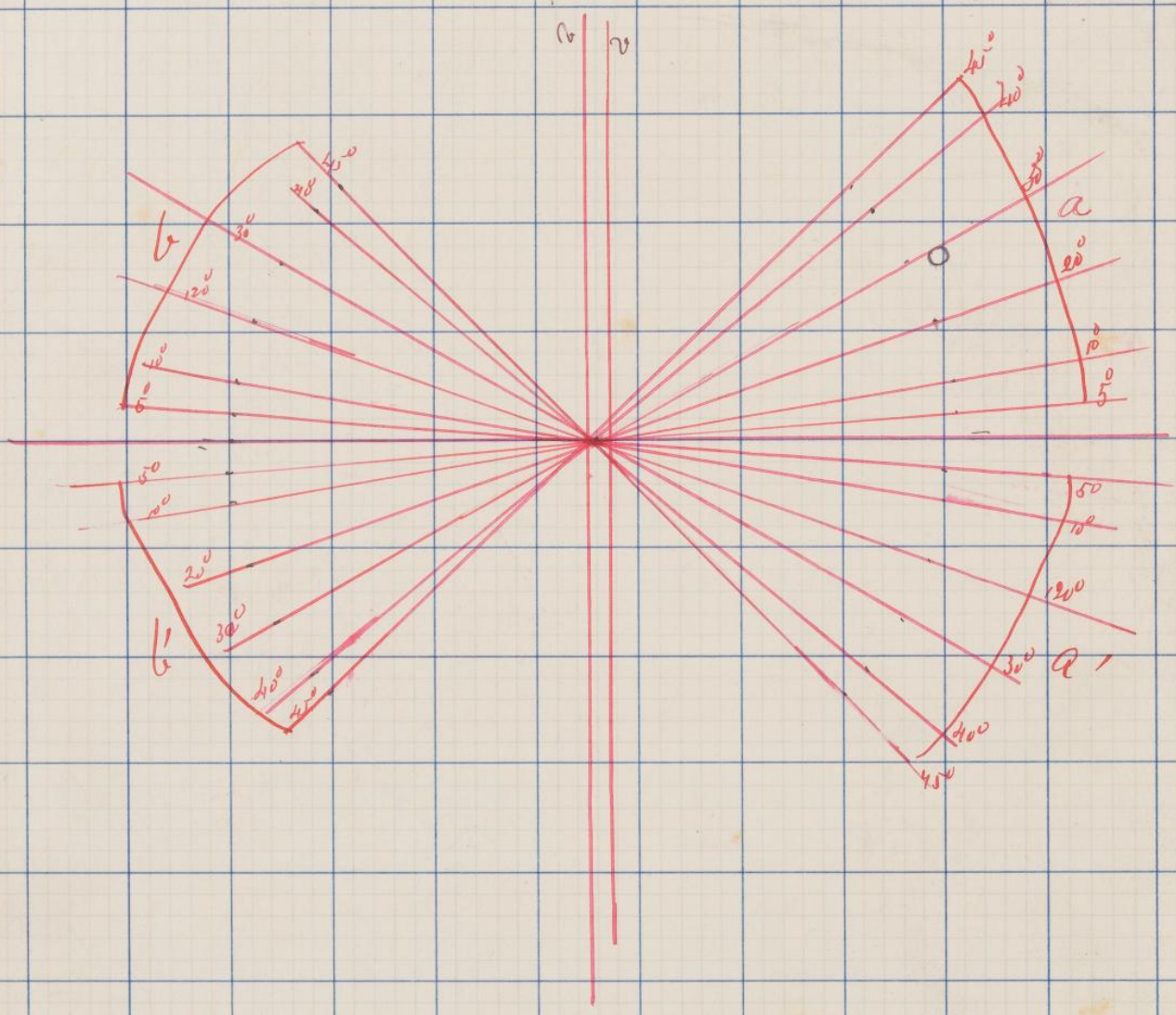
Dec. 28 — Dec. 30 — 1880

	No. 5		No. 12			No. 5		No. 12	
h m s	m s	m s	m s	Δ	m s	m s	m s	m s	Δ
2 9 52.0	9 49.6	11 40.2	11 20.0		9 59.0	10 4.2	11 8.3	11 34.0	29.8
53.7	53.4	43.5	23.0		2.4	8.2	13.7	37.7	29.5
58.6	57.2	46.2	27.0		5.4	11.3	16.6	41.6	30.3
2.1	Saw 1.2	48.6	Saw 30.7		8.0	15.0	2.6	45.3	30.3
5.3	4.9	51.4	35.0		10.2	18.6	5.7	49.3	30.7
						22.7		53.0	30.3
		12 49.7				26.4	12 4.0	56.6	30.2
		52.1				30.2	43.1	0.9	30.7
		54.3				34.0	45.8	4.0	30.0
		57.4					50.0		
		1.2					52.8		
	10 27.06	11 57.89				10 18.956	11 49.156		
	9 58.74	11 46.04				10 5.00	11 57.38		
	+28.32	12 54.94					12 46.34		
		+ 11.15				+ 13.96	− 10.22		
		− 57.75					− 57.38		
	53 40.04		35 14.36	36 4.81		53 50.79		35 31.96	36 6.31
	+20.75		+8.10	−41.94		+10.23		− 7.42	−41.66
	54 0.79		35 22.46	35 22.87		54 1.02		35 24.54	35 24.65
	18 38.33			18 37.92		18 36.48			18 36.37

1881 — Jan. 1 — Jan. 3 — 1881

	No. 5		No. 12			No. 5		No. 12	
h m s	m s	m s	m s	Δ	m s	m s	m s	m s	Δ
2 10 8.7	10 2.7		11 32.6	29.9	9 13.0	10 2.0	10 56.8	11 31.7	29.7
12.0	6.4		36.6	30.2	18.5	5.7	57.0	35.5	29.8
15.2	10.3		40.2	29.9	21.2	9.1	2.2	39.2	30.1
18.2	14.1		44.0	29.9	23.5	13.1	4.5	43.1	30.0
20.1	17.5		47.8	30.3	26.1	16.7	7.4	46.9	30.2
	21.5		51.6	30.1		20.5		50.7	30.2
	25.2	12 48.0	55.4	30.2	9 57.6	24.1	12 36.3	54.5	30.4
	29.0	50.0	59.2	30.2	54.8	28.0	39.0	58.2	30.2
	32.7	52.0	3.2	30.5	56.7	31.9	42.3	2.0	30.1
		53.8			59.2		45.0		
		56.6			2.2		48.0		
		0.7							
		2.8							
	10 17.711	11 47.844				10 16.789	11 46.589		
	10 14.84	12 7.88				9 20.86	11 1.98		
		12 (54.84)				9 56.90	12 42.12		
	+2.87	− 20.04				+ 55.93	+ 44.91		
		− 67.00				+ 20.89	− 55.23		
	54 0.38		35 38.83	36 12.78		53 18.00	53 44.41	34 48.44	36 1.95
	+2.10		−14.53	−48.65		+40.97	+ 15.30	+32.61	−40.11
	54 2.48		35 24.30	35 24.13		53 58.97	53 59.71	35 21.05	35 21.84
	18 38.18			18 38.35		18 37.92			18 37.87
	38.35								

Form of Plate for observing declinations of Venus.



Observations for diameter of Venus with the East Equatorial

W. A. R. observer.

S. T. M. N. = $16^h\ 52^m$ log 4.42248

Series I

observation over lines a and b.

Time	30°	Diff.	45°	Diff.	b b'	a a'	45°	Diff	30°	Diff.
prec. foll.	16 37 17.0 25.6	8.6	23.0 29.6	6.6	30.6 31.0 30.80	35.0 35.4 35.20	4.40	36.9 45.6	8.7	~~43.0~~ ~~50.4~~
	16 38 27.2 35.9	8.7	33.3 39.6	6.3	41.0 1.4 41.20	5.2 5.7 5.45	4.25	47.0 53.3	6.3	50.2 59.7 9.5
	16 39 9.7 18.6	8.9	15.9 22.2	6.3	23.8 23.7 23.75	27.7 28.0 27.85	4.10	29.3 35.7	6.4	32.8 41.8 9.0
	~~16~~ 39 52.6 1.3	8.7	58.5 5.0	6.5	— —	10.5 11.7		12.0 18.3	6.3	15.7 24.8 9.1
	16 40 30.5 39.0	8.5	36.2 42.7	6.5	43.8 44.2 44.00	48.1 48.6 48.35	4.35	49.7 56.0	6.3	53.0 2.5 9.5
	16 41 12.0 20.9	8.9	18.0 24.6	6.6	25.6 30.0 ~~25.80~~ 27.75	25.9 30.3 ~~26.20~~ 28.15	4.40	31.2 37.7	6.5	34.8 44.0 9.6
	16 41 50.0 58.7	8.7	56.0 2.2	6.2	3.1 3.6 3.35	7.7 8.0 7.85	4.50	9.0 15.7	6.7	12.7 21.8 9.1
	16 42 41.0 53.0	9.0	50.0 56.2	6.2	57.3 57.7 57.50	1.8 2.3 2.05	4.55	3.2 9.7	6.5	6.6 16.1 9.5
	16 43 29.6 38.4	8.8	35.6 42.0	6.4	42.8 43.2 43.00	47.2 47.7 47.45	4.45	48.7 55.0	6.3	51.7 1.1 9.41
		8.75		6.40			4.38		6.41	9.34

Series incomplete, Chronograph failed till 17h 52m.

δ = −22° 43′.4

Seeing pretty fair.

	30°	45°
	8.75	6.40
	9.24	6.41
	9.045	6.405
	15	10
	9.03	6.39

Pair

log 15 = 1.17609

log cos δ 9.96583

.84099

39

30° 9.69897 + 1.17609 + 9.96583 = .84099

45° 9.84948 + 1.17609 + 9.96583 = 0.99150

log cos 4.37 = 9.99847

39

2.64047

1.14202

1.78249

42248

60 46

.20347

16.05″

3

cor.

log. 1.25569

84099

.79668

9.42248

21816

16.58″

3

6.39

1.80550

99150

.79400

9.42248

21848

16.55″

5

62.64″ 47

16.56

62.66″ 57

16.58

62.64″

16.57

Rate of motion for $1^s = .0165$

New Series, Arcs a and b
new setting for position.
Venus South.

Time	30°	Diff.	45°	Diff.		2 i	2 i	45°	Diff.	30°	Diff.
Free.	17 6 26.3		31.6								
foll.	35.2	8.9									
	17 7 10.8		17.0		1'	24.6 24.9	28.8 29.2	30.3		34.0	
	19.7	8.9	23.3	6.3		24.75	29.00	4.25 36.7	6.4	43.0	9.0
	7 69.4		55.5			3.0 3.5	6.5 6.9	9.2		12.6	
	58.2	8.8	1.8	6.3		3.25	6.70	4.45 15.4	6.2	21.3	8.7
	8 30.6		37.0			44.2 44.7	48.7 49.0	50.2		53.7	
	40.0	9.4	43.1	6.1		44.45	48.85	4.40 56.6	6.4	2.7	9.0
	9 18.2		24.0			31.6 32.0	36.0 6.3	37.3		40.7	
	27.0	8.8	30.4	6.4		31.80	6.3 36.15	4.35 43.6	6.3	50.0	9.3
	9 58.4		4.5			11.9 12.3	16.3 16.7	17.8		21.0	
	7.2	8.8	10.7	6.2		12.10	16.50	4.40 24.0	6.2	30.4	9.4
	10 36.0		42.2			49.6 50.0	53.8 54.2	55.4		58.5	
	45.0	9.0	48.6	6.4		49.80	54.00	4.20 1.6	6.2	7.9	9.4
	11 16.8		21.8			29.2 29.6	33.5 33.8	35.0		38.2	
	24.7	8.9	28.0	6.2		29.40	33.65	4.25 41.3	6.3	47.0	8.8
	12 58.0		4.3			11.7 12.1	15.8 16.3	17.4		20.7	
	6.7	8.7	10.3	6.0		11.80	16.05	4.25 23.7	6.3	29.8	9.1
	12 39.0		45.2			52.2 52.6	56.6 56.9	57.9		1.2	
	47.9	8.9	51.1	5.9		52.40	56.75	4.35 4.0	6.1	10.0	8.8
	13 15.2		21.4			21.7 29.0	32.8 33.4	34.4		37.4	
	24.1	8.9	27.6	6.2		21.85	33.10	4.25 40.6	6.2	46.6	9.2
		8.94		6.20				4.32	6.26		9.17
		86							6.20		8.80
							4.32		6.23		9.015
							− 1				
							4.31		6.22		9.00
							0.63448		0.79379		0.95424
							1.14202		99156		84099
							1.77650		1.78529		1.79523
							1.42248		1.42248		1.42248
							1.19898		1.20777		1.21771
			30°	45°	90°		1.5977		6.100	61.71	62.92
			62.37	60.85	61.62		15.81		1614		16.51
			16.48	16.11	15.78					16.32	

Seeing wretchedly fair

New Series, lines a' and b'.
Venus North.

Time	30°	Diff	45°	Diff	a'	b'	a'	b'	45°	Diff	30°	Diff.
Pmt.	17 22 24.1		30.5						44.3		46.0	
Foc	32.8	8.7	36.6	6.1	38.2	38.6	42.6	4.30	50.6	6.3	57.0	9.0
					38.40		42.80	4.40	6			
	23 7.5		13.8		21.5				27.6		31.3	
	15.9	8.4	20.0	6.2	21.8		25.7	27.0	33.7	6.1	40.4	9.1
					21.65		25.85	4.20				
	23 48.1		54.7						8.6		12.3	
	56.8	8.7	1.0	6.3	2.2	2.6	6.7	7.0	14.7	6.1	21.1	8.8
					2.40		6.85	4.45				
	24 27.1		34.0						48.0		52.0	
	36.0	8.6	40.1	6.1	41.7	42.1	46.1	46.5	54.0	6.0	0.7	8.7
					41.90		46.30	4.40				
	25 11.6		17.8						32.4		36.2	
	20.0	8.4	24.0	6.2	25.7	26.2	30.1	30.7	38.3	5.9	44.7	8.5
					25.95		30.40	4.45				
	25 52.1		58.2						12.7		16.7	
	0.6	8.5	4.3	6.1	6.2	6.6	10.6	11.0	18.8	6.1	25.6	8.9
					6.40		10.80	4.40				
	26 32.8		39.3						54.0		58.2	
	41.5	8.7	~~45.6~~	6.2	47.3	47.7	51.7	32.1	0.3	6.3	6.6	8.4
					47.60		51.90	4.40				
	27 14.7		21.2						35.8		40.0	
	23.4	8.7	27.5	6.3	29.2	29.7	33.6	34.0	42.0	6.3	49.0	9.0
					29.45		33.80	4.35				
	27 57.0		3.3						18.0		22.2	
	5.6	8.6	9.6	6.3	11.6	12.0	15.8	16.3	24.2	6.2	31.0	8.8
					11.80		16.05	4.25				
	28 42.7		49.0						3.0		7.6	
	51.2	8.5	55.2	6.2	~~57.0~~ 57.0	57.5	1.3	1.6	9.4	6.4	16.4	8.8
					57.25		1.45	4.20				
	29 27.0		33.3						47.9		52.0	
	35.3	8.3	39.5	6.2	41.2	1.7	45.7	46.1	53.9	6.0	0.5	8.5
					41.45		45.90	4.45				
		8.55		6.20				4.356		6.15		8.77
										6.20		8.55
										6.175		8.660
										10		866
										616		1.93702
										6.79188		
										0.99150		14099
					4.36					1.78108		1.77801
					01					4.42248		4.42248
					4.35					60.41		59.98
					0.63849					1.20356		1.20048
					1.42205					15.98		15.87
					1.78051	60.33						
					4.22248							
					.20299	15.96						

Seeing very bad.

60.20
15.92

New Series, lines a and b.

Time free fall.	30°	Diff	45°	Diff.	22	22	45°	Diff	30°	Diff
	17 37 51.9		58.6				11.6		15.1	
	—		4.8	6.2	6.1 6.5	9.6 10.0	17.8	6.2	28.5	8.4
					6.30	9.80 4.50				
	38 43.0		49.3				3.6		7.0	
	51.8	8.8	55.7	6.4	57.1 57.7	1.2 1.7	9.2	5.6	15.6	8.6
					57.40	1.45 4.05				
	39 25.6		31.9				48.7 48.1		49.1	
	34.0	8.4	38.0	6.1	39.7 39.9	43.7 44.1	57.6 57.82		57.8	8.7
					39.80	43.90 4.10				
	40 7.2		13.7				—	—	—	—
	16.1	8.9	19.7	6.0	21.2 21.6	25.7 27.0				
					21.40	25.85 4.45				
	40 48.2		54.5		2.2 2.7	6.6 7.0	8.4	14.6	12.2	
	56.8	8.6	8.8	6.3	2.45	6.80 4.35	14.6	6.2	21.2	9.0
	41 29.2		35.5		43.5 44.0	47.8 47.9	45.8		53.8	
	37.8	8.6	41.9	6.4	43.45	47.65	55.8	6.0	62.2	8.4
	42 52		15.8		23.8 24.1	28.0 28.4	30.7		34.3	
	18.1	8.9	22.3	6.5	23.95	28.20 4.25	36.1	5.7	42.2	7.9
	42 52.8		59.6		7.3 8.0	11.7 12.2	13.8		18.0	
	1.3	8.4	5.8	6.2	7.65	11.95 4.30	20.0	6.2	26.7	8.7
	44 21.3		27.0		33.6 34.0	37.7 38.0	38.8	5.8	41.3	
	30.1	8.8	33.0	6.0	33.80	37.85 4.05	44.6		50.1	8.8
	45 8.1		13.7		20.3 20.7	24.6 25.0	25.8	5.21	28.8	
	16.2	8.1	19.7	6.0	20.50	24.80 4.30	31.2		36.8	8.0
	45 47.7	8.5	53.4		57.6 57.9	4.5 5.0	6.0	5.8	9.8	
	56.2		59.5	6.1	57.75	4.75 4.00	11.8		17.8	9.0
		8.60		6.20			4.23	5.88		8.55
							−.01	6.20		8.60
							4.22	6.04		8.575
								6.03		11
										8.56
					Seeing horrible Rejected		0.62531	0.76032	0.93247	
							1.14202	1.49150	1.84096	
							1.76733	1.77182	1.77346	
							9.42248	9.42248	9.42248	54
							1.18981	1.19430	1.19594	60
										66
							15.48	15.64	15.70	66
							58.52	59.13	59.36	246
							58.52		59.35	

	20°	30°	45°	90°												
	1263	863	6.15	4.36												
	13.28	896	6.35													
	12.955	8.795	6.25	4.36												
	−.21	−.12	−.1													
	12.93	8.78	6.24	4.35												
Dec 6	1882															

log 15 cos 1 sin 0.67607 — 1.11160 — 1.78767 — 61.38 — 1.21015 — 16.23

	20°	30°	45°
R. sin =	453405	969897	984998
log 15 cos	1.14202	1.14202	1.14202
	0.67607	0.84099	0.99150
	1.11160	1.94349	0.13649
	1.78767	1.78448	1.78668
	61.38	60.88	61.19
	1.21015	1.20896	1.20916
	16.23	16.11	16.19

W. A. R. Observer
N. Eq.
Lines a and b.
seeing good

	20	20	30	30	45	45	v	v'	45	45	30	30	20	20
15	41 54.4		42 9.7		20.2		32.1	42.2	52.2		0.8		13.8	
	7.5	13.1	18.5	8.8	26.4	6.2	36.5	4.4 46.1	3.9 58.8	6.6	10.0	9.2	27.4	13.6
14	0.3		14.3		23.5		34.1	43.8	52.7		0.3		11.0	
	13.2	12.9	22.9	8.6	29.9	6.4	38.5	4.4 48.1	4.3 59.0	6.3	9.1	8.8	24.6	13.6
46	4.2		18.9											
	16.8	12.6	28.0	9.1										
46	46.3		47 0.4		10.3		21.7	31.5	41.2		49.2		1.3	
	58.7	12.4	9.1	8.7	16.5	6.2	26.3	4.6 35.8	4.3 47.7	6.5	58.4	9.2	—	
50	10.2													
49	11.6		25.1		35.8		48.0	57.0	7.6		16.1		28.0	
	23.9 24.1	12.4	34.2	9.1	41.9	6.1	51.8	3.8 1.4	4.4 13.7	6.1	25.0	8.9	—	
52	9.4		24.0		34.1		45.6	55.5	5.4		13.7			
	21.6	12.2	32.0	8.0	40.2	6.1	50.0	4.4 59.7	4.2 11.7	6.3	22.6	8.9		
53	46.0		2.3		12.7		25.0	34.8	45.5		54.2			
	59.1	13.1	10.6	8.3	19.1	6.4	29.4	4.1 39.2	4.4 51.8	6.3	3.8	9.6		
55	15.3		29.7		40.3		52.0	1.8	12.1		20.6			
	27.2	11.9	38.5	8.8	46.3	6.0	56.3	4.3 6.4	4.6 18.4	6.3	30.0	9.4		
56	44.0		59.0		9.2		21.0	30.7	41.0		49.8			
	57.0	13.0	7.7	8.7	15.3	6.1	25.6	4.6 35.3	4.6 47.3	6.3	58.3	8.5		
58	22.1		35.7		45.2		55.7	5.6	14.6		22.0		33.0	
	34.6	12.5	44.1	8.4	51.2	6.0	0.3	4.6 9.9	4.3 21.0	6.4	31.1	9.1	46.7	13.7
16	0 0.7		13.1	14.8	30.1 24.0		36.0	31.6 46.6	44.3 59.7	53.1	9.5	0.7	34.6	10.9
	13.6	12.9	24.0	23.1 8.3	34.7 30.1	6.1	44.3	39.0 53.1	48.6 4.3 0.6	59.7 6.6	10.9	9.6 8.9		24.6 13.7
5	44.6		0.3		9.3		19.0	28.8	36.9		44.0		53.2	
	59.1	12.5	9.0	8.7	15.3	6.0	23.2	4.2 33.3	4.5 43.0	6.1	52.1	8.1	5.7	12.5
		12.63		8.63		6.15		4.37 4.36	4.35	6.35		8.96		12.42

Dec 6 1882

W. A. R. W Eq.
~~L. 6. 6.~~ Observer

Lines a and b.

Seeing fair
Venus

20°	30°	45°	60
12.94	8.81	6.25	4.35
13.05	8.83	6.33	4.42
12.995	8.820	6.290	4.385
12.97	8.81	6.28	4.38
1.11294	0.94498	0.~~74803~~	0.64147
06760	84099	95150	14202
1.78801	1.78597	~~1.80953~~	1.78395
9.42248	9.42248	9.42248	9.42248
.20845	.21154	.20587	
16.27	16.16	16.29	16.07
61.52	61.09	61.58	60.74
	61.40"	16.25"	

20	20	30	30	45	45	∞	∞'	45	45	30	30	20	20
33 ~~33.4~~ 46.5		~~47.7~~ 56.0		~~56.9~~ 3.1		~~7.0~~ 10.7							
38 ~~7.3~~ 20.5		~~27.0~~ 32.0		~~36.0~~ 42.8 47.0									
19 0 59.0 11.7 12.7	12.7	14.7 23.6	8.9	25.7 31.7	6.0	37.5 41.7	4.2	47.0 51.5	4.5	57.0 3.2	6.2	5.2 13.7	8.5
2 47.9 0.9	13.0	4.0 13.0	9.0	14.9 21.1	6.2	27.0 31.3	4.3	36.6 41.1	4.5	46.9 53.0	6.1	54.6 3.5	8.9
5 35.3 48.7	13.4	50.7 59.7	9.0	0.8 7.2	6.4	11.9 16.2	4.3	21.6 26.1	4.5	30.8 37.2	6.4	38.6 47.1	8.5
6 11.2 24.3	13.1	26.8 35.4	8.6	36.9 43.1	6.2	47.8 52.1	4.3	57.7 2.2	4.5	6.8 13.1	6.3	7.2 23.1	8.9
7 47.0 59.9	12.9	2.0 10.9	8.9	12.1 18.5	6.4	23.1 27.6	4.5	32.9 37.3	4.4	43.1 49.5	6.4	~~45.5~~ 49.5 ~~0.3~~ 58.6	9.1
9 23.5 36.3	12.8	39.1 47.6	8.5	49.1 55.3	6.2	0.3 4.7	4.4	10.0 14.4	4.4	19.0 25.4	6.4	26.5 35.6	9.1
11 12.4 25.2	12.8	27.5 36.6	9.1	37.9 44.3	6.4	49.1 53.6	4.5	59.0 3.5	4.5	8.2 14.6	6.4	24.6 26.0	15.7 8.9
12 48.2 7.4	13.2	3.6 12.0	8.4	13.3 19.6	6.3	24.1 28.6	4.5	34.0 38.3	4.3	42.7 49.0	6.3	50.1 58.9	8.8
14 21.7 34.0	12.3	36.6 45.2	8.6	46.6 52.9	6.3	57.3 1.6	4.3	7.1 11.3	4.2	15.9 22.3	6.4	23.6 32.0	8.4
15 58.0 11.2	13.2	13.4 22.5	9.1	23.7 29.8	6.1	35.1 39.3	4.2	44.7 49.1	4.4	53.9 0.3	6.4	1.5 10.7	9.2

12.94 8.81 6.25 4.35 4.38 4.42 6.33 8.83 13.05

Lines a' b'

W. & R. observers

Seeing book

2°	3°	4.5°	
12.37	8.66	6.10	4.20
12.58	8.67	6.05	4.38
12.60	8.765	6.075	4.295
12.58	0.875	6.06	4.29
1.09968	0.94201	0.78247	0.63246
4.67607	8.40499	9.94546	1.14202
1.77578	1.78300	1.77397	1.77448
8.42248	8.42248	8.42248	8.42248
1.19823	1.20548	1.19645	1.19696
69.67	60.68	59.43	59.50
15.79	16.05	15.72	15.74
		59.93"	15.85"

	20	20	30	30	45	45	v	v'	45	45	30	30	20	20
19	17.463		1.7		11.6		22.7	32.6	41.3		49.0		1.7	
	58.9	12.6	10.1	8.4	17.8	6.1	27.1	4.4 36.8	4.2 47.7	6.4	57.8	8.8	12.3	12.6
20	14.7		29.0		39.7		50.3	46.3	55.9		0.4		9.0	
	26.6	11.9	37.6	8.6	46.8	6.3	56.0	50.4	0.2		6.4		5.9	
							46.3		55.9		9.0		20.1	
							50.4	4.1	0.2	4.3	17.9	8.9	32.8	12.7
21	53.1		7.8		19.0		26.9	35.5	44.6		49.2		1.1	
	5.6	12.5	16.6	8.8	25.1	6.1	30.0	4.1 39.7	4.2 46.7	6.1	58.4	9.2	14.7	13.6
23	46.4		2.6		14.8		22.3	32.0	37.8		47.5		59.9	
	59.5	12.9	11.5	8.9	20.9	6.1	26.6	4.3 36.5	4.5 44.3	6.5	56.6	9.1	11.7	11.8
25	37.2		57.3		3.6		10.5	20.0	25.1		33.9		45.8	
	49.9	12.7	1.0	8.7	9.7	6.1	14.7	4.2 24.5	4.5 31.6	6.5	43.0	9.1	59.6	13.8
27	20.3		34.6		45.4		51.8	1.2	5.7		14.0		25.2	
	33.0	12.7	43.3	8.7	51.3	5.9	55.8	4.0 5.5	4.3 11.6	5.9	22.6	8.6	38.3	13.1
28	56.8		10.7		21.2		27.8	37.2	42.0		50.3		1.1	
	8.8	12.0	19.5	8.8	27.6	6.4	31.8	4.0 41.7	4.5 47.7	5.7	58.8	8.5	14.0	12.9
							~~37.2~~	~~42.0~~	~~50.3~~		1.2			
30	29.9 ~~27.9~~		44.1		55.8		2.0	12.0 16.3	16.8 22.7		25.9 34.6		37.7	
	41.9	12.0	53.3	8.9	1.6	5.8	6.5	4.5 ~~14.8~~	4.3 ~~26.0~~	5.9	37.7	8.7	50.2	12.5
32	4.0		18.0		28.4		34.8	44.0	49.0		56.9		8.2	
	15.9	11.9	26.3	8.3	34.3	5.9	38.8	4.0 48.7	4.7 54.7	5.7	~~5.3~~ 5.7	8.8	20.9	12.7
33	46.0		1.0		12.0		18.7	28.4	33.5		41.9		57.0	
	58.7	12.7	9.5	8.5	18.3	6.3	22.9	4.2 32.7	4.3 39.4	5.9	50.7	8.8	6.6	12.6
35	16.9		31.4		42.7		49.4	59.4	4.1		13.2		~~5.3~~ 5.8	
	29.1	12.2	40.1	8.7	48.8	6.1	54.0	4.4 3.9	4.0 10.6	6.0	22.3	9.1	34.2	12.3
	12.38			8.66		6.10		4.20	4.39	6.05		8.89		
								4.30						

Lines a and b
W. A. R. Observer.
Jerusalem
Seeing fair

Lines a and b
W. A. R. Observer,
Jerusalem
Seeing bad.

10°	v	v'	10°	24
18 20 25.6	24.7 55.0	4.7	—	
50.4	57.6	9.1	—	
24.7	2.6	4.9		
22 49.9	18.2	27.9	32.6	
13.4	22.6	32.2	59.3	
25.5	4.4	4.3	26.7	
24 10.8	36.7	46.3	51.2	
35.1	40.1	50.7	16.8	
24.3	4.4	4.4	25.6	
26 6.5	32.8	42.7	47.8	
31.8	37.4	47.1	12.2	
25.3	4.6	4.4	24.4	
28 13.0	44.0	33.7	3.4	
39.0	48.6	58.1	28.6	
24.0	4.6	4.4	25.2	
29 43.4	13.9	23.4	34.2	
6.7	18.1	28.0	59.6	
23.3	4.2	4.6	25.4	
31 47.2	14.6	24.2	30.1	
12.0	18.9	28.7	56.0	
24.8	4.3	4.5	25.9	
33 10.3	38.8	48.7	54.8	
35.9	43.2	34.0	21.0	
25.6	4.4	4.3	26.2	
34 35.5	2.6	12.4	18.0	
1.1	7.0	16.9	44.1	
25.6	4.4	4.5	26.1	
35 51.6	17.5	27.1	32.8	
16.8	21.8	31.7	58.1	
25.2	4.3	4.6	25.3	
37 12.8	38.9	48.7	54.4	
37.3	43.5	53.1	19.9	
24.5	4.6	4.4	25.5	
24.80	4.44	4.48	25.63	

10°	v	v'	10°
18 39 59.2	26.1	36.2	43.3
23.2	30.0	40.6	7.8
24.0	3.9	4.4	24.5
41 16.4	43.0	52.4	59.3
39.6	47.3	57.0	23.0
23.2	4.3	4.6	23.7
42 33.6	3.9	10.4	19.1
57.0	5.1	14.7	42.1
23.4	1.2	4.3	23.0
44 3.6	32.0	41.5	50.8
26.4	36.1	45.7	13.6
22.8	4.1	4.2	22.8
45 26.5	54.8	4.7	13.1
51.1	59.5	9.0	37.0
24.6	4.7	4.3	23.9
46 45.6	15.4	25.2	36.2
9.2	19.7	29.5	59.2
23.6	4.3	4.3	23.0
48 6.5	37.8	47.6	59.0
29.7	42.1	51.9	23.9
23.2	4.3	4.3	24.9
49 30.9	1.1	10.9	21.4
34.7	5.2	15.2	44.6
23.8	4.1	4.3	23.2
50 52.2	24.0	33.3	44.6
15.0	28.0	37.7	7.8
22.8	4.0	4.4	23.2
52 42.6	14.6	24.1	—
4.8	18.8	28.4	—
21.4	4.2	4.3	
23.58	4.77	4.34	23.77

Lat 15° 0' 5" log 1.98075
log 15 cos and 10°

9.23967
1.14202
0.38169 0.38169 X 1.4202
1.40088 1.37058 64536
1.78257 1.75257 179038
9.42248 9.42248 9.42248
1.20505 1.19505 1.21286

Jerusalem	16.03	14.96	1633
Seeing bad.	6.061	56.57	61.72

S. C. Chandler, Jr. obs.

	30		30		45		45		v		v'		45		45		30		30	
39	2.7				15.0				23.2 27.6 ~~27.6~~		33.1 37.6		~~39.8~~ 39.8 ~~50.0~~ 45.9				50.0			
	11.6				21.6				33.1		~~39.8~~		~~58.5~~		6.1	6.1	58.6		8.6	
	8.9	8.9			6.6		6.6		4.4	4.4	4.5	4.5					8.6			
40	6.0				21.2				29.9		39.7		47.0				57.3			
	17.0				27.3				34.3		44.2		53.3				6.7			
	9.0	9.0			6.1		6.1		4.4	4.4	4.5	4.5	6.3		6.3		9.4		9.4	
41	24.6				~~43.9~~ 37.7				~~51.2~~ 46.5		~~43.3~~ 36.6		~~14.9~~ 4.3.1				14.8			
	~~37.7~~ 33.9				~~46.8~~ 43.5				~~56.6~~ 51.2		~~10.1~~ 4.3		~~23.2~~ 14.0				23.2			
	~~13.1~~ 9.3	9.3			6.1		6.1		4.4	4.4	4.4	4.4	9.0		9.0		8.4		8.4	
42	58.0				11.7				27.1		36.7		50.0				0.4			
	7.0				~~15.3~~ 11.0				31.5		41.4		56.3				9.6			
	9.0	9.0			6.3		6.3		4.4	4.4	4.8	4.7	6.3				9.2		9.2	
44	41.0				50.7				1.6		~~16.0~~ 11.1		~~26.6~~ 20.2				~~36.2~~ 27.4			
	49.3				57.1				6.8		~~20.3~~ 16.0		~~29.4~~ 26.7				~~38.5~~ 36.0			
	8.3	8.3			6.4		6.4		4.4	4.4	4.6	4.6	6.5		6.5		8.6		8.6	
45	55.7				5.9				17.7		27.4		37.0				44.6			
	4.3				12.3				22.1		31.9		42.6				53.7			
	8.6	8.6			6.4		6.4		4.4	4.4	4.5	4.5	5.6		5.6		9.1			
47	54.3				6.3				18.6		~~24.4~~ 21.3		37.7		31.2		40.2			
	1.2				12.6				23.6		~~31.2~~ 26.4		~~47~~ 37.7				~~49.0~~ 40.3			
	7.9	(7.9	6.9		6.3		6.3		5.0		4.8		6.5		6.5		8.8		8.8	
48	47.0				58.3				5.5		15.7		20.7				28.6			
	56.1				4.7				10.0		20.1		~~29.5~~ 27.0				38.6			
	9.1	8.1			6.4		6.4		4.5	4.5	4.9	4.8	7.0		7.0		9.0		9.0	
49	59.9				10.7				21.3		~~31.2~~ 21.2		31.2				40.3 ~~49.0~~ 40.3			
	8.5				16.6				26.6		26.5		37.7							
	~~8.6~~ 8.6	8.6			5.9		5.9		5.1				6.5		6.5		8.7		8.4	
51	58	37.7			49.9				8.9		13.5		25.0				34.2			
	~~14.0~~	46.8			56.1				8.1		18.1		31.6				42.8			
	~~8.4~~ 9.1	9.1			6.2		6.2		4.2	4.2	4.6	4.6	6.6		6.6		8.6		8.6	
52	59.4				11.2				24.2		33.8		44.7				53.0			
	8.4				17.7				28.5		38.4		~~51.0~~ 47.0				2.6			
	9.3	9.3			6.5		6.5		4.3	4.3	4.6	4.6	6.3		6.3		~~8.6~~ 9.6		9.6	
54	1.7				2.96				4.20		5.19		1.8				10.0			
	2.74				3.61				4.65		~~5.61~~ 5.42		8.0				~~11.0~~			
	8.7	8.7			6.5		6.5		4.5	4.5	4.2	4.2	6.2		6.3				9.0	
		8.82				6.31				4.39		4.50			6.44				8.90	

4.47

Remeasure north.

Remeasure south

Rej. Card-work sheet

Remeasure north

Rej. Card-work sheet

Remeasure south

Venus south. of horizontal line.

S. C. Chandler. Observer.

20	20	30	30	45	45	v	v'	45	45	30	30	20	20
16 33 33.4	33 43.2	33 47.7		33 56.9		7.2	—	—	—	—		—	
46.6		56.0	8.3	3.1	6.2	11.7 4.5	—	—	—	—		—	
38 7.4		22.0		32.0		42.7	52.3	1.0		8.3		18.0	
20.1	13.0	31.0	9.0	38.0	6.0	47.0 4.4	56.8 4.5	7.1	6.1	16.9	8.6	31.6	13.6
17 3 12.9		27.9		38.3		49.2	59.0	8.2		15.4		26.5	
26.0	13.1	36.8	8.9	44.6	6.3	53.7 4.5	3.5 4.5	14.6	6.4	24.0	8.6	39.1	12.6
17 4 56.0		11.5		21.9		32.7	42.6	51.5		58.8		9.5	
9.6	13.6	20.8	9.3	28.1	6.2	37.0 4.3	47.1 4.4	57.7	6.2	7.7	8.9	22.6	13.0
17 7 16.9		34.3		43.9		54.8	4.6	13.0		20.4		30.5	
32.7	12.8	43.1	8.8	50.7	6.8	59.0 4.2	8.9 4.3	19.4	6.4	28.7	8.3	42.8	12.3
17 9 9.7		25.0		35.0		46.3	56.0	4.9		12.2		22.9	
22.9	13.2	34.0	9.0	41.4	6.4	50.6 4.3	0.3 4.3	11.1	6.2	21.0	8.8	35.4	12.5
17 10 57.2		11.6		21.0		32.0	41.5	50.3		57.3		7.0	
10.4	13.2	20.2	8.6	27.6	6.6	36.4 4.4	46.0 4.5	56.5	6.2	6.1	8.8	20.7	13.7
17 12 47.2		1.6		11.5		21.6	31.2	39.7		46.4		56.4	
0.4	13.2	10.4	8.8	17.5	6.0	25.9 4.3	35.7 4.5	46.0	6.7	55.4	8.9	8.5	12.1
14 29.5		44.2	8	54.0		4.7	14.6	22.9		30.2		39.9	
42.6	13.1	53.6	9.4	0.5	6.5	9.2 4.5	19.0 4.4	29.5	6.6	39.0	8.8	52.7	12.8
	13.16		8.90		6.33	4.38	4.42		6.35		8.71		12.8

Venus south of horizontal line.

S. C. Chandler. Observer.

20	20	30	30	45	45	D	D'	45	45	30	30	20	20
5 28 24.7		40.8		51.9		59.4	9.1	14.5		24.0		36.7	
37.1	13.0	49.5	8.7	58.4	6.5	4.0 4.6	13.5 4.4	21.1	6.6	32.8	8.8	49.5	12.8
44.0		59.4		10.7		17.8	27.6	32.8		42.0		53.7	
56.0	12.0	8.2	8.8	17.0	6.3	22.0 4.2	32.0 4.4	38.9	6.1	50.7	8.7	5.8	12.1
	12.50		8.75		6.40	4.4	4.4		6.35		8.75		12.45

S. C. Chandler. Observer.

	20	20	40	40	ν	ν′	40	40	20	20	
54	6 3.6		23.8		31.0		40.6	45.2		—	
	16.6	13.0	30.6	6.8	35.3	4.3	44.8	4.2	—	—	
47	5.2		26.8		34.6		44.4	49.3		5.0	
	18.9	13.7	34.1	7.3	39.1	4.5	49.0	4.6	56.8	7.5	17.3	12.3
49	31.7		54.2		3.1		12.7	19.0		36.0	
	44.7	13.0	1.6	7.4	7.7	4.6	17.4	4.7	26.0	7.0	48.8	12.8
54	26.2		49.0		58.0		7.7	—		—	
	39.0	12.8	55.7	6.7	23	4.3	12.2	4.4	—		—	
		13.12		7.05		4.42		4.47		7.25		12.55

Venus North of horizontal line.

S. C. Chandler. Observer.

10°	10	v	v'	10°	10°
18 4 5.0		38.7	48.3	59.9	
28.9	23.9	42.9 4.2	52.7 4.4	24.7	24.8
5 52.8		28.4	38.2	50.8	
17.7	24.9	32.7 4.3	42.4 4.2	15.2	24.4
7 32.1		8.4	18.3	33.7	
57.9	25.8	12.7 4.3	22.8 4.5	58.5	24.8
	24.87	4.27	4.37		24.67

Venus South of horizontal line.

S. C. Chandler. Observer.

10°	10°	v	v'	10°	10°
10 21.0		56.1	6.1	18.7	
47.9	26.9	0.9 48	10.7 46	45.9	27.2
16 37.2		23.9	37.2	~~18~~ 26.7	
2.7	25.5	28.1 4.2	3.2 26.0	51.6	26.0
~~18~~ 26.7		10.5	20.0	24.0	
51.6	24.9	15.0 4.6	24.0 4.0	48.9	24.9
	25.77	4.53	4.31		26.03

Observation of the diameter of Venus with the East Equatorial

Rate of motion for $1^s = -.00130^s$

Dec -13-14

Venus Sunrise

Series I Venus Sunrise.

	30	40	45	V	V'	45	40	30
16.6	484	5-28	541	—	—	—	—	—
	572	592	02	4.8	5.3	12.0	13.5	17.8
	8.8	6.4	6.1	4.5				
7	27.7	32.1	33.7	—	—	—	—	—
	36.8	39.0	40.0	44.6	45.0	51.9	53.4	57.5
	9.1	6.9	6.3					
8	6.0	10.7	12.3	—	—	—	—	—
	15.4	17.5	18.5	23.2	23.9	30.1	31.5	36.0
	9.4	6.8	6.2					
	43.0	47.0	48.5	—	—	—	—	—
	5-1.7	5-3.9	5-4.8	5-9.2	5-9.8	6.4	8.0	12.1
	8.7	6.9	6.3					
9	17.4	22.0	24.0					
	27.0	29.3	30.0	34.5	35.0	41.5	43.0	47.3
	9.6	7.3	6.0					
	5-2.5	5-6.9	5-8.4					
	1.7	3.7	4.5	9.0	9.4		17.0	
	9.2	6.8	6.1					
10	3.44	33.6	35.0					
	38.4	40.6	41.5	46.0	46.6	5-3.2	5-4.6	5-8.5
	9.0	7.0	6.5					
11	5.3	9.8	11.0					
	14.2	16.6	17.6	22.0	22.5	28.7	30.3	34.5
	8.9	6.8	6.6					
18	39.2	41.0	43.5					
	44.9	50.1	51.0	55.5	56.0	2.4	3.6	7.9
19	18.2	22.5	24.0					
	27.0	29.0	30.0	34.4		41.0	42.5	46.8
	8.8	6.5	6.0					
20	5.5	9.7	11.2					
	14.5	16.4	17.2	21.5	21.9	28.2	29.5	33.8
	9.0	6.7	6.0					
20	4.63	5-2.4	5-2.0					
	5-5.3	5-7.3	5-8.9	2.2	2.7	8.9	10.2	14.2
	7.0	6.8	6.0					
	6.95							
	Corrected	6.82	6.19					

$\ell \cos \delta$ 9.99335 1.17609 1.14944

$\delta = -19^\circ$ $\ell \cos \delta$

ℓ sin 30	ℓ sin 40	ℓ sin 45
9.69897	9.80807	9.84948
1.14944	1.14944	1.14944
0.84841	0.95751	0.99892
0.94694	0.82801	.78247
1.79535	1.78552	1.78139
62.42	6.103	60.45
61.65	61.04 − .08 = 60.96	

log 61.30 1.7875 1.7850

9.4870 9.4870

1.2245 .2220

16.77" 16.68

++ .08

Regd. for motion of planet: for .01°

$\delta = 20^\circ$ 9'

$\ell \cos \delta$ 9.43738 log 9.43738

9.99256

1.17609

1.14865

9.69897	9.80807	9.84948
1.14865	1.14865	1.14865
0.84762	0.95672	0.99813

Dec. 13–14.

Series II Venus South. (South ?)

	30	40	45	v	v'	45	40	30
21	29.7	34.0	35.1					
	38.3	40.4	41.2	45.4	45.9	52.0	53.3	57.6
	8.6	6.4	6.1					
22	11.5	15.5	17.0					
	20.0	22.0	23.0	27.0	27.5	33.4	34.7	38.9
	8.5	6.5	6.0					
	49.0	53.0	54.5					
	57.5	59.6	0.4	4.5	5.0	11.0	12.1	16.0
	8.5	6.6	5.9					
23	33.3	36.4	38.3					
	41.5	43.4	44.1	48.0	48.5	54.2	55.5	59.2
	8.2	7.0	5.8					
24	40.8	45.0	46.6					
	49.4	51.7	52.5	57.0	57.5	3.9	5.4	9.5
	8.6	6.7	5.9					
	8.48	6.64	5.94					
	9.00	6.82	6.19					
	8.65	6.73	6.06					
	9.00	6.82	6.19					
	8.82	6.76	6.10					
	8.59	6.54	6.02					
	8.70	6.65	6.06					
	−.01	−.01	−.01					
	8.69	6.64	6.05					

Seeing good

	0.93902	0.82217	0.78175	0.93902	0.82217	0.78175
	.84841	.95781	.99892	.84762	.93672	.99813
	1.78743	1.77998	1.78067	1.78664	1.75889	1.77988
	5.43720	5.43720	5.43720	5.43738	5.43738	5.43738
	1.22463	1.21688	1.21787	1.22402	1.21627	1.21726
	16.77	16.48	16.52	16.75	16.45	16.49
	61.30	60.21	60.35			
		60.62				
		16.59				

~~13-14~~ (Sec)

Dec. ~~13-14~~

Perseus North.

	30	40	45	V	V'	45	40	30
29						43.7	44.6	46.5
	35.0	37.0	38.0	42.7	43.2	49.7 6.0	51.0 6.4	53.2 8.7
31	~~8.0~~	~~10.0~~				17.3	18.1	20.1
	8.0	10.0	11.2	16.2	16.6	23.3 6.0	24.8 6.7	29.0 8.9
						57.8	58.8	1.0
	48.5	50.6	51.7	56.8	57.2	4.0 6.2	5.4 6.6	9.8 8.8
32	~~23.7~~	~~26.1~~				36.5	39.5	40.8
	23.7	26.0	27.0	32.3	32.8	[illegible]	45.0 5	
33						19.5	20.4	22.5
	9.6	11.9	12.9	18.2	18.7	25.4 6.9	26.8 6.4	31.0 8.5
						52.8	53.7	56.0
	42.8	45.2	46.1	51.5	52.0	58.8 6.0	0.1 6.4	4.5 8.5
34						26.1	26.8	29.2
	16.0	18.4	19.4	24.7	25.2	32.0 5.9	33.5 6.7	38.0 8.8
						59.0	59.8	2.0
	48.9	51.2	52.2	57.5	58.0	4.9 5.9	6.4 6.6	10.7 8.7
35						28.0	29.0	31.4
	17.6	20.2	21.0	26.5	27.0	34.0 6.0	35.4 6.4	39.8 8.4
35	4					58.3	59.0	2.0
	48.0	50.4	51.4	56.8	57.2	4.4 6.1	5.8 6.8	9.8 7.8
37						18.2	19.3	21.5
	7.4	10.0	11.0	16.5	17.0	24.3 6.1	25.7 6.4	30.3 8.8
						6.02	6.54	8.59

Dec. 14.– 15.

$V = -19^\circ 31' \quad -19^\circ 51'$

$\log \cos V = 9.97412 \quad 9.97836$

$\log \sin V = 1.17609 \quad 1.17609$

$1.15021 \quad 1.14945$

log 4 9.44121

Lemon Hatch (South?)
South

	30	40	45	V	V'	45	40	30
	h m s.							
16	20 337	359	368					
	41.8	42.6	43.0	44.2	44.6	47.2	48.2	50.0
	8.1	6.7	6.2					
26	2.5	7.0	8.3					
	11.2	13.4	14.2	18.9	19.4	26.0	27.3	31.4
	8.7	6.9	5.9					
27	3.0	7.1	8.7					
	11.6	13.8	14.4	19.0	19.7	26.1	27.5	31.5
	8.6	6.7	5.7					
	41.5	45.3	47.0					
	50.0	52.0	53.0	57.5	58.0	4.2	* 5.8	9.7
	8.5	6.7	6.0					
28	18.4	22.4	24.2					
	27.0	29.0	30.0	34.5	35.0	41.5	42.7	46.7
	8.6	6.6	5.8					
28	52.2	56.0	58.0					
	1.0	3.0	3.8	8.3	8.8	15.2	16.7	20.5
	6.8	7.0	5.8					
29	42.2	46.5	47.8					
	50.7	52.8	53.7	58.0	58.5	4.8	6.2	10.2
	8.5	6.3	5.7					
30	15.2	19.2	20.9					
	23.8	25.8	26.7	31.0	31.5	37.8	39.0	43.0
	8.6	6.6	5.8					
30	53.2	57.3	58.8					
	1.9	3.8	4.7	9.0	9.5	16.0	17.1	20.9
	8.7	6.5	5.9					
91	33.2	37.0	38.5					
	41.5	43.5	44.2	48.8	49.2	55.4	56.8	0.9
	8.3	6.5	5.7					
92	14.9	18.7	20.2					
	23.5	25.4	26.1	30.5	31.0	37.1	38.5	42.3
	8.6	6.7	5.9					
	50.9	54.6	56.4					
	59.7	1.4	2.2	6.5	6.9	13.2	14.4	18.5
	8.8	6.8	5.8					
	8.56	6.63	5.87					

Sin 30 9.69897 1.15021 0.84818 0.43323 1.78271 60.89

Sin 40 9.69807 1.15021 0.95828 0.51855 1.77683 59.82 59.94

Sin 45 9.69948 1.15021 0.99865 0.53774 1.77384 59.40

log 4 9.44051

log sin 59.94 7777

log D .2182

log D 16.53 02

16.51 11

.84842 .95752 .99853

8.56 6.63 5.87

8.54 6.54 6.02

7.18 13.17 14.89

8.57 6.55 5.90

8.56 6.62 5.86

.93197 .82086 .76790

.84978 .95828 .99963

1.78175 1.77914 1.76753

9.44108 9.44103 9.44103

1.22218 1.22017 1.20862

1668 16.60 16.17

60.42 60.14 58.86

11

16.48

1.78038 1.77838 1.76683

44121 44121 44121

.22160 .21959 .20804

1666 1658 1614

Nevers ~~South~~ North.) (North ~~South~~)

(and - Make out:

	30	40	45	V	V'	45	40	30
16	33					73	92	
		44.3	48.3	49.8	57.1	57.6 +.5		
	34	~~34.2~~				48.8	50.3	55.0
		31.2	34.2	35.1	40.8	41.3 0.5		
	35					26.5	28.0	33.0
		8.8	11.6	12.7	18.4	19.0 0.6		
	37	~~5.0~~	~~7~~			22.4	24.0	28.9
		5.0	7.5	8.6	14.2	14.8 0.6		
						58.3	59.7	4.8
		40.4	43.0	44.2	50.0	50.5 .05		
	38	~~14.1~~	~~21.0~~			36.0	38.0	42.8
		18.4	21.0	22.4	28.2	28.6 0.4		
						14.4	16.0	
		56.5	59.3	0.5	6.2	6.7 0.5		
	40	~~5.9~~				17.5	19.1	24.2
		59.2	2.1	8.3	9.3	9.7 0.4		
	41					58.2	0.0	4.5
		41.7	44.1	45.4	50.7	51.2 +0.5		
	42					34.0	35.4	39.8
		17.2	19.8	20.8	26.3	26.8 0.5		
						3.6	5.2	9.6
		47.0	49.7	50.6	56.1	56.6 0.5		

20	20	30	30	45	45	γ	γ'	45	45	30	30	20	20

5 2 44.0	5 3 3.3	3 29.3
51.9	11.5	37.7
27.0	46.2	13.2
19.5	39.3	6.5

Dec 4 1882

α Persei 21h 15m.45 +62° 5′ 1.89 β Cephei 21h 27m.8 +70° 3′ 2.75 π² Cygni 21h 42m.26 +48° 46′ 1.15 μ Capric 21h 46m.52 −14° 6′ −.25

✓ ✓ ✓ ✓

21 12 5.58 1 416 8.1 23 8.8 23 480 238 39 8.6 39 350 540 43 593 44 104 230
0.8 460 12.4 134 540 30.0 10.8 383 569 10 125 254
4.0 501 16.9 16.0 599 363 13.5 414 0.0 29 146 274
7.9 544 21.0 21.7 5.9 423 154 443 3.3 46 168 295
15.0 4.70 58.6 25.5 26.6 17.30 11.8 484 18.1 13.28 474 6.4 5.8 2.72 18.9 317
29.7 545 9.5 338
30.0 522 34.5 24 19.3 248 0.3 40 524 253 127 45 2.1 444 359
32.7 566 390 241 305 6.4 549 283 157 4.0 465 38.0
34.9 1.0 431 29.1 369 12.4 579 314 18.9 5.5 487 402
38.0 5.2 34.0 429 0.8 347 7.3 508
12 42.5 35.62 9.9 38.9 29.08 48.8 2.8 57.22 37.8 8.7 5.52 530

13 17.5 25 56.6
19.9 1.5
22.7 4.5
25.0 9.2
29.7 22.96 15.0 5.36

25.56 25.58 48.35 48.27 6.39 6.38 31.66 31.66
25.57 48.31 6.38 31.66
2 18.26 13 25.54 24 48.29 6.36 31.64
1 47.34 15 46.84 27 8.31 28.45 55.06
138.26
107.34
−2 21.30 −2 20.02 −2 22.09 −2 23.42

5 2 44.0 3 3.3 3 29.3 10 0 2.2 0 34.1 1 14.1 25 1 17.3 2 43.3 15 2 14.9 3 3 31.0
51.9 11.5 37.7 9.9 42.5 23.0 23.4 49.0 16.1 33.1
27.0 46.2 13.2 44.8 16.4 56.1 58.8 35.0 53.9 9.2
19.5 39.3 6.5 38.3 9.3 49.0 52.5 17.4 57.0 12.6
2 ~~48.10~~ 35.60 2 25.06 3 21.68 9 59 53.80 10 0 40.58 25. 10 1 20.55 05 1 08.00 2 36.18 15 2 35.48 3 21.48
46.08
26.60

46.08 78.26 9 59 53.80 16806 62.80 76.00
1.66351 1.89354 10 1 5.55 2.22546 1.79496 1.88081 1.88081
2.74005 1.17609 1 11.75 1.17609 1.17609 1.17609 2.96076
~~5654~~ 9.67042 71.75 9.53301 9.38691 9.38670 8.92005
8.92346 2.74005 1.85582 2.93456 ~~2.36075~~ 2.44360
2.93456 2.96076
892126
c = 4 47 33 i = 4° 46′ 6″ 4 45 19

Dec 4 1882

61 Cygni 21h 32m.13 +39° 53′ ~~1.37~~ 84 11 Cephei 21h 40m.11 +70° 46′ .87 α Aquarii 21h 59m.43 −0° 54′ −.02 θ Aquarii 22h 10m.36 −8° 22′ −.15 π

21 29	264	427	—	37	264	56	538	57	28	15.1	7	440	7	556	8.0
	291	455	—		327		557		48	172		453		577	10.1
	318	480	—		39.1		57.0		6.8	193		46.7		598	12.1
	344	506	—		45.7		584		8.8	214		48.2		18	14.3
	37.1	533	—		52.2		5.98		11.0	235		504		39	164
		560			580					255					184
	94	588	—		4.4	58	0.0		359	275	8.	476		289	20.5
	120	1.3	—		10.0		1.7		378	297		493		31.0	227
	148	4.0	—		174		3.8		400	31.6		509		33.0	248
	174		—				5.4		420			525		35.1	
	203		—				6.5		44.0			54.0		37.3	
	53.27	53.36			51.77				23.39	23.42				16.41	16.37
		53.31			51.77					23.41					16.39
		53.29			51.73					23.39					16.37
		15.68			12.14					46.68					39.79
	−2	22.39		−2	20.41				−2	23.29				−2	23.42

b = .77

π
h m
21 42 +1.15 o = −2 22.09 −12.6 −2 23.35
21 47 −.25 23.42 +.28 .14
21 32 ~~+1.07~~ .54 22.39 −92 .31
21 59 −.62 23.29 +2 27
22 10 −.15 23.42 +17 25
22 19 +.01 23.27 −.1 .28
~~+0.86~~ ~~22.98~~ −2 23.29
21 55 0.26 22.98

m = b sec φ − n tg φ
= 1.04 +1.00 = +2.04

4π + m = +2 23.29
m = +2.04
4π = +2 21.25 α 21h 55m

o = −2 21.30 +1.89 n = −1.09
20.02 +2.75
20.41 +2.87

o = +1.68 +1.63 n n = −1.03
+2.96 +2.49 1.19
+2.57 +2.41 1.07
n = −1.10

.0 4 58.4 1 21.8
59.0 24.2
36.7 1.5
35.8 1.4

30 3 20.9 4 38.8
209 39.0
58.8 16.6
58.4 15.9

Dec 4 1882

π Aquarii 22h 19.15m +0 47 +.11 | 4 Draco 12h 6 39 +78 16 4.83 | γ Virginis 12h 13m 52s −0.1 | ζ Virginis 12h 35m 40s −0 48 −.02

22	16	34.7	47.0		12	3	39.9	19.3				12	32	19.8	12.0
		36.7	49.0				43.3	23.7						18	14.0
		38.7	51.0				46.2	26.3						39	16.2
		40.8	53.0				49.6	30.2						59	18.2
		42.8	38.74 55.0				52.9	34.0						8.2	20.3
			57.1				56.7	37.0							22.4
		7.5	59.3				04	41.0						32.7	24.4
		9.7	1.4				34	45.0						34.8	26.5
		11.8	11.76 3.5				7.0	47.2						36.8	28.6
		13.9					10.8	51.2						39.0	
		15.9					13.6	53.8						41.0	
							16.4	56.8							
								59.8							
		55.85	53.14					19.34	1					20.37	20.29
			55.19					38	19.27						20.31
			55.1					19.27	19.27						20.29
			18.49					39.41	39.06						43.52
			−2 23.27					−2 19.98	2 19.79						−2 23.63

		π						n = −.103							
		12h 35m		−0.2		0 = −2	23.63	+02	−2	28.61		0 = −2	19.79	+ 4.63	
		12 45		+1.51			22.12	−.160		23.72			20.79	+ 2.61	
		12 19		+ .83			22.86	−.85		23.71					
		12 32		+ .81			22.51	−.83		23.64					
		12 38		+.81			−2 22.85		−2	23.67					

[0 = +3.06 + 402 n = −.78]
0 = 2.06 + 402 n = −1.03

Δπ = +2 23.67 at 12h 38m m = +104 +94 = +198
m = 1.98
Δπ = +2 21.69 h = +.031

10	2 45.8	4	9.9
	49.0		14.5
	25.2		49.5
	25.6		50.1

Dec 4 1882

Urs Maj	12 4847	+56 36	6 Can. Ven.	12 19 59	+39 41	κ Draco.	12 2826	+70 26	12 Can Ven	12 50 28	+38 57
		+1.51			+.13			2.81			+.81
12	45 514	143		17 15.0	310	24 244	25 44	414		47 432	592
	554	180		17.6	337	30.0	10.7	48.0		46.0	1.7
	593	217		203	364	354	17.0	537		485	4.5
	3.0	257		230	390	392	229	598		51.2	7.0
	569	59.20 294		25.6	20.30 418	438	29.0	6.0		539	9.8
		331			444			122			124
	520	369		579	472	25 49.0	429	184		258	15.0
	555	407		0.5	499	54.8	493	246		28.2	179
	594	59.34 445		3.3	526	594	553	30.7		31.0	20.4
	3.0			6.0		42	15			337	
	68			8.7	3.28	100	79			36.3	
						27 334					
						38.3					
						44.4					
						49.2					
						53.9					
	59.27	29.37		41.79	41.60 79		6.09	6.01		9.78	9.77
		29.32			41.79			6.04			9.78
		29.29			41.77			6.00			9.76
		51.41			4.65			26.79			32.57
	−2	22.12		−2	22.88		−2	20.79		−2	22.81
						45 2 35.0	3 12.0	55.1			
						44.9	22.8	5.3			
						18.0	55.8	37.8			
						9.3	46.7	30.1			
						2 26.8	3 4.33	3 47.08			

Dec 5 1882 9.99912
0.9861
.09973

9.88106
0.9861
9.99967

αCeti 2 56 10 +3 38 +06

53 192 204 216 229 245 21.72
53 27.0 29.0 31.0 33.0 35.2
393 414 434 456 477 498

54 18.0 19.4 21.1 22.7 24.2 21.85
0.1 2.1 4.2 6.2 8.4
519 539 560

55 30.9 38.5 41.2 43.8 46.5

pPersei 2 57.40 +38 23 +80

57 31.1 33.2 35.0 37.2 39.2 35.14
57 45.9 48.6 51.2 54.0 56.7
2.0 4.8 7.5 10.2 12.9 15.6

58 53.0 55.7 58.0 59.8 1.8 57.66
29.3 31.9 34.7 37.5 40.3
18.3 21.0 23.9

4762 4767 47.65 53 47.63 17.57 −2 23.94

12.96 12.91 12.94 58 12.92 36.00 −2 23.08

βPersei 3 0 32 +40 30 +85

2 12.9 15.0 17.2 19.4 21.6
26.0 28.0 30.3 32.4 34.8 36.9 38.9 36.9

34.68 34.67 34.67 34.65 57.34 −2 23.69

δArietis 3 4 − +19 17 +35

n = −1.05

h m
2 56 +06
3 0 +55
3 4 +35
3 15 11.17
3 02

o = −2 23.94 − .06 − 2 24.00
23.08 − .89 23.97
23.69 − .37 24.06
22.92 − 1.23 24.15
+2 24.05
2.00

m = +1.04 +.96 = +2.00

4T + m = +2 22.05 at 3h 4m
h = +.021

30 409.1 31.9 16.6 31.9 53.9 8.1 55.8 8.9
0 34.9

33 88.85 34 3.82 32.41 +2.591 1.41347 0.27213 1.51120 +.3245 34 34.30 34 34.27
35 20.95 −33.45 1.52440 0.08773 1.62213 −41.89 39.06

48 12.08 +8 37 27 0.49000 56110 +38.46 1.66470 +0.12291 1.67761 −47.60

47 24.48 3 36 58.2 37 47.5 10.263 −9 36.0

40 2 20.0 31.0 8.3 1.4
3 38.2 49.1 25.5 19.7

42 15.18 +36.05 +37.78 1.57726 4.55967 1.58693 42 51.23
43 33.12 −42.70 −44.74 1.65070 4.55967 1.68037 42 50.42 42 50.84 39 57.38

40 29 12 .16912

+1 54 0.28110 +.01291 +0.29401 −.1.96

39 55.54 29 31.5 30 20.0 +10 2.41 −9 35.6

Dec 5 1882 G.S. 3 14
0 9 8 61
9.91175

Perseid 3 15 54 +49 26
1.17

12 47.7 13 69 260
49.7 10.0 29.0
51.4 13.0 32.1
55.0 16.3 35.3
56.7 52.14 19.5 38.5
41.6

14 16.0 57.7 45.0
18.4 0.7 48.0
22.0 3.9 51.3
24.7 7.0
26.7 21.56 10.3

38.53 38.53
38.53
13 38.57
1.43
- 2 22.92

45 14.4 2 17.4 40
15.0 28.3
53.1 5.3
45.2 57.9

45 59.42 47 12.2
+37.84 35.13

+46.37 -43.05

1.66624 1.63397
9.91175 9.91175
1.57998 1.54572

46 37.26 46 37.09

46 37.18

36 11.47

49 25 26

1.08269
-7 2
0.85160
11291
86451
+ 7.32

47 36 18.49
46 26 [illegible]
+10 [illegible]

-9 36.3

D 5 0 5
Reg.
-9 36.0
35.6
36.3
-9 35.97

Dec 5/6 1882

⊙ Venus 16h 2m 0 −22° 33′
52 52

40 3 47.9	55 0 59.7	1 42.7	4 1.8
54.8	4.1	47.8	8.0
33.2	43.3	28.2	46.9
34.8	47.2	29.8	48.1

Dec 6 1882

9.53301
0.09861
9.63162

ρ tan ζ = 8.92252
1.17609
0.09861

β Cephei	21	27	8	+70	3	27.5	γ Cygni	21	32	13	+39	53	+14	11 Cephei	21	40	11	+70	46	−28.7
π² Cygni	21	42	26	+48	46	1.14														

25	1.0		25	23.0			30	41.5			38	42.0	40	19.2	40	34.0		52.8	
	5.2			28.6				44.2				44.5		21.6		37.1		53.9	
	10.0			34.9				47.0				46.5		23.8		40.2		59.0	
	14.3			40.1				49.6				48.8		26.1		43.3		2.2	
	19.0	9.90		47.2				52.2				50.6		28.2	23.78	46.5		5.3	
				53.0				55.0				52.8						8.4	
26	4.1			59.2				57.7				54.8	41	43.9		24.0		11.6	
	49.4			5.0				0.4				56.4		46.5		27.2		14.7	
	55.0			11.3				3.0						48.2		30.3		17.9	
	59.4													57.2		88.5			
	4.5	54.54												58.9	48.74	36.7			

				48.92				52.29				48.52				5.28		5.31	
			25	48.88				52.27				48.48					41	5.28	
				8.20				15.64				12.02						28.41	
			2	20.32			2	23.37			−2	23.84					−2	23.13	
												+2.11							
												21.43							
		+36.98		−7.66															

			21	32		0 =	−2	23.87	+.84	−.88	−2	24.25	0 =	−2	21.32	+2.75			
			21	42				23.13	+1.14	−1.20		.33			21.43	+2.87	n =	−1.00	
			21	59				24.41	−.02	+.02		.39							
			22	19				24.41	+.02	−.02		.43	0 =	−2.59		+2.35	n =	−1.10	
			22	26				23.16	+1.18	−1.24		.40		−2.48		2.47	n =	−1.00	
			22	10				24.53	−.15	+.16		.37						−1.05	
			22	15				24.38	−.03	+.03		.35							
			22	19				24.4	+.02										
											−2	24.36					n =	+1.04	+.96 = +2.00
			22	03			−2	23.91	+.40										

10	0	16.8		10.2									25	1	18.0	2	28.0		
		32.2		14.8											31.2		40.6		
		9.3		52.9	Sun										10.3		20.8		
		0.9		44.0	Sun										3.8		13.9		
		14.00		0.48															
													25	1	15.82	2	25.82		

+	36.98		−	7.66												+41.80		−43.46	
	1.56799			0.88423	n											1.61805		1.63809	−
	9.63162			9.63162												9.91758		9.91758	
	1.19959			0.51585	n											9.53563		1.55567	
+	15.83		−	3.28	n											+ 34.33		− 35.90	n
																+34.33	− 35.95		
															25	1 30.15	1 49.87		
															25	26 50.01			

Reg. Dec 6
4 " Sun
= 9. 36.3 −.10
35.0 +.18
35.5 +.66
36.2 −.12
34.4 +.77

Adopt for D − 9′ 35.0

−9 35.0

																25	58	34.56	4.96
															48	45	13.46	28.7	
																1.58167		−9 36.3	
																0.80790			
																0.12791			
																0.82081	n		
																+ 1.62			
																84.96			
															70.0				
															1.84510	1.92921			
															2.92427	1.17609			
															8.92083	9.81897			
																2.92427			

i = 4 45 50

Dec 6 1882

9.99995
09861
9.09856

α Aqua, 21 5943 −0 54
−.02

9.99995
09861
.09856

π Aquarii 22 19 15 +0 47
+.02

9.81091
09861
9.90952

α Lacertae 22 2626 +49 41
+1.18

9.16748
9.99535
09861
.09396

δ Aquarii 22 10 36 −8 22
−.15

57	52.9	58	1.7		14.0	16	19.0	16	33.4		45.9	23	21.0	23	34.0		53.0	7	43.0	7	54.4		7.0
	54.5		3.8		16.0		21.3		35.4		47.8		23.9		37.0		56.3		44.7		56.7		9.0
	56.3		5.8		18.1		23.2		37.6		50.0		25.8		40.3		59.4		46.4		58.7		11.0
	57.9		7.8		20.0		25.0		39.5		52.0		28.2		43.6		2.7		48.0		0.8		13.0
	59.2	56.16	10.0	58	22.2		27.0	23.10	41.8		54.0		30.4	25.86	46.8		5.8		49.3	4785	2.7		15.3
					24.1						56.1						8.9			46.42			17.2
58	52.8		34.5		26.4	17	23.7		6.4		58.2	24	40.5		24.8		12.3	8	43.1		27.8		19.2
	55.5		36.9		28.5		25.8		8.3		0.3		43.4		28.2		15.3		45.8		29.9		21.4
	57.4		38.9	38.84	30.7		27.2		10.5		2.4		46.0		31.0		18.5		47.4		31.8		23.8
	59.1		41.0				28.9		12.6				48.0		34.5				48.9		34.0		
	0.8	57.32	42.9				30.2	27.16	14.6				50.0	45.58	37.8				51.0	47.24	36.3		
			22.33		22.22				54.01		54.08				5.80		5.80				15.31		15.21
					22.27						54.04						5.80						15.26
				58	22.25					16	54.02					24	05.77					8	15.24
					46.66						18.43						28.83						29.77
			−2 24.41						−2 24.41								−2 23.16				−2 29.53		

47 + m = +2 24.36 (m, s) 01 − 22 (h, m)
m + 2.00
47 = +2 22.36 h = +016

0	4	57.44	13.8			20	4	34.8	0	55.4		30	1	33.3	2	37.9		30	3	20.3	4	35.9	
		3.0	20.8					43.4		3.3				47.2		52.4				25.1		40.3	
		411.4	1.3					23.9		45.0				29.2		33.5				7.0		22.8	
		45.0	2.9					22.9		45.2				20.8		24.9				7.0		22.3	
		452.4	9.70					3.25		52.22				32.62		37.18				1.45		28.30	
		+32.74	−44.00					+35.80		−41.58				+32.40		−32.32				35.78		27.23	
		+26.09	−35.07					+30.92		−33.14				+35.91		−32.81				+28.82		−32.00	
		1.41647	1.54494	m				1.49024		1.52035				1.60108		1.57999	m			1.45969		1.50515	m
		9.09856	9.09856					9.09856		9.09856				9.90852		9.90852				9.09383		9.09383	
		1.51503	1.64350					1.58880		1.61891				1.51060		1.50951				1.55362		1.59905	
		42.519	44.257					38.100		25.084				32.40						+35.78		−39.73	
			45 25.44							25 9.24				32 5.02		32 4.86				33 50.63		52.57	
																82 4.94							
			~~22.91~~							57 39.11						50 43.41						32 57.60	
			45 37.09	48	~~32.84~~				56	46.76							50	50.97				11 3.25	
		−0	52 22	53	21.79		+0		47	113				+49	38	58	41	14.8		−8	8.48	
			43 15	9	~~36.9~~				~~24.5~~						−7	16	−9	36.2					
			1.~~57491~~		35.0				35.6						6.86890					12	15.0	50 44	
			01291					41 37							01291					21	80.1	01291	
			1.~~58782~~					1.70600		−9					.87581					−9	34.4	1.86001	
			−+1530	55.75				07291							+7.56							+1.1245	
			77.25	61.16				1.71891														c = 4 47 33	
								−+1235														4 46 06	
																						4 45 18	
																						4 45 50	
																						21 49.51	
																						4 46.56	
			1.88790		1.78647																		
			2.96251		1.17609																		
			8.92539		2.99995																		
					2.96251																		
			c		4° 49.51'																		

Dec 6 1882 9.99974
.09861
.09835

Dec. 6 22 49 18.42
34.08

The Sun and Venus
$\delta = -22\ 33\ 17.4$
$\log \Delta = -0.41$

22 33 17.4
16 16.68

Venus $\delta = -22\ 43$ 588

Hourly rate in $x = 6.123$

Aquarii 22 15 34 −1 59
.03

I Limb			II Limb			Venus p2 limb		
16 48 48	17 49.6		—	—	51 45	—	16 50 65	16 49 54.2
52 3	38		—	—	6.2	—	8.5	
52 7	60		—	—	10.2	—	10.7	
54 7	83		—	—		—	12.3	50 46
57.2 52.40	106		—	—		—	15.3	
	129		—	—			17.6	
24.1	151		51 45.3	50 36.2	−4.44	287	19.7	50 57.7
26.4	173		47.6	38.7	−6.66	I 310	22.0	51 6.9
28.7 28.61	19.7		49.9	40.9	−8.88	331	24.3	
30.8			52.1	31.76		I 356		
33.1			54.3	32.04		377		
			49.84	32.02				
17 49 10.61	49 10.59		−18.00			33.22	50 15.32	
			31.84	31.94		+8.00		
	17 49 10.60		50	31.89		1522	15.32	

13 2.0	—	13 4.5
3.6	—	6.5
4.8	—	8.3
7.0	—	10.7
8.0	—	12.5
5.08	—	14.9
25.0		16.9
27.0		18.8
29.2		21.0
31.5		
33.3		

12.68
13 12.66
1 37.54
−2 24.38

48	10.60	
50	31.87	
49	21.24	
16	28.22	

16 50	21.78	
	21.23	
	+.43	
16 50	21.66	
	+2 24.28	
	52 45.94	
	+4.32	
16	52 50.26	

Venus

55	1 42.2	
	47.8	
	28.2	
	29.8	
56	37.12	
	53.34	
55	43.78	
22	48.35	
32	55.43	
2	5.42	
3.5	0.85	
−9	3.50	
44	3.58	
	−30.6	
44	5.2	

Time Tri
−42.5
1.62839
09761
0.72700
65
1.38240
00678
1.38915
2.09163
006780
2.09841

10 0 37.41
38.3
24.2
19.9

10 29.95
+9.57

+7.58
0.57467
09838
.97802
+

10 38.46

47 51.11

−1 58 36

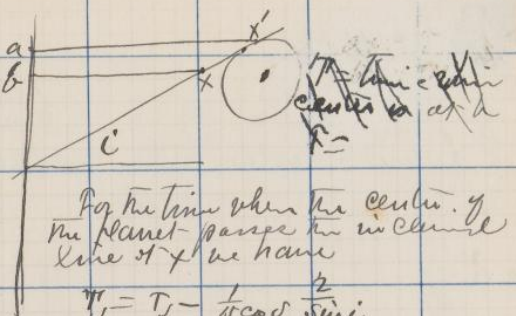
44 21
1.76002
012918
1.87294+
.76291

−+15.64 57.93
48.48.0
46 00.42
58. 28.0
−9 39.0 2

Dec. 6.0
6.2

	Bau	Att M.	Ext. M.	B	T	γ	B+T+γ
	29.89	44.5	45.2	.00421	−.00049	+.00306	+.00678
	30.00	46.5	40.0	.00588	−.00066	+.00759	+.01291

For



For the time when the centre of the planet passes the wire-line $x'x$ we have

$$T_v = T_j - \frac{r}{15\cos\delta}\sin i$$

Then $\Delta\delta = 15\cos\delta\tan i\,(T_m - T_v)$

$$= 15\cos\delta\tan i\left[T_m - T_j + \frac{r}{15\cos\delta}\sin i\right]$$

= apparent upper limb^2

= " " lower "^{2}.

= apparent upper limb (same)

= 0

Collection of Results.

$h = +0^h.2243$ ΔT of $16^h.84$

Red. to Dec. 1888

	S	T	ΔT	No. Stars			n_s	b_s
Dec. 42	21.92	+2	21.25	65	+0.99	+2 22.24	−1.10	+77
48	12.63	+2	21.69	4	+0.77	22.46	−1.03	+77
54	3.97	+2	22.05	4	+0.32	22.37	−1.05	+77
62	22.05	+2	22.36	7	−0.12	22.24	−1.05	+77

M: 60 16.84 +2 22.33

Reduction to Merian Transit +.08

+2 22.41

Observed Collimation

	Collimation	end
208h	Dec. 3 17	+1.3 8.3 −02
179	6	8.1 8.7 +2.6
146	14	8.5 8.5 +0
114	21	9.0 8.0 +9.0
—	25	8.3 8.3 −1.2
157	31	8.2 8.0 −0.5
		8.5

Let T = The time when the centre of the planet crosses the wire-line

T_1 = The observed time of x'. r = Reading of planet.

Then $T = T_1 - \frac{r}{15\cos\delta\sin i}$

Let T_m = The time when the centre of the planet passes the wire-line

Then $\Delta\delta = 15\cos\delta\tan i\,(T_m - T)$

$$= 15\cos\delta\tan i\left[T_m - T_1 + \frac{r}{15\cos\delta\sin i}\right]$$

$$= 15\cos\delta\tan i\,[T_m - T_1] + \frac{r}{\cos i} \quad \text{for pres. limb.}$$

$$= 15\cos\delta\tan i\,[T_m - T_1] - \frac{r}{\cos i} \quad \text{for foll. limb.}$$

Dec 12 1882

Circle West
Russian Transit.

A B C 0 26 κ Cass	δ	ζ Cass	δ	0h 34m α Cass.	δ	0 41 ζ Androm	δ	0 50 γ Cass	δ
22	+62° 17' −19 44		+53° 14' − 10 51		+55° 53' −13 30		+23 38 +18 45		+60 44 −17 41
32 0 ~~28~~ 56.7				30 ~~29~~ 37.8		38 13.7		6 ~~47~~ 18.5	
4.9				44.6		17.1		25.7	
12.1				50.0		21.4		33.0	
19.9				56.3		25.1		39.2	
27.0	12.12			2.7	50.28 5	28.7	31.20	46.6	32.60
42.3		2~~6~~7 51.6		16.1		36.7		1.2	
49.9		58.2		22.0		40.7		8.7	
57.8		3.1		28.0		44.6		15.6	
4.8		8.7		34.7		48.3		22.6	
12.9	57.54	15.2		41.1	28.38	52.0	44.46	29.0	15.42
24 26.8				53.7		59.1		43.7	
35.8				0.2		3.9		50.7	
43.6				6.5		7.6		58.0	
51.4				12.8		12.1		5.0	
58.5	43.22			19.0	6.44	15.4	7.62	12.7	58.02
0 22	57.63	28	3.36	0 31	28.37	0 38	44.43	0 47	15.35
K	− 3		−.03		− 03		−02		−03
Bb.	+.11		+08		+08		+05		+10
T+Bb+K 22	57.71	28	3.41	31	28.42	38	44.46	47	15.42
R.A. 26	24.~~38~~04	30	29.36	33	54.40	41	9.60	49	41.66
−2	26.33	2	25.95	2	25.98	2	25.14	+2	26.24

C.W.

π					
.04	0 = −2m 26.~~77~~33s	−.73 a	+2.15 c	+.73	25.60
0.6	25.95	−.31	+1.67	+.31	25.64
0.6	25.98	−.42	+1.71	+.42	25.56
0.7	25.14	+.35	+1.09	−.35	25.49
0.8	26.42	−.61	+2.09	+.61	25.81
0.6					−2 25.~~71~~.62

C E

0 = −2 25.34	+.16 a	+1.22 c	−.16	−2 25.50	1.1
26.42	+.26	+1.15	+.26	25.68	1.1
(25.90	+.48	+1.03	+.48	25.42)	1.4
25.68	−.15	+1.50	+.15	25.53	1.6
26.04	−1.11	+2.61	+1.11	25.93	1.6
26.91	−1.66	+3.31	+1.66	25.25	1.6
				−2 25.55	1.4

−2 4

a T

C.W − 2 25.~~71~~62

C.E − 2 25.55

− 2 25.~~63~~58

c = .08s

0 = −2 57.28 −31.63 +43.75

0 = −31.40 − 31.37 a   a = −1.00

A.	−0.73	−.31	−.42	+.85	−.61
B.	+2.02	+1.64	+1.~~69~~73	+1.03	+1.91
C.	+2.15	+1.67	+1.71	+1.09	+2.00

Circle East

Russian Transit.

		1 3			1 5			1 21			72 26 42 23 30 03	1 35		1 34	
B Andr.	+35° 0′	+7 23	ζ Pisc.	+29 28	+12 55	Polaris	+88 36	−46 13	η Pisc	+14 44	27 39	40 Can	−6727 +1.29 40 54	o Pers	+48 1	−6 88	43 Can	+67 27	−25
1 0 12.7			2 17.0						1 28 20.5 24.2										
16.9			21.0						27.8										
21.5			24.9						31.0										
25.8			28.7						35.6										
29.6	21.30		32.8	24.88					42.5	27.82									
38.7			41.1			4 30.48	28.2		42.4			26 23.3		28 14.9		1 38	9.2 9.5		
43.0			45.5			8 28.3	11 40		46.1			36.8		20.2			16.9		
47.6			49.6			12 50.0	13 40		50.2			48.7		25.1			28.3		
57.8			53.1			16 19.7	16 19.7		53.5			0.7		30.9			33.0		
56.1	47.44		57.5	49.36			4 57.0		56.8	49.80		13.0		36.0			37.9		
4.6			5.7						4.6										
9.1			9.4						8.5										
13.1	1		13.4						12.5										
17.0			17.0						15.9										
22.0	13.16		21.7	13.44					19.0	12.10									
1 0	47.30		0 2	49.23		1 13	43.98		1 28	48.91		1 26	48.50	1 28 25.42		1 31	14.96		
	−.02			−.02			−.66			−.02			−.03	−.02			−.02		
	+.06			+.5			+1.51			+.05			+.15	+.07			+.11		
0	47.34			49.26		13	44.83			48.94		26	48.62	28 25.47		1 31	14.03		
8	12.68			15.68		18	4 44.44 42.17		25	14.84		29	15.53	31 51.15		33	45.07		
−2	25.34		−2	26.42		−2	57.28		−2	25.90		−2	26.91	−2 25.68		−2	26.04		

1.1	@ 7h.	C. E	
1.1	25.64	25.50	
14	56	68	
16	48	42	
16		53	
17			
	2 25.56	25.53	
1.4	2 25.53		
	2 25.54		

	+.16		+0.26		−31.63		+.48		−1.66			−.15		−1.11		
	+1.21		+1.12		+30.22		+.92		+2.87			+1.48		+2.36		
	+1.22		+1.15		+43.75		+1.03		+3.31			+1.50		+2.61		

Dec 12 1882

Observations with the Meridian Circle W. A. Rogers.

δ = +7 45 4

Polaris			18h		19h		20h		20h	
			α Trianguli	+29 0	γ Andr	+41 46	α Arietis	+22 54	β Trianguli	+34 26
		tφ		+55		+39		+42		+68
			1 43 36.3	50.5	153 51.5	7.9	57 47.1	0.7	59 45.0	0.2
			38.7	53.0	54.1	10.7	49.6	2.8	48.0	2.8
			41.2	55.2	56.8	13.6	57.7	5.3	50.6	5.3
1	13	18.8	43.4	57.6	59.6	16.3	54.1	7.5	53.0	7.9
	13	56.3	45.7	0.9	2.6	19.1	56.2	9.6	55.4	10.4
	14	25.4		2.6		22.0		11.9		12.9
	14	50.0	14.4	4.8	35.6	24.5	23.1	14.0	25.3	15.3
	15	22.3	16.8	7.2	38.7	27.5	25.5	16.2	28.1	17.8
	16	1.0	19.0	9.6	41.3	30.2	27.6	18.3	30.8	20.4
	16	30.0	21.2		44.1		30.0		33.0	
			23.5		46.8		32.1		35.7	
			44 0.02	44 0.16	54 19.11	19.09	58 9.70	9.60	2 0 10.49	10.60

1	14	54.83	44 0.02	44 0.09		54 19.10		58 9.65		2 0 10.55
		−.66		−.3		−.03		−.03		−.02
		+24.13		+0.85		+19.1		.79		+.92
	15	18.30		44 0.91		54 20.11		58 10.41		0 11.47
	16	42.17		46 26.65		56 45.44		0 36.50		2 37.47
	−1	23.87		−2 26.56		−2 26.34		−2 26.85		−2 26.92
				2 25.74		−2 25.33		−2 26.09		−2 25.60

0 = −2 25.74 + 1.11 a + 27 + 51
25.33 + 1.34 + 01 + 82
26.09 + 1.03 + 36 + 68
25.60 + 1.20 + 17 + 92
2 25.69 + 1.17 a + 70

25.23
25.31
25.41
25.28
25.31
+3
25.34

0 = −1 2307 − 31.37 a + H
0 = −2 25.69 + 1.17 a
0 = + 61.82 − 32.54
a = +1.90

Δ = +2 25.35

tφ

+.44 +.55
+.95 +.14
+.63 +.42
+.84 +.68
+.79

a = −2 26.59 − 47 = 2 27.26.09 25.98 − 25
26.37 − 55 − 50 27.22.17 .38 23
26.38 + 57 − 38 27.45 26 .61 42
26.81 − 76 − 61 27.20 15 46 31
26.60 2 27.81.17 25.47 25.33
+ 1.54
2 25.71

25.36

m = b sec φ − n tan φ
+1.03 + .81 +1.17

a = b tan φ − n sec φ
= +.70 + 1.20 = +1.90

0 = −145.00 + 4373 n
0 = −226.60 + 1.63
0 = + 38.60 + 4299/4310 n
n = −.90
a = +.70 + 1.20 = +1.90
n = −.90

b = +.5
a = 1.00 + .81 = +1.81

	+.27	+.01	+.36	+.17
	+1.11	+1.34	+1.03	+1.20
	+1.14	+1.34	+1.09	+1.21

Dec 12 1882 W B B Observer.

	2.2		2.2		2.4		2.0
	γ Tauri		ν Arietis		γ² Ceti		ν Arietis	
	+33 18		+19 21		+7 56		+21 27
	+.66		+.30		+.14		+.39
2	7 32.2	47.2	8 50.2	3.0	19 10.2	22.6	29 23.4	36.7
	34.8	49.8	52.3	5.5	12.1	24.6	25.5	38.0
	37.0	52.6	54.7	7.7	14.6	26.8	27.9	41.3
	39.8	54.8	56.6	10.0	16.4	26.7	29.9	43.3
	42.2	57.3	58.7	12.0	18.5	30.8	32.1	45.5
		59.6		14.1		33.0		47.6
	12.0	2.1	25.1	16.5	43.2	35.0	38.6	49.9
	14.6	4.5	27.0	18.2	45.4	37.1	0.9	52.0
	17.0	7.0	29.3	20.5	47.2	39.0	3.3	54.4
	19.5		31.6		49.5		5.1	
	22.0		33.9		51.6		7.8	
	7 57.11	57.21	9 11.94	11.94	19 30.87	30.84	29 45.45	29 45.52

	2 7 57.16		9 11.94		19 30.85		29 45.48
	−2		−2		−2		−2
	−.57		−.31		−.13		−.30
Π+κ+ν	7 66.59		11.63		19 30.72		29 45.18
R A	10 23.68		35.86		58.97		12.33
	2 27.18		24.23		27.74		27.15

2 27.13
2.25
27.27
27.22

Π+κ+ν = +2 27.24
ν +1.81
25.43

h = +.016 ν

h
1.9 W. & R. Obs. 47 = +2 26.85
2.3 W. B. B. Obs = +2 25.43 − 1 25.41
1.9 Meridian Circle = +2 26.39 +0 +2 25.39
10 R. Transit. +2 26.54 +1 25.55
MC − RT = −.16 −.16

	+.19	+.41	+.57	+.38
	+1.18	+.97	+.83	+1.08
	+1.20	+1.06	+1.01	+1.07

Dec. 14 — 1882. Meridian Circle U. S. N. Observer.

b = +7/5 n = −.90
n =

ψ Pegasi	+23 58	O Androm.	+41 41
	+4.4		+.89

22 41 31.7	45.2	53 38.2	54.8
34.0	47.6	40.9	57.5
36.2	49.8	43.8	0.4
38.5	52.0	46.5	3.0
40.9	54.3	49.3	6.9
	56.6		8.4
7.9	58.9	22.5	11.3
10.2	1.0	25.3	14.1
12.4	3.5	28.0	17.0
14.7		30.8	
16.8		33.6	
54.33	54.32	5.89	5.86

22 41 54.33 — .02 = 54.31
41 54.31
44 22.50
−2 27.54 − .40 = −.40
−2 27.99

22 54 6.84 − .02 = 6.82
22 54 6.85
33.03
−2 27.18 − .81 = −.81
27.99

ntaj

4T + n = +2 27.99
n = +1.80
4T = +2 26.19

Dec 14 1882

Circle West

Russian Transit — b = +51

	Dr. 3079		γ Piscis		τ Pegasi	
	∫ +56 30		+2 38		+2 3 5	
	−14 7		320 15		340 42	
			38 45		−19 18	
23	3 43.2		7 57.5		11 31.8	
	48.8		58.0		83.5	
	56.0		58.5	58.48	39.4	39.42
	2.4		1.9		43.2	
	9.0	56.08	5.5		47.2	
4	21.6		8 12.6		54.4	
	28.3		16.2		58.5	
	35.0	34.80	20.0	19.84	12 2.4	2.44
	41.3		23.4		6.2	
	47.8		27.0		10.3	
5	0.0		33.9		18.0	
	6.8		37.5		21.4	
	13.4	~~12.94~~	41.0	41.06	23.7	25.60
	19.5	18.14	44.7		29.3	
	26.0		48.2		33.3	
	32.0		53.2		41.0	
	38.8		58.8		44.9	
	44.7	51.84	9 2.4	2.24	48.7	48.74
	50.2		5.6		52.5	
	4.5		9.2		56.5	
6	17.7		16.5		13 4.2	
	24.0		20.1		8.0	
	30.4	30.50	23.7	23.60	11.8	11.82
	36.9		27.0		15.7	
	43.5		30.7		19.4	
23	45 13.27		23 8	41.04	23 12	25.60
	−.23			−.2		−.2
	+.19			+.09		+.11
5	13.43		8	41.11	12	25.69
1	40.06		11	6.52	19	57.50
−2	26.63		−2	25.41	−2	25.81
			a = −1.70			

MC = +2 26.19

R.T. = +2 26.25

MC − RT = −.06

$0 = -2\,26.63 - .46a + 1.81c + .50 - 2\,26.13$

$25.41 + .64 + 1.01 - .70 \quad 26.11$

$25.81 - .36 + 1.10 + .40 \quad 26.21$

26.15

A	−.46	+.64	−.36
B	1.76	+.78	+1.02
C	1.81	+1.01	+1.10

Dec. 14 - 1882 - Circle East.

Russian Transit.

ν Pegasi			72 Pegasi			λ Androm.		
S +22 44			+30 40			+44 54		
+19 39			+11 43			3 56 34		
						−3 26		
23 16 13.3			24 46.3			28 13.7		
17.4			50.2			18.8		
21.1	21.10		54.2	54.26		23.8	23.84	
25.0			58.2			28.9		
28.7			2.4			34.0		
36.5			25 10.7			44.2		
40.4			14.9			48.9		
44.2	44.18		18.8	18.94		54.4	54.32	
48.0			23.0			57.4		
57.8			27.3			29 4.7		
59.6			35.6			14.8		
17 8.3			39.5			19.7		
7.0	7.18		43.7	43.74		24.9	24.78	
11.0			47.9			29.6		
15.0			52.0			34.9		
22.7			26 0.3			45.1		
26.3			4.5			50.2		
30.2	30.22		8.5	8.48		55.2	55.34	
34.0			12.4			30 0.5		
37.9			16.7			5.7		
45.3			24.9			16.0		
49.5			29.0			20.8		
53.2	53.26		33.2	33.18		26.0	25.94	
57.0			37.3			30.9		
18 1.1			41.5			36.0		
23 16 7.17			23 25 43.32			23 29 24.84		
1.02			−	−.02			−.02	
+11				+13			+17	
17 7.26			25 43.83			29 24.99		
19 33.12			9.81			57.48		
−2 25.86			−2 25.98			−26.49		

q = −1.50

o = −2 25.86	+.36	a	+1.08	c	7.54	−2	26.00	
25.88	+.22		+1.17		7.33		26.31	
26.49	−.09		+1.54		+.14		26.35	

−2 26.35

−2 26.15

−2 26.35

−2 26.25

A	+.36	+.22	−.09
B	+1.01	+1.14	+1.52
C	1.08	+1.17	+1.54

Dec. 16-1882 Meridian Circle W.A.R. Observer

b = +.75

α Androm	+28° 26′	γ Pegasi	+14° 31′	Br. 6	+76-17	ι Ceti	−9° 29′	Polaris		43 Cass.	+67° 27′
	+.54		−1.26		+4.10		−.17				2.40
59 30.1	44.0	0 4 24.0	36.8	6 57.3		10 39.2	51.6	1 11	51.4	1 30 25.2	57.0
32.5	46.5	26.2	39.0	6.1		41.3	53.9	12	28.7	30.3	2.9
34.5	49.0	28.2	41.3	13.6		43.3	55.9	12	52.7	35.8	7.9
37.2	51.2	30.4	43.3	24.0		45.3	57.9	13	26.7	41.2	13.5
39.4	53.5	32.8	45.4	32.6		47.8	0.1	13	54.1	46.6	18.6
	55.8		47.4				2.1	14	25.7		23.9
7.7	58.0	58.0	49.7			12.7	4.7	14	~~57.7~~	51.0	29.6
9.9	0.4	0.3	51.8			14.6	6.5	15	27.2	56.7	35.3
12.3	2.8	2.3	53.9			17.0	8.6	16	4.0	1.8	40.0
14.6		4.5				18.9		16	24.3	7.5	
17.0		6.7				21.0		16	56.0	12.7	
								17	26.4		
53.52	53.47	45.34	45.40	14.72		0.22	0.26	17	56.6	18.80	18.60 ~~17.74~~
	59 53.49	4	45.37	7 14.72		10	0.24	14	56.01	3 0	18.70
	− 2		− 2	− 0.6			−02		− 66		−04
	59 43.47		45.35	14.66			0.22	14	55.35		18.66
	2 21.82		13.64	38.85			28.77	16	38.74		44.93
	2 28.05		28.29	2 24.19			28.55	+1	43.39		2 26.27

h						
0.0	+.54	−2 28.05 −.57	−2 28.62	43.73	−2 43.39	+4,373
0.1	+.26	28.29 −.27	28.56	4.10	2 24.19	+4.10
0.2	−.17	28.55 +.18	37	2.40	2 26.27	+2.40
1.6	+.09	28.37 −.09	46			
1.6	+1.20	27.56 −1.20	~~77~~			
1.7	+.15	28.42 −.16	.58			
0.9	+.39	28.21	2 28.57			

∘ = +44.82 43.39 n = −1.03 n = ~~−1.01~~

4.02 3.46 1.07 1.01

1.94 2.06 0.94

		4m + m
α Androm.	+2	28.62
γ Pegasi		28.56
γ Piscium		28.77
φ Persei		28.58
o Piscium		
	+2	28.63
		1.82
	+2	26.81

4m = +.90 +.92 = 1.82

Dec. 16 – 1882 Meridian Circle – W. A. R. Observer

ν Piscium	+4° 54′	ζ Persei	+50° 6′	O Piscium	+8° 34′
	+.09		1.20		+.18
	32 45.5		33 41.7	86 25.2	37.4
	47.3		45.0	27.0	39.7
	49.4		48.3	29.3	41.9
	51.5		51.5	31.4	43.9
	53.5		54.4	33.5	43.8
	53.4		58.0		44.9
	57.6		1.2	38.7	49.9
	59.9		4.2	0.7	52.2
	2.0		7.7	2.9	54.1
				4.9	
				6.8	
	32 53.57		54.70	46.04	45.90
	−.02		−.03	−.02	40.97
	55.55		54.67	46.02	44.93
	55.55				
	21.92		22.23		14.37
	28.37		2 27.56		+2 28.42

Dec. 16-1882 — Meridian Circle — H. C. B. Observer

	1.8	1.9	2.0	2.0	2.2
	β Arietis	γ Androm	α Arietis	β Triang	θ Arietis
	+2° 14'	+41° 46'	+22° 54'	+34° 26'	+19° 22'
	+.37	+.89	+.42	+.68	+.30
	1 45 22.0	1 53 50.0	1 57 46.0	1 59 44.0	2 8 48.8
	24.3	52.8	48.2	46.5	51.0
	26.5	55.6	50.3	49.0	53.1
	28.8	58.4	52.6	51.7	55.4
	31.0	1.0	54.7	54.2	57.5
	57.3	34.3	21.9	24.0	23.8
	59.5	37.0	24.0	26.6	26.0
	1.6	39.9	26.2	29.0	28.0
	3.9	42.6	28.5	31.6	30.2
	6.2	45.2	30.8	34.0	32.4
	44.11	17.68	17.63 8.32	8.31 9.06	9.00 10.62
	44.10		17.65	8.21	9.03
	44.10		.02	.02	.03
	44.08		17.63	8.29	9.01
	1.38		.91	.43	.69
	45 43.70		16.72	7.86	8.32
	48 12.27		45.40	36.46	37.83
	2 28.57		28.68	28.60	28.71

	10.79
	10.66
	.02
	10.64
	.36
	10.28
	38.54
	28.59

4 W + n = +2 28.57
28.68
28.60
28.71
28.59

2 28.63 = W. B.
1.81

2.0 2 26.82 = W B −.02 2 26.80
0.9 2 26.82 = W. A. P. +.00 26.82

Dec. 16 1882 — Circle West — U. S. N. Observer.

b = .19

Russian Transit.

K Pass.		Z Pass.		x Pass.		O Pass.		Z Andrew		J Pass	
+62 16		4 53 14		+35 53		+47 38 42 23 5 15		+23 37		+60 4	
0 22 54.4		0 27 14.4		0 30 36.1		0 35 49		0 38 11.9		0 46 16.7	
1.8		20.3		42.5		10.5		15.7		23.7	
10.1	9.74	26.5	26.24	48.8	48.76	15.9	15.76	19.3	19.56	31.5	31.02
17.0		32.5		53.0		21.2		23.4		38.3	
25.4		37.5		1.4		26.3		27.5		44.9	
40.9		49.8		14.2		36.5		35.2		53.5	
48.0		55.9		20.5		41.5		39.0		6.8	
53.3	55.98	1.8	1.74	26.9	26.82	47.2	47.06	42.6	42.82	13.8	13.82
4.0		7.5		33.0		52.4		46.6		20.8	
14.7		13.7		39.5		57.7		50.7		28.2	
26.4		25.0		52.0		8.1		58.0		42.4	
34.3		31.5		58.5		13.7		2.4		49.7	
41.8	41.74	37.5	37.24	4.8	4.70	18.9	18.84	6.2	6.12	56.6	56.64
49.0		43.2		11.0		24.2		10.0		3.6	
57.2		49.0		17.2		29.3		14.0		11.0	
o 23 55.82		o 28 1.74		o 31 26.76		o 35 47.22		o 38 42.83		o 47 13.83	
-.03		-.03		-.03		-.03		-.02		-.03	
+.38		+.32		+.33		+.28		+.19		+.31	
o 23 56.17											
56.17		28 2.03		31 27.06		35 47.47		38 43.00		47 14.16	
23 23.60		29.26		57.31		14.23		9.55		41.55	
23 ~~33.11~~ 27.43		-2 27.23		-2 27.25		2 26.76		2 26.55		2 27.39	

o = -2 27.23 -.31a +1.67c +.18
-2 27.25 -.42 +1.71 +.24
-2 26.76 -.14 +1.47 +.08
-2 26.55 +.35 +1.68 -.20
-2 26.95 +.13

27.05
27.01
26.68
26.75

o = -2 27.43 -.73a + 2.02c
-2 27.39 -.61 +2.00

o = -.48 -.56a
o = -.44 -.74

a = -.56
-.60
-.58

With a = -.66

-2 27.23 -.31a +.20 — -2 27.03
27.25 -.42 +.28 — 26.97
26.76 -.14 +.9 — 26.78
26.55 +.35 +.23 — 26.78 — -2 26.89

27.43 -.73 +.48 — 26.95
27.39 -.61 +.40 — 26.99 — -2 26.97

-.73		-.31		-.42		-.14		+.35		-.61	
+2.02		+1.64		1.73				+1.83		181	
+2.15		1.67		1.71				+1.89		200	

Dec. 16, 1882

Circle East

b = 19

Russian Transit

	E Piscium		B Androm		T Piscium		N Piscium		40 Cass.		U Persei		Polaris
	−7 15		+3 5 0		+29 28		+14 44		+7 2 2		+4 8 02		
	4 2 23				4 2 23		4 2 23				4 2 23		
	35 08				17 55		27 39				5 39		
	0 53 884		1 0 112		1 2 150		1 22 188		1 26 230		1 27 412		
	1.9		15.3		19.2		22.5		34.3		46.9		
	5.4	5.50	19.4	19.62	23.2	23.18	26.0	26.44	46.4	46.48	52.0	51.86	
	9.1		24.0		27.3		29.8		58.4		57.0		
	12.4		28.2		31.2		33.6		10.3		2.2		
													1 8 238
	19.8		36.8		39.5		40.8				13.1		11 29
	23.4		41.2		43.4		44.3				18.1		13 356
	27.0	27.00	45.4	45.48	47.8	47.60	48.0	48.08			23.4	23.64	16 88
	30.6		49.8		51.6		51.8				29.0		18 680
	34.2		54.2		55.4		55.5				34.3		
	41.1		3.0		4.0		3.0				45.0		
	45.0		7.2		8.0		6.4				50.6		
	48.4	48.42	11.5	11.58	12.3	+12.18	10.0	10.08			55.8	55.68	
	51.9		16.0		16.2		13.6				0.8		
	55.4		20.2		20.4		17.4				6.2		
	0 53 26.97		1 0 2556		1 2 47.65		1 22 48.10		26 46.48		1 28 23.72		1 13 358
	−.02		−.02		−.02		−.02		−.03		−.02		−.66
	54 26.95		45.54		47.63		48.06		46.45		23.70		1 13 35.14
	+.19		+.23		+.21		+.17		+.55		+.28		+5.74
	+ 24 2.14		0 45.77		2 47.84		22 48.25		26 47.00		28 23.98		13 40.88
	68.45		12.63		4.63		14.81		45.55		6.09		16 35.74
	−2 26.31		−2 26.86		−2 26.79		−2 26.86		−25.55		−2 27.11		−2 47.86

$0 = -2\ 26.31 + .58a - .45 - 2\ 26.76$

$0 = -2\ 25.55 - 1.66a$

26.86	+.16	−.12	.98
26.79	+.26	−.20	.99
26.56	+.48	−.37	.93
27.11	−.15	+.12	.99

$0 = -2\ 27.86 - 3.16a$

$0 = -1.82 - 1.93a$ $\quad a = -.91$

$0 = -21.13 - 31.90$ $\quad = -.66$

$a = .78$

$-2\ 26.43 + .27$

With $a = -.86$

4 Tr.

$+2\ 26.89$ C.U.

$+2\ 26.90$ C.E.

$0 = -2$	26.31	+.58a − .39	$-2\ 26.70$				
	26.86	+.16 −.11	26.97				
	26.79	+.26 −.17	26.96	10	Mean	$2\ 26.89$	= R.T.
	26.56	+.48 −.32	26.88	1.9		26.82	= Mic
	27.11	−.15 +.10	27.01			−.07	= Mic − R.T.
			26.90				

$0 = -2\ 28.55 - 1.66 - 1.08 = -2\ 26.64$

+.58		+.16	+.28	~~+.28~~ +.48	−1.66	−.15	−3163
1.01		+1.21	+1.12	~~+1.28~~ +1.91	+2.87	1.49	+30.25
1.02		+1.22	+1.15	+1.11 1.04	+3.31	1.49	+4375

Dec. 17, 1882. Meridian Circle W. A. R. Observer.

b = +75

	+.57		+.42		+2.20		+.89	
η Pegasi	+29° 35′	λ Pegasi	+22 57	ι Cephei	+65° 54′	ο Androm.	+41° 42′	
	+29 36		+22 56		42 23		+41 42	
	42 23		42 23		−23 11		42 23	
	12 47		19 27				+0.41	
22 34 39.4	53.6	38 3.3	168	42 14.8	44.9	53 37.3	54.0	
41.8	56.0	5.5	19.0	19.7	49.8	40.0	56.6	
44.2	58.4	7.8	21.2	24.8	55.0	42.8	59.4	
46.5	0.9	10.0	23.5	29.7	59.8	45.7	2.0	
49.0	3.0	12.2	25.7	34.8	5.0	48.3	4.9	
	5.3		28.0		9.8		7.6	
17.5	8.0	39.1	30.1	34.8	14.8	21.5	10.5	
19.8	10.3	41.4	32.4	39.7	19.8	24.2	13.1	
22.3	12.6	43.5	34.7	44.7	24.8	27.0	16.0	
24.5		46.0		49.8		29.8		
27.0		48.2		54.9		32.7		
3.20	3.14	25.70	2571	4.77	4.86	493	4.47/50	
	35 3.17		25.71		4.83		54 491	
	−02		−02		−04		−03	
34	35.15		25.69		479		488	
37	31.54		5418		3160		32.97	
−13	56.39	−2	2849	−2	26.81	−2	2808	
	28.39							

0 = −2 28.39 + .57n − .46 − 2 28.85

28.49 + .42 − .38 28.87

28.09 + .89 − .09 29.00

28.32 + .63 −2 28.91

1.73

− 27.18

0 = −2 26.89 + 2.20n

0 = +1.43 − 1.57n

n = −.91

n = +.90 + .83 = +1.73

+.25	+.36	−.95	4.01
1.13	1.01	2.21	1.31
1.15	1.08	2.41	1.31

Dec. 17, 1882 — Circle West — W. A. R. Observer.

Russian Transit — b = 0

Be. 3079		ϒ Piscium		T Pegasi	
56 30		+2 38		2 3 6	
		42 23			
		39 45			
23 4 208		7 505		11 308	
27.4		54.0		34.5	
34.0	33.90	57.4	57.54	38.3	38.40
40.3		1.1		42.2	
47.0		4.7		46.2	
59.7		11.9		53.6	
6.0		15.3		57.5	
12.1	12.26	18.8	18.80	1.4	1.44
18.3		22.0		5.4	
25.2		26.0		9.3	
38.0		33.0		17.0	
44.4		36.5		20.9	
50.8	50.78	40.0	40.08	24.6	24.64
57.0		43.7		28.4	
3.7		47.2		32.3	
		54.3		40.0	
		57.9		43.8	
		1.3	1.40	47.9	47.80
		4.9		51.7	
		8.6		55.6	
		15.7		3.3	
		19.0		7.0	
		22.8	22.72	11.0	10.94
		26.3		14.7	
		29.8		18.7	
23 05	1231	8	40 11	12	24 64
	−.03		−.02		−.02
	1228		40.09		24.62
7	.3997		6.49		5.46
2	27.69		26.40		2 26.84

$0 = -2\ 26.40 + 6.9\,a - 61$ — 27.01

$26.84 + 3.6\,a - .40$ — 27.24

$-2\ 26.62 + .50\,a$

$0 = -2\ 27.69 - .46\,a$

$0 = +1.07 - 0.96\,a$

$a = -1.11$

27.13

	−.46	+.64	+.36
	1.76	.78	1.02
	1.81	1.06	1.10

Dec. 17. 1882 — Circle East — Russian Transit. — W. A. R. Observer.

ν Pegasi		ψ2 Pegasi		λ Andum.	
23 16 35.6		24 45.0		28 12.8	
38.3		49.2		17.7	
43.0	43.16	53.2	53.22	22.9	22.86
46.8		57.2		27.9	
51.1		1.5		33.0	
58.4		9.7		43.0	
2.5		14.0		48.2	
6.1	6.18	18.1	18.06	53.2	53.26
10.1		22.2		58.4	
13.8		26.3		3.5	
21.6		34.5		13.9	
25.5		38.5		18.5	
29.0	29.22	42.7	42.74	23.7	23.78
33.0		46.8		28.8	
37.0		51.2		34.0	
		59.3		44.2	
		8.4		49.0	
		7.4	7.46	54.4	54.32
		11.5		59.5	
		15.7		4.5	
		24.2		14.8	
		28.0		19.9	
		31.9	32.24	24.9	24.98
		36.5		30.0	
		40.6		35.3	
23 17	6.19	25	42.74	29	23.84
	−.02		−.02		−.02
	6.17		42.72		23.82
	13.08		9.77		5.82
	−2 26.91		27.05		27.60
			a = 11.31		

0 = −2 26.91 +36 +40 | −2 27.31
27.05 +22 +24 | 27.29
27.60 −09 +10 | 27.50

2 27.37

C.E 4T = +2 27.37

C.M = +2 27.13

Mean = +2 27.25 = R.T.
27.18 = M.C
−.07 = M.C − R.T.

	+.36	+.2²	−.09
	+1.01	+1.44	+.52
	+1.08	+1.24	+1.54

Dec. 19, 1882 — Meridian Circle. — U. V. B. Observer.

12 Cet	−4° 37′	π Androm.	+33° 4′	ε Androm.	+28° 4′	δ Androm.	+30° 13′	o Cass.	+47° 38′	ζ Androm.	+23° 38′
0 21 14.2	36.2		27 59.9	29 30.6	44.6		30 26.5	35 14.3	32.8	38 17.3	30.8
16.2	28.4		2.3	32.9	46.9		29.0	17.3	35.8	19.4	33.0
18.0	30.5		4.7	35.1	49.3		31.3	20.3	38.9	21.8	35.2
20.1	32.5		7.2	37.7	51.8		33.5	23.5	41.9	24.0	37.5
22.2	34.6		9.7	40.0	54.0		36.0	26.5	45.0	26.3	39.7
	36.8		12.2		56.4		38.3		47.9		41.9
47.0	38.7		14.7	8.2	58.7		40.8	8.3	51.0	53.3	44.2
49.1	40.9		17.0	10.4	1.0		43.2	6.4	54.1	53.4	46.5
51.3	43.0		19.7	12.8	3.4		45.6	9.4	57.3	57.8	48.8
53.3				15.0				12.3		59.9	
55.3				17.5				15.5		2.2	
34.67	34.62		9.71	54.02	54.01		36.02	44.88	44.97	39.74	39.73

Dec 19 – 1882 Meridian Circle W. U. B. Observer.

Polaris.

1	12	20.2
	12	50.0
	13	21.6
	13	53.0
	14	21.3
	14	52.2
	15	23.4
	15	49.8
	16	21.4
	16	52.0
	17	21.0
	14	52.14

Dec. 19 - 1882 — W. C. B. Observer.

Prussian Transit-

γ Piscium		Polaris		43 Cass.	
1 22 39.5					
43.0					
46.8	46.70				
50.2					
54.0					
1.2		26 8.3			
5.0		28 42.3			
8.7	8.68	31 23.3			
12.5		34 1.6			
16.0					
23.3				31 57.2	
26.8				59.8	
30.4	30.56			10.0	9.74
34.3				19.3	
38.0				28.4	

Dec. 20. 1882. Meridian Circle. W. O. B. Observer.

	π Androm.	+33° 4	E. Androm.	+28° 40	S Androm.	+30° 12	O Cass.	+4° 38
		+66		+55		+58		109
		1.18		1.14		1.16		1.48
	0 27 444	27 490	29 299	440		238	35 138	32.1
	47.0	17	32.0	463		28.3	16.8	35.0
	49.4	4.2	34.5	48.5		30.8	19.9	38.2
	51.9	6.5	37.0	51.0		33.0	23.0	41.2
	54.3	9.0	39.3	53.3		35.4	26.0	44.3
		11.5		55.7		37.8		47.3
	23.8	14.0	7.5	58.0		40.2	2.8	50.4
	26.4	16.4	9.9	03		42.5	5.8	53.5
	28.8	18.9	12.0	2.7		45.0	8.8	56.5
	31.2		14.5				11.8	
	33.8		16.8				15.0	
	9.10	9.02	53.34	53.31		35.42	44.37	44.28
		27 9.06		53.33		35.42		44.32
		-.02		-.02		-.02		-.11
		-.67		-.56		-.54		-.02
		27 8.37		52.75		34.81		43.19
				23.68		5.67		1.14
		30 31.27						
		-2 30.90		-2 30.93		-2 30.86		-2 30.95
		4						
		05	-2 30.90					
		05	30.83					
		06	30.86					
		06	30.90					
	4T + m		-2 30.91					
	m		1.93					
	4T 06		2 28.98 +.02	W.B.	29.01			
	1.8		2 28.99	W.R.	28.99			
			2 28.99					
			C = -.08	n = -.85				
		27 9.04		53 31		35 40		44.30
		-.63		-.52		-.55		1.04
		8.41		52.79		34.85		43.26
		35.27		23.68		5.67		1.14
		-2 30.86		30.89		30.52		30.88
C = -.08		-.09		-.09		-.10		-.11
		+ 2 30.86		+ 2 30.85				
		.89		98				
		.82		92				
		.88		99				
		+ 2 30.86		+ 2 30.96				
		1.87		1.87				
	W.B.	+ 2 29.99	B	+ 2 29.09	0.6	+ 2 29.11		
	W.R.	+ 2 29.0	R	+ 2 29.08	1.8	29.05		

Dec. 20. 1882 — Meridian Circle — U. S. N. Observer.

C = −.08

Polaris	+88° 41′	φ Persei	+50° 6′	θ Piscium	+8° 34′	α Trian.	+29° 0′	β Piscium	+2° 37′
	43.77		1.20 / 1.56		+15 / 1.01		+55 / 1.14		.03 / 1.00
1 11 49.7			1 33 39.9	36 22.8	35.2	43 32.5	46.8	44 37.7	52.2
12 20.0			42.9	24.8	37.3	35.0	42.1	41.9	54.3
12 52.1			46.0	27.0	39.4	37.3	37.5	44.1	56.4
13 21.2			49.2	29.0	41.4	39.5	53.8	46.0	58.3
13 50.4			52.5	31.1	43.4	42.0	56.2	48.0	05
14 21.9			55.8	?	45.8		58.6		2.7
14 48.0			59.0	56.2	47.8	10.5	1.0	12.8	4.6
15 16.7			2.0	58.2	50.0	12.8	3.4	14.9	6.7
15 49.2			5.3	03	52.0	15.0	5.8	17.0	8.8
16 20.5				24		17.3		19.0	
16 49.8				4.5		19.9		21.0	
17 20.9									
17 52.9									
14 50.25			52.51	43.63	43.66	56.18	56.24	0.44	0.50
14 50.25			52.57		36 43.64		43 56.21		45 0.47
− .66			− 3		− 2		− 2		0.47
14 49.59			52.48		43.62		56.19		31.30
16 35.63			22.16		14.32		26.60		
−1 46.04		2	29.68		2 30.70		2 30.41	2	30.83
− 9.50			− .12		− .08		− .09		− .08
−1 49.54		− 2	29.80		− 2 30.78		− 2 30.50		2 30.93

16	0 = −2	29.68 +1.20	−12	30.90	0 = −1 46.04 + 43.75
17		30.70 +.15	−18	30.85	
16		30.41 +.55	−56	30.97	0 = +44.31 + 43.41 n
18		30.85 +.03	−.03	30.88	
18		30.00 +.89	−.91	30.91	n = −1.02
20		30.44 +.42	−43	31.01	
1.8		30.42 +.54		− 2 30.92	

35

$\frac{1}{r} = .83$

$m = 1.01 + .92 = +1.93$

$AT + m = +2\ 30.92$

$m = 1.93$

$AT = +2\ 28.99$

C = .08

− 2	29.80 +1.20	−14	2 30.94	0 = −1 49.54 + 43.75
	30.28 +.15	−14	30.90	0 = −2 30.44 + .54
	30.50 +.55	−52	31.02	
	30.83 +.03	− 3	30.96	0 = +40.90 + 43.21 n = .96
	30.11 +.89	−14	30.95	
	30.55 +.42	−40	30.95	
	30.44 +.51		− 2 30.95	m = 1.01 + .86 = 1.87
			1.87	
			− 2 29.08	

Dec. 20, 1882 — Meridian Circle — W. A. R. Observer

γ Androm.	+41° 46		α Arieti	+22° 54		
	+89			+42		
	1,33			1,19		
1 53 47.6	42		1 57 43.7	57.0		
50.3	7.0		45.9	59.2		
53.2	10.0		48.0	1.5		
56.0	12.4		50.4	3.7		
58.7	15.3		52.7	5.9		
	18.1			8.2		
02.0	21.0		19.5	10.5		
04.7	23.8		21.8	12.8		
07.4	26.4		24.0	15.0		
10.2			26.0			
13.0			28.5			
15.31	15.36		6.05	5.98		
	53 15.34			58 6.01		
	15.34			36.45		
-2	30.00		-2	30.44		
	-11			10		
	30.11			30.55		

Dec. 20. 1882 — Circle West. — U.S.N.O. Observer.

Russian Transit.

$l = +09$

γ Cass.		ε Piscium		β Androm.		τ Piscium	
0 46 14.6		53 56.4		1 0 9.0		2 13.2	
21.5		0.0		13.4		17.3	
28.9	28.94	3.6	3.56	17.5	17.66	21.3	21.34
36.4		7.1		22.1		25.4	
43.3		10.7		26.3		29.5	
57.4		17.8		34.9		37.6	
4.5		21.4		39.5		41.7	
11.3	11.52	25.0	24.98	43.6	43.60	45.9	45.84
18.7		28.5		48.0		50.0	
25.7		32.2		52.0		54.0	
40.0		39.3		0.8		2.0	
47.0		42.8		5.0		6.2	
54.5	54.28	46.3	46.40	9.7	9.52	10.3	10.26
1.3		50.0		13.8		14.3	
8.6		53.6		18.3		18.5	
47	11.58	54	24.98		43.49		45.81
	− 3		− 2		− 2		− 2
	11.55		24.96		43.47		45.79
	47.47		+.04		+.11		+.10
	47.18		25.00		43.58		45.89
	11.73						
	41.42		12.57		12.57		14.58
	29.69		53.43		28.99		28.69
			−2 28.37				

.08	−2	28.37	+.58	−.63 −2	29.00	$0 = -2\ 29.69 - .61$
.9		28.99	+.16	−.17	29.16	
1.0		28.69	+.26	−.28	28.97	$0 = +1.01 + .94\,a$
1.0	2	28.68	+.33	−2	29.04	$a = -1.08$

−.61	+.58	+.16	+.26
+1.91	+1.01	+1.21	+1.12
+2.00	+1.02	+1.22	+1.15

Dec. 20. 1882. Circle East. W.A.R. Observer.

Russian Transit. $\lambda = +.04$

Polaris		N Piscium		40 Cass.		ν Persei		43 Cass.	
		1 22 17.0				27 39.1		29 38.5	
		20.4				41.4		9.0	
		24.1	24.16			49.6	49.66	18.7	18.42
		27.8				54.9		27.7	
		31.5				0.3		37.2	
1 8 8.2		38.7		26 20.3		11.0		55.7	
10 49.5		42.5		31.9		16.0		5.0	
13 22.3		46.0	46.02	43.8	43.78	21.7	21.54	13.9	14.22
15 58.0		49.7		55.5		27.0		23.5	
18 36.7		53.2		7.4		32.0		33.0	
		0.7				43.0		51.2	
		4.4				48.0		0.6	
		8.1	8.00			53.4	53.38	9.9	9.72
		11.5				58.5		18.8	
		15.3				4.0		28.1	
13 23.14			4606		4378		2153		1412
−.66			−.02		−.04		−.2		−.3
13 22.48			4604		4374		21.51		1409
~~+.90~~			+.04		+.10		+.06		+.10
13 23.38			4608		4385		21.57		14.19
10 35.63					15.36		61.02		
3 11.54			~~.46~~				~~32.45~~		
			14.77		−2 31.51		−2		
		−2 28.69							

1.4	$o = -2$	31.51 − .66	2.24	29.27	
1.5	$o = -2$	28.69 + .48	−.65	29.34	$o = -3$ 11.94 − 3.163 a
1.6	−2	29.45 − .15	+.20	29.25	$o = +42.87 + 31.79\ a$
	−2	29.07 + .16		29.29	$a = -1.35$

1.0 C.E. $\alpha T = +2\ 29.29$ $c = -.10$

1.5 1.2 Obs. $\alpha T = +2\ 29.04$

Mean $+2\ 29.16 = RS$

$+2\ 29.\ 99 = mc$

$+ \ \ \ \ \ = mc - RT$

$29.\ 0$

$-.06$

1.2 2 29.16 $= R$ R+01 29.17

1.8 2 29.08 $= mc$ 2908

$-.08 = mc - R.T. -.09$

+.48	−.66	−.15	−1.11	
+.91	+2.87	1.49	2.36	
+1.04	+3.31	1.49	2.61	

Dec. 21 - 1882 — Meridian Circle — W. D. B. Observer.

$n = -.94$

	Π Andrm.	+33° 4		E Andrm.	+28° 40		S Andrm.	+30° 13	O Cass.	+48° 38
		+.66			+.55			+.58		+1.13
	0 27 43.8	58.4		29 29.0	43.1			30 25.0	35 13.0	31.3
	46.0	0.9		31.4	45.6			27.4	16.0	34.4
	48.5	3.4		33.9	48.0			29.8	19.0	37.5
	51.0	5.7		36.2	50.0			32.0	22.0	40.5
	53.5	8.1		38.5	52.6			34.4	25.0	43.5
		10.9			54.9			36.9		46.4
	23.1	13.2		6.8	57.3			39.3	2.0	49.8
	25.5	15.6		9.0	59.7			41.7	4.9	52.8
	28.0	18.3		11.4	2.0			44.1	8.0	56.0
	30.3			13.7					11.1	
	32.9			16.0					14.1	
	8.26	8.28		52.59	52.58				43.51	43.61
		8.27			52.59			34.57		43.56
		39.25			23.67			5.67		14.12
		−2 30.98			−2 31.08			−2 31.10		−2 30.56
		30.96			31.06			31.14		30.53
		.62			−.52			−.55		1.06
		−2 31.58			−31.58			31.69		31.59

h	
0.5	−2 31.58
0.5	31.58
0.6	31.69
0.6	31.59
0.6	−2 31.61

Dec. 21 1882 — Meridian Circle — W. A. R. Observer.

b = +.83

Polaris +88° 41′			ζ Persei +50° 6′		o Piscium +8° 34′		γ Androm. +41° 46′		α Arietis +22° 54′	
			1.20			+15		89		.92
1 11 44.7			33 38.8		36 22.0	34.5	54 36		57 43.0	56.3
12 13.6			42.0		24.0	36.6	6.4		45.1	38.5
12 44.8			45.1		26.2	38.7	9.1		47.3	0.8
13 14.7			48.3		28.3	40.8	11.7		49.6	3.0
13 46.7			51.5		30.3	42.9	14.7		51.9	5.1
14 15.0			54.5			45.0	17.5			7.5
14 44.6			58.0		35.3	47.0	20.3		18.8	9.7
15 14.7			1.1		37.5	49.1	23.0		21.0	12.0
15 43.7			4.4		39.6	51.3	25.7		23.2	14.3
16 12.2					1.7				25.4	
16 47.6					4.0				27.7	
17 15.8										
17 46.7										
14 45.14			51.52		42.89	42.88			5.30	5.24
−66			−2		−	42.88		146		5.27
14 4448			51.50			42.86		1465		67.25
16 3493			22.13			14.34		45.33		36.45
−1 6045			−2 50.63			−2 31.93		−2 30.68		2 31.20
+43.75										

1.6	−2 30.63	+1.20	−1.13	−2 31.76	0 = −1 50.45 + 43.75
1.7	31.53	+.15	−.14	31.67	
1.8	36.68	+.89	−.84	31.52	0 = 40.56 + 43.08 m m = −.94
2.0	31.20	+.42	−.39	31.57	
	31.01	0.67		−2 31.63	

1.8 — NAR = +2 31.63 — 3163

1.6 — NBR = +2 31.61 + 0.2 — 3163 / 197

Mean +2 31.62 — m = +.111 + .86 = +1.97

m_1 = 1.97

2 29.65 — 2966 / 2966

Dec. 21 1882. Circle West W.A.R. Observer.

Russian Transit - b = -.02 a = -1.25

V Chas.		E Risaim		B Andrus		T Risaim	
0 46 14.2		53 55.8		1 0 8.5		2 12.4	
21.5		59.5		12.9		16.4	
28.3	28.44	3.0	3.04	17.0	17.10	21.0	20.82
35.6		6.4		21.4		24.8	
42.6		10.2		25.7		28.9	
57.0		17.5		34.4		37.1	
59		21.0		38.8		41.0	
1.0	11.06	24.5	24.50	43.0	43.08	45.2	45.20
1.80		28.0		47.4		49.3	
2.54		31.5		51.8		53.4	
39.5		38.6		0.4		1.4	
46.5		42.0		4.8		5.5	
54.0	53.76	46.0	45.84	9.0	9.06	9.7	9.62
0.8		49.5		13.2		13.7	
8.0		53.1		17.9		17.8	
47	11.09	57	24.46	0	43.08	2	45.21
47	11.06	54	24.44	0	43.06	2	45.19
	-.02		-.02		-.02		-.02
	+.77		-.75		-.20		-.33
47	10.25	54	23.69	0	42.84	2	44.84
49	4598 4140		53.40		12.56		14.57
42	3408 2969	2	29.91		29.72		29.73

08	+2	29.69
09		29.71
11		29.72
11		29.72

1.9	+2	29.71	= CW
1.5	2	29.68	= CE
1.3			
1.3	+2	29.77	= mean = RT
1.8	2	29.65	= MC.
		-.12	= MC - RT.

-.61		+.58	+.16 +.26
+1.81		+1.01	+1.21 +1.12
+2.00		+1.02	+1.26 +1.10

Dec. 21 1882. Circle East - W. A. R. Observer.

Russian Transit k = −.02

Polaris	η Piscium		40 Cass.		υ Persei		43 Cass.	
	1 22 16.2				27 39.0		29 59.8	
	19.8				44.0		8.7	
	23.4	23.48			49.3	49.32	18.0	18.04
	27.0				54.7		27.4	
	31.0				59.6		36.3	
1 8 16.8	38.0		26 19.7		10.6		55.4	
× 10 54.2	41.8		31.3		15.9		4.5	
13 24.7	45.4	45.44	43.7	43.46	21.0	21.10	13.8	13.78
16 2.6	49.2		55.4		26.3		23.0	
18 34.6	52.8		7.2		31.7		32.2	
	0.3				42.1		50.8	
	3.8				47.4		0.1	
	7.4	7.54			52.8	52.76	9.0	9.34
	11.3				58.0		18.3	
	14.9				8.5		28.5	

13 26.58	22-45.49	26 43.46	21.06	30 13.72
−66				
13 25.92	22.45.47	26 43.43	28 21.04	30 13.69
−.60	−02	−05	−03	−05
13 25.32	22-45.45	26 43.38	28 21.01	30. 13.64
16 34.93	23 14.76	15.33	57.01	45.76
−3 09.61	−2 29.31	−2 31.95	−2 30.00	−2 32.12

1.4	0 = −2 29.31	+.48a	−.60	−2 29.91	0 = −3 9.61 − 31.63 a
1.5	31.95	−1.66	+2.07	29.88	0 = −2 30.85 −.61
1.6	30.00	−.15	+.19	29.81	0 = − 38.76 − 31.02
1.6	32.12	−1.11	+1.39	29.73	a = − 1.20
	−2 30.85	−.61		−2 29.83	

−31.63	+.48	−1.66	−.15	−1.11
30.22	+.91	+2.87	+1.49	+2.36
13.75	+1.04	+3.31	+1.49	+2.61

Dec. 24 1882 — Circle West. — W. A. R. Observer.

Russian Transit

b = +.01

K Cass.		ζ Cass.		α Cass.		ζ Androm.		γ Cass.		ε Piscium		Polaris
62 16		53 14		1353		~~47 38~~ 23 37		~~23 37~~ 60 04		+7 15		
0 23 ~~24.0~~		27 104		30 320		38 8.0		46 128		53 345		
~~00~~		16.4		38.5		11.8		20.0		58.0		
6.1	~~2.04~~	22.3	22.28	45.0	44.76	15.5	15.66	27.0	27.06	1.8	1.66	
13.8		28.1		51.0		19.5		34.3		5.3		
21.3		34.2		57.3		23.5		41.2		8.7		
36.4		46.0		10.0		81.2		53.3		15.8		1 8 13.2
44.1		57.8		16.5		35.0		2.6		19.4		10 47.8
51.9	51.72	58.0	57.88	22.9	22.80	39.0	38.94	9.7	9.72	23.0	23.04	13 24.4
59.2		3.8		29.2		42.7		16.9		26.7		16 25
7.0		9.8		35.4		46.8		23.9		30.3		18 36.0
22.4		21.5		48.2		54.3		38.0		37.3		
30.0		27.5		54.5		58.2		45.2		40.8		
~~37.8~~ 8.8	~~37.52~~	33.5	33.34	1.0	0.78	2.0	2.04	52.3	52.32	44.5	44.60	
44.8		39.0		7.0		5.8		59.5		48.0		
52.0		45.2		13.2		9.9		6.6		51.7		
	51.72											
	~~52.04~~		57.83		22.76		38.88		9.70		23.10	13 24.4
	1.69											- 66
	~~52.04~~		57.81		22.76		38.86		9.67		23.08	13 24.1
	+.02		+.02		+.02		+.01		+.02		+.00	+.31
	~~52.06~~ 71		57.83		22.78		38.87		9.69		23.08	24.42
	23.28		29.06		~~54.10~~ 31.32		9.44		~~11.82~~ 11.82		~~53.07~~ 53.07	~~16 32.69~~ 16 32.69
	- 2 31.~~32~~ 51		- 2 31.23		- 2 30.32		30.87		31.63		30.28	308.26
0 = −2		31.~~22~~ 51	−.73	+.86	−2 30.~~36~~ 65		0 = −3	−8.26	− 31.63 a			
		31.23	−.31	+.36	.59		0 = −2	31.04	− .19			
		31.32	−.42	+.50	.82							
		30.57	+.35	−.41	.98		0 =	−37.22	− 31.44 a			
		31.63	−.61	+.72	.91							
		30.29	+.58	−.68	.97				a = −1.18			
		31.04	−.19		−2 30.82							
	−.73		−.31		−.42		+.35		+.61		+.58	
	+.02		+.16		+.13		+.03		+.21		+.01	
	+2.15		+1.67		+1.71		+1.09		+2.00		+1.02	

Dec. 24, 1882 — Circle East — W. A-R. Observer

Russian Rapid — b = -.06[s] a = -1.18

B Bandroom		T Rescrim		N Rescrim		40° Cass.		V Rescrim		J Stritch
7.0										
1 0 11.2		2 —		22 15.0				27 37.7		
15.6	15.60	—		18.7				42.6		
20.0		—		22.1	22.28			47.9	48.00	
24.2		23.4		26.0				53.2		
		27.1		29.6				58.6		
33.0		35.4		37.0		26 18.6		9.2		
37.2		39.6		40.7		30.6		14.5		
41.8	41.62	43.8	43.76	44.3	44.34	42.3	42.28	20.0	19.82	
46.0		47.9		48.0		54.0		25.0		
50.1		51.8		51.7		59		30.4		
59.0		0.0		59.0				41.0		
3.0		4.0		2.4				46.2		
7.4	7.50	8.1	8.14	6.4	6.38			51.5	51.60	
11.9		12.3		10.0				57.0		
16.2		16.3		13.8				2.2		
	41.58		43.76		44.33		42.28		19.81	
	41.56		43.74		44.31		42.23		19.79	
	-.07		-.07		-.06		-.17		-.19	
	-.19		-.30		-.57		+2.59		+.18	
	41.30		43.39		43.68		45.07		19.88	
	17.51		14.53		14.73		15.17		50.95	
— 2	31.21	— 2	31.14	— 2	31.05	— 2	30.10		31.07	

47

+ 2 31.21
31.19
31.05
31.10
31.07

+ 2 31.11 = c. E
+ 2 30.82 = c W

c Diurnal 94.5
c = +.10[s]

1[o] 2 30.96 +.01 = Mean R. R.
1.7 2 31.02 = M. C.
+2 ~~30.89~~ .13 = ~~.06~~ = mc - RT
~~-.07~~
2 30.88
-.08 = mc - R.T.

+.16		+.26		+.48		-.46		-.15	
+1.21		+1.12		+.92		+2.87		+1.49	

Dec. 24. 1882.

Circle East -
Russian Transit

U. S. R. Observer

~~5 bars.~~

Dec. 24 1882 — Meridian Circle — W.A.R. Observer

c = +.10 — b = +.84

Polaris — δ Piscium +8° 34′ — γ Andem. +41° 46′ — α Arietis +22° 54′ — β Trianguli +34° 26′

+15 1.01 — +88 1.34 — +45 1.09 — +64 1.21

1	36 33.4	53 45.5	2.0	57 41.5	55.0	59 39.7	54.7
	35.2	48.2	4.9	43.5	57.0	42.0	57.0
	37.3	51.0	7.7	45.8	59.4	44.8	59.7
	39.4	53.9	10.5	48.1	1.7	47.0	2.1
	41.4	56.7	13.1	50.4	3.9	49.6	4.5
	43.5		16.0		6.0		7.0
1 13 37.7	45.6	29.9	18.8	17.2	8.3	19.7	9.6
14 9.4	47.8	32.6	21.5	19.5	10.6	22.1	12.1
14 38.7	49.9	35.2	24.4	21.8	12.8	24.7	14.7
15 8.6		38.0		24.0		27.1	
15 39.0		40.9		26.3		29.7	
	41.50	13.19	13.21	3.81	3.86	4.64	4.60
			1320		3.88		4.62
14 38.26							
.66							
14 37.60	41.48		1318		3.81		4.60
16 32.69	14.31		45.29		36.41		36.95
−1 55.09	−2 32.83		−2 32.11		2 3.260		−2 3.235
+4.35	+10		+13		+11		+12
−1 50.71	32.73		31.57		32.48		−2 32.23
	−2 32.83 +15	−13	−2 32.96		−1 5.50	+4.375	
	32.11 +88	−77	32.88		−2 30.26	+3.06	
	32.60 +45	−39	32.99				
	32.23 +68	−54	32.94				
	−2 32.47 +.54						

δ = 37.38 + 43.21 n n = +.47 / −.87
α = 2.21 2.82

2 32.94 / 32 — n = −.87

2 30.02

∴ n = +1.18 × .75 = +1.92

γ Arietis +18° 42′ — 50 Cass. — +71 57 — − 2 32.73 +15 +15

	+34 1.05		306 3.22		32.57 +88 −87	32.88	− 2 2954 +306
					32.49 +45 −44	.86	− 1 50.70 4.375
					32.23 +68 −67	.93	2.56
					32.81 +34 −34	90	= +2.47 + 2.68 + 41.18 + 4.375
						95	n = .47
1 44 13.8	26.8	49 57.3	85.5				
16.0	29.0	24	42.2		32.41 +10		n = −.98
18.2	31.2	9.0	48.5				
20.4	33.5	15.5	55.4		− 2 32.90		n = 1.13 + 89 + .202
22.5	35.5	22.3	1.7		1.72		
	37.8		8.3		202		
48.7	40.0	41.8	15.0				
50.8	42.0	48.4	22.0		47 + n = + 2 32.90		
53.0	44.3	55.4	28.5		n 202		
55.2	~~53.0~~	1.9					
57.4	~~55.2~~	8.5			47 = 2 30.88		
	57.4						
3560	35.57	2.05	1.90				
	35.58		1.97				
	8.19		32.23				
	−2 32.61		− 2 3026				
	−.30		+32				
	2 32.91		− 2 2994				
	+10						
	−2 32.81						

Dec. 25 1882 — Circle West — W.A.R. Observer

Russian Transit — b = −.01 — a = −1.05

Br. 30 Deg 15 6 20 — γ Maxima +2 38 — T Pegasi +2 30 5 — 72 Pegasi +20 40 — X Andromedæ 43 41 — 42 23 — −1 18

22	4	16.2			8	7.1			11	49.5			25	5.8	
		23.0				10.8				53.3				9.7	
		29.4	29.34			14.4		14.32		57.2		57.16		18.5	13.76
		36.0				17.8				1.0				18.0	
		42.1				21.5				4.8				21.8	
		55.0				28.4				12.5				30.2	
		1.5				32.0				16.4				34.5	
		7.8	7.92			35.6		35.56		20.2		20.22		38.5	38.50
		14.3				39.0				24.0				42.8	
		21.0				42.8				28.0				46.5	
		34.0				49.6				35.7				53.0	
		40.0				53.4				39.5				59.0	
		46.6	−46.52			56.9		56.88		43.3		43.30		8.3	3.24
		52.5				0.5				47.0				7.4	
		59.5				4.0				51.0				11.5	
			7.93					35.57				20.23	25	38.50	
			7.90					35.57				20.21		38.48	
			.02					−.01				−.01		−.01	
			7.88					35.56				20.20		38.47	
			39.74					6.40				51.84		2.64	
		−2	31.86					30.84				31.14		31.19	
			+.48					−.67				−.38		−.23	
		−2	31.38					31.51				31.52		31.40	

4															
			23.0					+ 2		31.38					
			23.2							31.51					
			23.2							31.52					
			23.2							31.40					
			23.5							31.53					
			23.2												
			23.2					+ 2		31.47	= c 2v				
			23.8							31.57	c 2				

2 31.52 = Mean R.T.

		−.46				+.64				+.36				−.03	
		+1.76				+.78				1.02				+1.37	

Dec. 25 1882 — Circle East — W. A. R. Observer

Russian Fromis

b = -.04

41 H Cephei		67 09		Pegasi		1 27		Cass.		56 51	Piscium	+6 12
		42 23				42 23				42 23		42 23
		-24 46				+23 56				-14 28		+36 11
23	38 850			43 320				45 10.4			50 19.5	
	44.0			35.5				16.6			22.9	
	53.2	53.22		39.3		39.42		22.8		22.90	26.4	26.48
	2.5			43.4				29.0			80.0	
	11.4			46.9				35.7			33.6	
	29.5			54.1				48.9			40.9	
	39.0			58.0				53.3			44.0	
	48.0	47.94		1.9		1.80		1.5		1.66	48.0	47.84
	57.2			5.6				8.0			57.3	
	6.0			9.4				14.6			55.0	
	24.5			16.8				27.5			2.0	
	33.8			20.5				34.0			5.8	
	42.6	42.74		24.4		24.34		40.7		40.58	9.2	9.30
	51.8			28.0				47.0			12.9	
	1.0			32.0				53.7			16.6	
23.6		47.97				1.89				1.71		47.87
23.8		47.94				1.87				1.68		47.85
2 3.8		20.89				-.04				-.07		-.23
		47.85				1.83				1.61		47.82
		20.55				32.90				33.67		15.87
		-2 32.70				-2 31.07				-2 32.06		-2 31.65

0 = -2 31.07 +.42 -.44 | 2 31.57 | 0 = -2 32.70 -.07
31.05 +.57 -.02 | 31.47 | 2 31.06 +.30
32.06 -.50 +.52 | 31.54 | = -1.64 -1.57
2 31.57 | a = -1.05

-1.07	+.42	-.50	+.57	
+2.33	+.95	1.77	+.81	

Dec. 25 1882 — Meridian Circle — W. A. R. Observer.

$\delta = +84^{\circ}$

	12 Cele	$+4^{\circ}\ 3'$	χ Cass.	$+62\ 16$	π Androm	$+33\ 4$	N Androm	$+30\ 12$
		+.08		1.91		+.61		+.58
0	21 10.8	23.0		23 33.4	27 41.8	56.6	30 8.9	23.1
	12.8	25.2		38.0	44.3	59.0	11.2	25.5
	14.9	27.2		42.5	46.7	1.4	13.5	28.0
	16.9	29.3		47.0	49.1	4.0	16.0	30.2
	19.0	31.3		51.5	51.5	6.4	18.2	32.4
		33.4		56.0		8.9		35.1
	43.8	35.5		0.4	21.2	11.3	47.0	37.5
	45.9	37.5		4.8	23.8	13.9	49.5	39.9
	48.0	39.7		9.4	26.0	16.3	52.0	42.3
	50.0				28.5		54.2	
	52.0				31.0		56.7	
	31 41	31.34		51.48	6.39	6.42	32.72	32.70
		31.37		51.48		6.40		32.71
		31.35		51.46		6.38	32.	32.69
		4.85		23.28		39.20		8.80
		−2 33.50		−2 31.82		−2 32.82		−2 32.81

$n = -9^{2}$

0.4	$\delta = -2\ 33.50$	+.08	−.07	−2 33.57
0.4		31.82	+1.91	−1.76	33.58
0.5		32.82	+.61	−.60	33.42
0.6		32.81	+.58	−.53	33.34
0.5					

$n = 1.15 + .84 = 11.99$

$-2\ 33.48$

$.99$

0.5 $2\ 31.49 = mC.$

23.5 $2\ 31.52_{+02} = RT$

$-.03 = mC - RT$

Collection of Results

Date	Observed mean				R. T.		m C − R. T.	
	4m (R.)	s	4m (B.)	s	m	s		Seeing
Dec 12	+2	25.35	25.41	25.38	+2	25.55	−.17	very bad
14	+2	26.19	—	26.19	+2	26.25	−.06	bad.
16	+2	26.80	26.82	26.81	+2	26.89	−.08	good
17	+2	27.18	—	27.18	+2	27.25	−.07	good.
20	+2	29.01	29.06	29.10	+2	29.17	−.07	good
21	+2	29.66	29.66	29.66	+2	29.77	−.11	good.
24	+2	30.88	—	30.88	+2	30.97	−.09	good.
25	+2	31.49	—	31.49	+2	31.54	−.05	

Date	mC − RT B	mC − RT R
Dec 12	−.14	−.20
14	—	−.06
16	−.07	−.08
17	—	−.07
20	−.09	−.06
21	−.11	−.11
24	—	−.09
25	—	−.05
	−.10	−.09

Dec. 24 – 1882

$\delta = -17° 44'$

log 15 4.97894 1.17609 1.18553

csc 30 9.69897 1.15508 0.85409

csc 40° 9.80507 1.15508 0.96313

csc 45° 9.84998 1.15508 1.00451

Venus South –

with E. Eq.

W.A-P Observer

Rate for $1^s = -.00555^s$

	30	40	45	0	0′	45	40	30	
16	36 37.7	41.5	42.8	52.1	52.6	58.3	59.5	3.0	
	45.2	47.2	48.0						
	7.5	5.7	5.2						
~~16~~	37 17.1	20.9	22.1	31.5	31.9				
	24.6	26.5	27.1			37.5	38.7	42.2	
	7.5	5.6	5.0						
	40 28.3	31.9	33.5	42.5	43.0				
	36.1	37.8	38.7			48.4	49.7	53.0	
	7.8	5.9	5.2						
	40 58.3	2.0	3.2	12.6	13.1				
	6.1	7.8	8.6			18.6	19.7	23.0	
	7.8	5.8	5.4						
	41 30.6	33.8	35.4	44.4	45.0				
	38.2	40.0	40.8			50.6	51.7	54.7	
	7.6	6.2	5.4						
	42 5.0	8.6	10.0	18.9	18.3				
	12.8	14.4	15.0			24.8	26.0	29.3	
	7.8	5.8	5.0						
	42 39.1	42.7	44.0	52.7	53.3				
	46.7	48.2	48.9			58.7	59.6	3.0	
	7.6	5.5	4.9						
	43 11.5	15.0	16.1	25.1	25.6				
	19.1	20.9	21.7			31.1	32.4	35.3	
	7.6	5.9	5.6						
	43 44.6	47.7	49.0	58.0	58.5				
	52.1	53.9	54.4			3.8	4.9	8.2	
	7.5	6.2	5.4						
	44 18.1	21.7	22.9	31.8	32.3				
	25.9	27.8	28.2			37.4	38.7	40.7	
	7.8	6.1	5.3						
	44 ~~55.6~~	~~57.0~~	~~59.8~~	6.7	6.2				
	~~1.6~~	~~2.2~~				11.3	12.4	15.6	
	52.1	55.6	57.0						
	59.8	1.6	2.2						
	7.7	6.0	5.2						
	45 23.7	27.2	28.4	37.8	37.6				
	31.7	33.1	33.6			42.8	43.8	47.0	
	8.0	5.9	5.2						
	7.68	5.89	5.24						
	−.04	−.03	−.03						

log	−.04	8.30103	.85402	9.1551	−14 9.4950	8.6501
	−.03	8.47712	.96313	9.4401	−.28	8.9351
	−.03	8.47712	1.00451	9.4816	−.30	8.9760

Ursae Majoris -

with ε Eq.

		30°	40°	45°	v°	v'	0 45°	0 40	0 30
16	48	49.8	52.7	54.0	59.3	59.8	1.8	2.7	5.1
							~~8.4~~	8.4	13.1
							7.0	5.7	8.0
							~~5.2~~		
	49	25.6	28.6	29.5	35.0	35.5	37.3	38.4	41.0
							42.7	44.2	48.9
							5.4	5.8	7.9
	49				9.1	9.6	11.6	12.3	15.2
		59.6	2.6	3.6			16.8	18.3	23.0
							5.2	6.0	7.6
	50				42.0	42.4	44.2	45.3	48.1
		32.7	35.2	36.4			49.7	51.2	56.1
							5.5	5.9	8.0
	51				19.1	19.6	21.4	22.6	25.8
		9.7	12.4	13.5			27.0	28.5	33.2
							5.6	5.7	7.4
	51				52.7	53.2	55.3	56.2	59.0
		43.0	46.0	47.1			0.5	2.1	6.7
							5.2	5.9	7.7
	52				26.4	27.0	29.0	30.0	32.8
		16.7	19.6	20.6			34.2	35.8	40.4
							5.2	5.8	7.6
	52				4.0	4.5	6.7	7.6	10.3
		54.5	57.3	58.3			12.1	13.7	18.5
							5.4	6.1	8.2
	53				35.6	36.2	38.4	39.2	43.6
		26.0	28.8	30.0			43.7	45.0	51.0
							6.7	5.8	
	54				14.6	15.2	17.7	18.6	21.6
		5.0	7.9	9.0			22.8	24.3	29.2
							5.1	5.7	7.6
	54				49.1	49.8	52.0	53.0	57.7
		39.6	42.3	43.5			57.3	59.0	3.9
							5.3	6.0	8.2
							5.29	5.88	7.84
							5.24	5.89	7.68
							5.27	5.885	7.76
						log	0.72154	0.76925	0.88916
						log 15 cos δ/2	1.00451	0.96513	0.85400
							1.7760	1.73288	1.74356
							57.99	54.06	55.44

17.33 − .05 = 17.28
16.80 − .08 = 16.72

~~16.90~~ log 1.2279
17.05

log 49.4 9.69455 9.69520
log D .2 2788 23880
16.90 17.33

16.90
17.23
423
17.11

δ = −17° 33.5
ΔA = 9.85661

Dec 25 1882. Venus South — S.C.C. Observer

		30	40	45	0	0'	45	40	30
	18	29	16.4	19.2	20.3	25.5	26.0	32.9	34.1	38.7
		29	55.3	58.0	59.0	4.0	4.5	11.3	12.8	17.2
		30	26.0	28.8	29.9	34.9	35.2	42.0	43.5	47.9
		31	53.8	56.0	57.0	2.0	2.4	9.1	10.9	15.0
		32	26.3	28.7	29.7	34.7	35.0	41.8	43.1	47.4
		35	32.6	35.0	36.0	40.4	41.2	47.5	49.0	52.9
		36	1.6	4.1	5.1	9.7	10.0	16.5	18.0	22.0
		36	31.4	33.9	34.8	39.5	40.0	46.2	47.7	51.8
		37	0.1	2.7	3.7	8.0	8.3	14.8	16.2	20.3
		37	34.8	37.0	37.9	42.3	43.0	48.9	50.4	54.4
		38	3.1	5.8	6.7	10.8	11.5	17.4	19.0	23.0

Dec. 25-1882 Venus North S.C.C.

		30	40	45	v	v'	45	40	30
18	39	29.5	32.0	32.8 37.6	37.6	38.0	44.6	46.0	49.9
	40	0.0	2.2	3.1	7.8	8.5	14.8	16.3	20.2
	40	29.7	32.0	32.8	37.7	38.0	44.9	46.0	50.1
	41	0.2	2.6	3.6	8.4	8.8	15.4	16.9	20.9
	41	31.5	33.9	34.7	39.6	40.0	46.7	47.9	51.9
	41	59.9	2.2	3.2	8.1	8.6	15.1	16.8	20.9
	42	31.0	33.5	34.4	39.5	39.9	46.5	48.0	52.0
	43	0.3	2.5	3.7	8.5	9.1	15.8	16.0	21.1
	43	28.7	31.2	32.3	37.2	37.8	44.4	46.0	49.8
	43	57.8	0.3	1.1	6.2	6.8	13.5	15.0	19.2

17 4

Dec. 28 1882

W. D. B. Observer

n = 100

C = +60

γ Piscium		τ Pegasi		4 Cass.		70 Pegasi		γ Cephei		φ Pegasi		
+2 38		+23 5		+61 38		+12 6		+76 5		+18 28		
+.05		+.43		+.55		+.21		+.33		+3.2		
								+.44		1.05		
23 8 105	224	11 340	74	16 216	47.9	20 186	310		31 246	43 360	492	
125	24.9	562	9.7	260	523	20.7	333		23.7	38.0	573	
145	27.0	584	120	30.4	566	228	35.4		428	40.3	535	
165	29.0	0.5	140	34.7	0.9	24.8	37.5		52.4	42.4	535	
18.6 1452	31.1	3.0 5842	163	39.2	5.1 20.38	26.9	2278 89.6		1.4	44.6	4026 57.9	
	33.2		18.6		9.8		41.7		10.4		0.0	
43.2	35.2	29.9	20.9	31.3	14.0	52.3	43.9		20.1	10.8	22	
45.5	37.3	32.0	23.1	35.8	18.2	54.4	46.0		29.3	13.0	45	
47.7	39.4	34.2	25.3	40.2	22.5	56.4	48.0 5061		38.1	15.4	65	
49.8		36.6		44.4		59.0				17.3		
51.9 47.62		39.0 3434	16.37	48.8	40.10 5.26	1.0				19.4 15.24	5785	
	31.07 31.09		1638 1637		524 5.26		39.69 39.60				5775	
8	31.08	12	1638		5.25		39.64		31 1.42		5740	
	31.06		1636		5.22		39.62		1.38		5738	
	6.36		51.30		37.33		14.71		34.26		32.57	
	−2 35.30		−2 3494		−2 3411		−2 35.13		−2 3288 3288		−2 3519	
	−.04		−43		−86		−21		−3.40 4.33		−.30	
	−2 35.34		−2 35.37		34.96		−2 35.34		−2 34.78 37.21		35.49	
									−2.67			
							−2 35.13		−2 3288		−2 3519	
									−4.33		−.33	
									−2 37.21		−2 35.52	
									+2.22		.53	
									−2 34.99		34.99	

0 = −2 35.30 +.05
34.54 +.43
35.13 +.21
−2 35.12 +.23

0 = −2 34.11 +.185
2 35.12 +.23
1.01 1.62

For an increase of the reading of the micrometer Elim. c is positive.

Dec. 28 1882

Q Cass.			W Piscium			Gr. 1857 F.C.			L Androm.			22 Androm.		
+1650			+6 12											
+1.53			+11											
1.83			1.01											
45 215		443	50 230		353	56 15		400	22 229		394	1 124		300
25.2		47.9	25.0		37.4	5.0		43.2	25.7		42.5	13.5		32.9
29.0		51.8	27.0		39.4	8.8		46.5	28.5		45.1	18.4		35.9
32.8		55.3	29.0		41.5	11.5		49.9	31.2		48.1	21.3		38.9
86.5	1880	59.3	81.2	27.4	43.6	15.0		53.0	34.0		50.8	24.3		41.8
		2.9			45.4	18.3		56.4			53.6			44.8
21.9		6.6	56.0		47.6	21.4		59.6	7.8		56.5	59.6		47.8
25.5		10.5	58.2		49.8	24.4		2.9	10.5		59.3	2.3		50.8
29.4		14.4	0.3		0.20	27.6		6.0	13.4		2.0	5.3		53.6
83.0			2.2			30.2		9.0	16.0			8.0		
87.0	24.36		4.4	0.22		33.3		12.2	19.0			11.3		
						36.8		15.2						
								18.4						

59.08 59.22 43.63 43.59

59.15 43.61
59.12 43.59
33.18 18.57
− 2 34.46 − 2 35.29
1.38 10
35.84 35.39

− 2 34.46 − 2 35.29
− 1.53 − .11
− 2 35.99 2 35.40
92 50
35.07 34.90

+ 2 34.99
+ 2.00
+ 2 32.99