

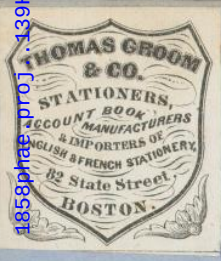
KG
11365
139

F.10

Magnetic 1858
x
Prime Vertical.

Sold by T. Groom & Co., Stationers, India Building, 82 State St., Boston.

1858phas proj 139H



KG 11365.139

KG 11365.139



Long. of Ann. Arbor. Mich.

From Greenwich	5 ^h	35 ^m	12 ^s
" Washington	0	27	1

Reading of the circle at the Equator $312^{\circ} 23'$

Comparison of clock in transit room.

March 22. 9^h A.M. 186 1 59 00.0
 attached Ther. 40.2 236 21 6 30.8

1858
 March 27 186 = 12^h 7^m 6.0 - 12.0 - 18.0 - 24.0 30.0 36.0
 attached Ther 35.8 EC = 22 34 43.0 - 49.0 - — 1.1 7.2 13.1
 42.0 48.0 54.0 60.0
 19.2 25.1 31.2 37.1

186 Stopped between this and subsequent comparison.

March 29 186 = 15^h 38^m 6.0 - 12.0 - 18.0 - 24.0 - 30.0 - 36.0
 attached Ther. 39.5 EC = 22 12 41.8 - 47.8 - 53.9 - 59.8 - 5.8 - 11.8

42.0 - 48.0 - 54.0 - 60.0
 17.8 - 23.8 - 29.8 - 35.8

March 30 186 14 17 6.0 - 12.0 - 18.0 - 24.0 30.0 - 36.0
 attached Ther 42.5 EC 22 39 44.8 - 50.8 - 56.8 - 2.8 8.8 - 14.8

186 stopped while comparing.

March 31

186 = 12 12 - 12.0 - 18.0 - 24.0 - 30.0 - 36.0
 EC 22 18 - 50.6 - 56.7 2.7 - 8.7 - 14.6

42.0 - 48.0 - 54.0 - 60.0
 20.7 - 26.7 - 32.6 - 38.7

April 1 186 stopped.

Apr 2^o 186 = 3 55 - 6.0 - 12.0 - 18.0 - 24.0 - 30.0
 EC = 22 27 - 20.4 - 26.4 - 32.5 - 38.4 - 44.5

36.0 - 42.0 - 48.0 - 54.0 - 60.0
 50.4 - 56.5 - 62.4 - 68.4 - 74.4

Apr 3^o 186 = 4 1 6.0 - 12.0 - 18.0 - 24.0 - 30.0
 EC = 22 39 50.4 - 56.0 - 2.3 - 7.8 - 14.3

36.0 - 42.0 - 48.0 - 54.0 - 60.0
 20.3 - 26.3 - 32.1 - 38.3 - 44.2

Apr 5^o 186 21 38 6.0 - 12.0 - 18.0 - 24.0 - 30.0
 EC 22 34 35.8 - 41.0 - 47.8 - 52.9 - 59.8

186 has a singular bear this morning

36.0 - 42.0 - 48.0 - 54.0 - 60.0
 4.9 - 11.8 - 16.9 - 23.8 - 28.9

1857. Sept 8th 9^h 45^m

Meridian reading	360. 35. 00
Reddli	349. 23. 20
	11. 11. 40

Setting reading Transit Instrument
3. 50

349. 23.

1857, Sept ¹⁴/₁₅

$$\begin{array}{r}
 360,,37,00 \\
 349,,11,30 \\
 \hline
 11,,25,30
 \end{array}$$

Reversed.

$$\begin{array}{r}
 180,,37,,00 \\
 169,,04,,30 \\
 \hline
 11,,32,,30
 \end{array}$$

1857
 Sept 15th Noon *W* 118. 20.
 118. 21
 118. 21

E
 298. 21.
 298. 20
 298. 21

N
 208. 20

Needle No 3.

Face North, 196. 31

16. 31

Face South, 197. 53 90. above. 90 below. 17. 53

Face West, 74. 42. Below

74. 45 Above

Face East, 74. 40 Below

74. 40 Above

Below
 Face West 74. 45

Above
 74. 45

Face East 174. 30 Below

174. 23 Above

1857

Sept 15th Noon.

Needle 1

W. Verner
118.20E. Verner
298.21

Face West.

Below 74.40

Above 74.37

Face East

Below 74.40

Above 74.50

South U
17.49North U
197.49

Above 89.55

Below 90.00

107.49

118.21

10.82

Magnetic Meridian

Below 74.40

Above 74.35

Needle No 2

Face West.

Above 89.55

Below 90.00

1857

Sept 15th

Needle No 2.

Above $90^{\circ} 00$
 Below $90^{\circ} 00$

South Vernier
 17. 53

North Vernier
 197. 52

Face West W. Vernier
 107. 53

E. Vernier
 287. 53

Above ~~81. 43~~ 74. 28
 Below ~~81. 45~~ 74. 32

Meridian

Below 74. 35

Above 74. 30

W
 118.21

E
 298.21

Below 81. 43

Above 81. 43

118. 21

107. 53

10. 28

Francis Circle (Probably in West Wing
 6. 42 or Depression.

1857

Sept 15th

Barrow's Dip Circle, No. 26.

Face East. 74.30

Face West 74.30

1857. Sept 16th Barrow's Dip Circle No. 26.

8.40 A.M. Needle No. 1.

Above. 90°

Vermin. 18° 49'

Below. 90°

Face West 18.49

Above 74.11

Below 74.11

A. North Pole

Fox Dip Circle

Oct 2 A.M. - 1857

A.H.

True Meridian.

W Vernier.	118° 18'	Below.	75° 00'
E Vernier.	298° 18'	Above	74° 55'
Turned 90°			

Below	86° 47'
Above	86° 40'

Above	90° 00'
Below	89° 55'

South Vernier. 18° 17'

North " 198° 17'

Barrow's Dip Circle, Oct. 29th A.M. 1857.
No 26.

Face South. Needle A1.

Above 90° .

Below 90° .

Az $49^{\circ} 11'$

Turned 90° and could not see the needle.

Barrow's Dip Circle No 26.

Oct 30, A.M. 1857.

Face South

Needle A1.

Below 90°

Azimuth $7^{\circ} 51'$

Above 90°

Turned 90° .

Face West

Below $74^{\circ} 16'$

Az

$7^{\circ} 52'$

Above $74^{\circ} 16'$

Turned back, 90°

Face South.

Below

89.32

Above

Az

$7^{\circ} 52'$

89.32

This needle is not accurately central. In these observations the wire in the lower microscope was placed on the point of the needle.

Face South

Above 90°

Az

$6^{\circ} 38'$

Below 90°

Az

$6^{\circ} 35'$

Turned 90°

Face West

Above $74^{\circ} 19'$

Below $74^{\circ} 19'$

Above $74^{\circ} 19'$

Below $74^{\circ} 18'$

Barrow's Lip Circle. N. 26. Oct 30. Am. 1857.

Needle A. 2.

Face West.
Above $73^{\circ} 48'$ Az $6^{\circ} 35'$
Below $73^{\circ} 48'$

Turned 90°

Face South
Above 90° Az $6^{\circ} 50'$
Below 90°

Above 90° Az $6^{\circ} 30'$
Below 90°

Put in one weight. - A. 2. Lower.

Face South
Above 90° Az $5^{\circ} 53'$
Below 90°

Above 90° Az $5^{\circ} 35'$
Below 90°

Turned 90°

Face West
Above $82^{\circ} 25'$ Az $5^{\circ} 35'$
Below $82^{\circ} 25'$

Above $82^{\circ} 23'$ Az $5^{\circ} 35'$
Below $82^{\circ} 23'$

Put in another weight. A. 2. upper.

Face West.
Above $84^{\circ} 34'$ Az $5^{\circ} 35'$
Below $84^{\circ} 34'$

Above $84^{\circ} 33'$ Az $5^{\circ} 35'$
Below $84^{\circ} 33'$

Barrow's Dip Circle. No 26. Oct 30th M. 1857.

Needle A.2.

Put in all the weights. 2 in A.2. and 1 in B.

Face West.

Above $82^{\circ} 12'$ Az $5^{\circ} 35'$ Below $82^{\circ} 12'$ Above $82^{\circ} 11'$ Az $5^{\circ} 35'$ Below $82^{\circ} 11'$ Turned 90°

Face South.

Above $89^{\circ} 40'$ Az $5^{\circ} 35'$ Below $89^{\circ} 40'$ Above $89^{\circ} 43'$ Az $5^{\circ} 31'$ Below $89^{\circ} 43'$

Two weights in B and one in A.2 (the lower one).

Face South

Above 90° Az $4^{\circ} 51'$ Below 90° Above 90° Az $4^{\circ} 51'$ Below 90° Turned 90°

Face West

Above. $21^{\circ} 45'$ Az $4^{\circ} 51'$ Below. $21^{\circ} 43'$ Above. $21^{\circ} 57'$ Az $4^{\circ} 51'$ Below. $21^{\circ} 57'$

N 26

Barrow's Dip Circle. Nov 2. 1857. A.M.

Face South

Needle N. 2.

Above 90° $A_2 = 44^\circ.16'$
 Below 90°

Above 90° $A_2 = 44^\circ.55'$
 Below 90°

Above 90° $A_2 = 44^\circ.12'$
 Below 90°

The sun shone on the instrument
 during these observations.

Above 90° $A_2 = 44^\circ.23'$
 Below 90°

Above 90° $A_2 = 44^\circ.42'$
 Below 90°

Turned 90° .

Face East.

Above $74^\circ.22'$ $A_2 = 44^\circ.42'$
 Below $74^\circ.22'$

Above $74^\circ.26'$ $A_2 = 44^\circ.42'$
 Below $74^\circ.26'$

Put two pins in B

Above $76^\circ.22'$ $A_2 = 44^\circ.42'$
 Below $76^\circ.22'$

Above $76^\circ.13'$ $A_2 = 44^\circ.42'$
 Below $76^\circ.13'$

The lower pin in B,

Above $33^\circ.00'$ $A_2 = 44^\circ.42'$
 Below $33^\circ.00'$

Above $33^\circ.00'$ $A_2 = 44^\circ.42'$
 Below $33^\circ.00'$

Burrows Dip Circle No 26. Nov 2^o 1857

Face East

The upper pin in B.

Above $27^{\circ}.00$

Below 27°

$A_2 = 44^{\circ}.42'$

Above $26^{\circ}.46'$

Below $26^{\circ}.46'$

$A_2 = 44^{\circ}.42'$

Turned 90°

Face South

Above $87^{\circ}.15'$

Below $87^{\circ}.15'$

$A_2 = 44^{\circ}.42'$

Barrows Dip circle No. 26. Nov 17th 1857. 14^h 45^m Sid. Time.

Needle A₂

Face North.

(B above)

Above 90°

Asimuth 26° 15'

Below 90°

Fixed one pin in B. upper one, and turned 90°

Face East,

Above 34° 55'

(A₂)

Below 34° 56'

Above 34° 55'

(A₂)

Below 34° 56'

B. in the third quadrant. to the ^{hand} right

Face East. Fixed two pins in B. A₂ remaining the same.

Above 76° 43'

B. below. in third quadrant.

Below 76° 43'

means of several readings.

Above 76° 43'

Below 76° 43'

Face East one pin in B, the lower one. A₂ the same.

Above 10° 52'

B above in second quadrant.

Below 10° 52'

Above 10° 49'

Below 10° 48'

Variation of the Magnetic Meridian.

1857
Nov 23rd 10^h 30^m A.M.

Variation Transit.

Determined the true meridian by the southern mark.

Vernier A reads 171 .. 33 .. 30
" B " 51 .. 34 .. 00
" C " 291 .. 34 .. 30

Brought the needle into the magnetic meridian

Vernier A reads 160 .. 07 .. 30
" B " 40 .. 08 .. 10
" C " 280 .. 08 .. 00

Variation by vernier A = 11 .. 26
" B = 11 .. 25 .. 50
" C = 11 .. 26 .. 30
11 .. 26 .. 06

Determined the true meridian by the transit instrument

Vernier A reads 171 .. 32 .. 50
" B " 51 .. 32 .. 50
" C " 291 .. 33 .. 30

Brought the needle into the magnetic meridian

Vernier A reads 159 .. 48 .. 30
" B " 39 .. 49 .. 00
" C " 279 .. 50 .. 00

Variation by vernier A = 11 .. 44 .. 20
" B = 11 .. 43 .. 50
" C = 11 .. 43 .. 30
11 .. 43 .. 53

1857. Variation Transit, Nov 23rd 4 o'clock P.M.

Readings for the true meridian.

Vernier A 171 .. 28 ..
 " B 51 .. 28 .. 10
 " C 291 .. 28 .. 10

Readings for magnetic meridian

Vernier A 160 .. 07 .. 00
 " B 40 .. 08 .. 00
 " C 280 .. 08 .. 30

Turned 180° and reversed the needle.

Vernier A 340 .. 10 .. 00

Variation Transit Dec 2nd Noon.
 (In room over Library.)
 Determined the meridian by the transit of the Sun.

	Vernier Readings	magnetic meridian	variation
A	179 .. 07 .. 10	168 .. 25 .. 50	10 .. 41 .. 20
B	299 .. 07 .. 00	288 .. 24 .. 50	10 .. 42 .. 10
C	59 .. 09 .. 00	48 .. 28 .. 30	10 .. 40 .. 30

Set the cross of the wires on the I I limb of the Sun at 11^h 49^m m.t.

Semi diam of the Sun = 16' 16"

$\frac{2}{+32' 32''} = \text{correction for variation}$

$$\begin{array}{rcl}
 10^{\circ} \dots 41' \dots 20'' + 32' \dots 32'' & = & 11^{\circ} \dots 13' \dots 52'' \\
 10 \dots 42 \dots 10 + 32 \dots 32 & = & 11 \dots 14 \dots 42 \\
 10 \dots 40 \dots 30 + 32 \dots 32 & = & 11 \dots 13 \dots 02
 \end{array}$$

Variation Transit See 3rd Noon.
Probably in Room over Library

A	352.20.02	341.19.30	du	14 00.15
B	232.20.0	221.18.00		11 2.0
C	112.20.0	101.20.00		11 00.0

A	352.00	341.10	10	50.0
B	231.59	221.10	10	49.0
C	112.01	101.12	10	49.0

Variation Transit March 30 about 10.30^h A.M.

For true meridian

C 120 34 30
B 240 33 20
A 0 34 30

For magnetic meridian

C 109 13 Diff 11 21 30
B 229 11 11 22 20
A 349 12 11 22 00
11. 21. 57

Levelled the instrument

C 120 33 00
B 240 31 30
A 0 32 20

C 108 46 20 Diff 11 46 40
B 228 46 00 11 45 30
A 348 48 00 11 44 20
11. 45. 30

Reversed the needle.

C 300 33 00
60 32 40
180 33 20

C 288 31 30 Diff 12 1 30
B 48 31 00 12 1 40
A 168 31 30 12 1 50

1858phae.proj..139H
April 1st 1858. 11^h 30^m A.M.

Observations in Transit room, near north window

For Dip.

Midwire on north mark

Face West. $31^{\circ} 11'$ Angle to chimney on the left $0^{\circ} 39'$

For true meridian

Face West $31^{\circ} 10'$

Face South 90° Above } $115^{\circ} 00'$
 90° Below }

Face South 90° Above } $115^{\circ} 5'$
 90° Below }
Turned 90°

Face West Above $75^{\circ} 5'$
 Below $75^{\circ} 5'$

Turned 180°

Face East. Above $74^{\circ} 10'$
 Below $74^{\circ} 10'$

1858

April 1st P.M. 2^h 30^m

Fox Dip In west transit room.
Needle N 1 or 2
For true meridian.

Face west. 19° 38'

Face South Above 90° 3' 75'
Below 90° 3'

Turned 90°
Face West. Above 74° 00'
Below 74° 10'

Turned 180°
Face East. Above 74° 40'
Below 74° 30'

Reversed the needle
Face South. Above 90° 277° 27'
Below 90°

For true meridian 19° 38'

For magnetic meridian 7° 27'
Above 74° 10'
Below 74° 15'

Face North Above 90° 99° 12'
Below 91°

For true meridian 19° 38'

magnetic merid Above 74° 0'
Below 74° 5'

4. 12

7. 5

16. 17

8. 08. 30

19. 38

11. 29 30

Fox Dip

April 2^o 1858. 10^h A.M.
Needle No 2^o...

Was Transit room

For true meridian

Face West $199^{\circ} 25'$
Face South Above 90° } $92^{\circ} 24'$
Below 90° }

Dec = $17^{\circ} 1'$

For magnetic meridian $2^{\circ} 24'$

Face West { $73^{\circ} 30'$ Above
 { $73^{\circ} 30'$ Below

Face north 90° Above 284° } $7'$ Dec = $5^{\circ} 18'$
 90 Below Mean = $11^{\circ} 9' 30''$

For mag merid $194^{\circ} 7'$

Face West $73^{\circ} 10'$ Above
 $73^{\circ} 10'$ Below

Reverted the needle.

Face South 90° Above 282.0
 90° Below

For true meridian $19^{\circ} 25'$

Dec = $7^{\circ} 25'$

Face north 90° Above $94^{\circ} 49'$
 90° Below

True merid $19^{\circ} 17'$

Dec = $14^{\circ} 28'$
Mean = $10^{\circ} 56'$

Dip

April 3rd 1858 10^h 30^m A.M. West Grannis room
Kiddle No 3

For true merid.

Face West 19° 28'

Face North 90° Above 92° 29' Sec = 16 59
91° Below

mag merid. Face West 76° 10' Above
76 10 Below

mag merid Face East 72° 42' Below
72 42 Above

Face South 90° Above

90 Below

284° 33' Sec = 4 55
Mean = 10 52

Reversed the needle.

For true merid.

Face West 19 20

Face North 90° Above 103° 51' Sec = 15 29
90 Below

Face South 90° Above 273 20 Sec = 16 40
90 Below Mean = 10 45

Face West 72 40 Above
72 40 Below

Face East 75 31 Above
75 31 Below

April 3rd P.M.Fox Dip
Kettle No 3.3^h about.

For true merid 19° 27'

Face North	90° Above	104° 5'	Sec =	5° 22'
	90° Below			

Face South	203	Above	272	38	Sec =	16° 49'
		Below			Mean =	11 05

April 10 1858.

Barrow's Dip Circle No 26
in the work room

Needle No 1

B. the north pole.

Face North

Az 79° 55'

78 25

79 24

Mean

79 14

Face South

Az

81 26

81 10

79 12

Mean

80 43

Reversed the needle from marked side front.

Face South

Az 80 12

80 55

81 08

80 45

magnetic merid Face East

74 28

74 33

74 32

Mean

74 34

Face West

75 05

75 13

73 20

Mean

75 24

Reversed the needle.

Face West

75 19

74 45

74 31

Mean

74 58

Face East

74 55

74 34

74 58

Mean = 74 49

74 34

75 24

74 58

74 45

Mean 74 56

165

60

225

April 10 1858

Barrow's Dip Circle

Needle No 2. A north pole.

Face East. $74^{\circ} 12'$ 1st Face East B inner. $-6^{\circ} 42' = 67^{\circ} 30'$ Face East B. 2 pins $+76^{\circ} 13' + 74^{\circ} 12' = 150^{\circ} 25'$ Face East B. 2 pins A. 1. inner $+36^{\circ} 35' + 74^{\circ} 12' = 110^{\circ} 47'$ Face East B. 2 pins A. 1. outer. $-6^{\circ} 26' + 74^{\circ} 12' = 67^{\circ} 46'$ Face West B. 2 pins A. 1. outer $-7^{\circ} 46' + 74^{\circ} 34' = 66^{\circ} 48'$ Mean $= 67^{\circ} 17'$ Face West B. 2 pins A. 1. inner $+40^{\circ} 11' + 74^{\circ} 34' = 114^{\circ} 45'$ 112 46Face W B. 2 pins $+77^{\circ} 30' + 74^{\circ} 34' = 152^{\circ} 14'$ 151 19Face W B. 1 pin inner $-6^{\circ} 57' + 74^{\circ} 34' = 67^{\circ} 37'$ 67 33Face W without pins $74^{\circ} 34'$

Station, 100 feet South of Transit Circle - 1

April 12 1858 11^h 30^m A.M. Barrow's Lip Circle No. 26
Needle No 1

Determined the true meridian by squinting at different objects on the southern horizon

21 28 Mean = 21 29 for true meridian
21 30

Face South 90 above 12 17
90 below 5 15
9 30
10 49

37. 49 Mean = 9. 27 = Declination
Zen 21 29

Face North 90 above & B 10. 26
14. 18
12. 09

8. 23 Zen 21 29
45. 16 Mean = 11 19 = Zen
Mean = 10 10 = Declination

Reversed the needle

Face North 90 above & B 8. 03

8. 08
10. 51
18. 18 Zen 21 29
35. 20 8 50
12. 30

Face South 90 above & B 14 20

10 50

11 05

7 46

43. 55

21 29

10. 59

10. 59

Mean = 9. 55

10. 30

10 21

Mean = 10 11 9

Results for Zen

Face S 12 2 } 11. 6'
" N 10 10 }
Face S 12 30 } Reversed = 75
" N 10 30 } 11. 30

Mean Result 11. 18'

For Relative Intensity

April 12 1858 2^h P.M. Barrow's Dip Circle n° 26.
Needle No 2

Face North 90 above & Below 95° 5'
95° 46'
95° 00'
Mean = 95° 17'

Face W no pins 74° 22'

Face W, B, inner, one pin - 7° 26' + 74° 22' = 66° 56'
" W B 2 pins + 77 13 + 74 22 = 151° 35'
" W B 2 pins A.I. inner + 42 24 + 74 22 = 116° 46'
" W B 2 pins A.I. outer - 7 15 + 74 22 = 67° 7'

Face E B 2 pins A.I. outer - 7° 4' + 74° 55' = 67° 51' Mean = 67° 29'
" " B 2 A.I. inner + 35 30 + 74 55 = 110 25 113 35
" " B 2 + 76 18 + 74 55 = 151 13 151 24
- 8 18 + 74 55 = 66 37 66 46
Without pins 74 55

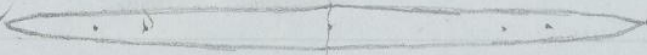
End of Needle

Face W 2 pins in B. 30° East of magnetic meridian + 78° 39'
" " " " 30° West of " " + 79° 56'

Face North " " 90° Above & B. Asimuth 94° 42'

Barron's Big Circle

Needle No 2 is 3.525 long

Shape is 

There are 2 holes for trap joints at ~~each~~ each side of the suspension

A = North Pole

B = South "

Holes on side A Dist from axis = inner 1 inch, outer 1.1/4 inch

" B " = inner 1 inch, outer 1.1/4 inch

April 16. 1858. in West Transit Room. about half past 2 o'clock P.M.
Allall obs.

Variation Transit.

For true meridian

vernier	A	180	31	00	mag merid.	A	168	58	00	Diff =	11	33	00
	B	60	30	20		B	48	57	40	" =	11	32	40
	C	300	32	00		C	288	57	30	" =	11	34	30
											11	33	23

Reverse the needle.

A 360 31 00	A 348 57 00	Diff = 11 34 00
B 240 30 00	B 228 56 10	" = 11 33 50
C 120 31 40	C 118 56 50	" = 11 34 50
		11 34 13

Mean Result $\Delta = 11^{\circ} 33' 48''$

April 17 1858 9 o'clock A.M. 40
Variation Transit 20 feet south of transit circle.

For true meridian

vernier	A	66	19	20	mag merid	A	55	36	10	Diff =	10	43	10
	B	6	18	50		B	295	35	00	" =	10	43	50
	C	186	20	10		C	175	36	10	" =	10	44	00
											10	43	40

Reversed

A	246	20	00	A	235	45	00	Diff =	10	35	00		
B	126	19	00	B	115	44	00	"	=	10	35	00	
C	6	21	30	C	355	45	30	"	=	10	36	00	
											10	35	20

Mean Result $\Delta = 10^{\circ} 35' 30''$

April 17 1858

in West Transit Room

Barrows Dip Circle Needle A.2

True South. 90° A. B. Azimuth = $80^\circ 17'$

Face W may meridian Without pins 74 14

Face W. B. 1 pin inner - 6 18 + 74 14 = 67 56

" " B. 2 pins + 77 30 + 74 14 = 151 44

" " B. 2 pins A. 1. inner + 38 18 + 74 14 = 112 32

" " B. 2 pins A. 1 outer - 8 10 + 74 14 = 66 4

Face E B. 2 pins A. 1 outer - 7 21 + 74 34 = 67 13 Mean = 66 38

" " B. 2 pins A. 1 inner + 36 10 + 74 34 = 110 44 " = 111 38

" " B. 2 pins + 76 10 + 74 34 = 150 44 " = 151 8

" " B. 1 pin inner - 6 19 + 74 34 = 68 15 " = 68 5

" " without pins 74 34

Reverse the needle.

Face E may meridian without pins 74 41

" " B. 1 pin inner - 6 20 + 74 41 = 68 21

" " B. 2 pins + 77 40 + 74 41 = 152 21

" " B. 2 pins A. 1 inner + 27 25 + 74 41 = 112 06

" " B. 2 pins A. 1 outer - 6 28 + 74 41 = 68 13

Face W. B. 2 pins A. 1 outer - 6 10 + 75 15 = 69 5 Mean = 68 39

" " B. 2 pins A. 1 inner + 37 54 + 75 15 = 113 9 " = 112 37

" " B. 2 pins + 76 28 + 75 15 = 151 43 " = 152 2

" " B. 1 pin inner - 5 54 + 75 15 = 69 21 " = 68 47

without pins 75 15

Mean of Means = Mean Result = 67 38

112 7

151 35

68 26

April 19, 1858. 9^h A.M. Barrow's Dip Circle

Needle A.1 poles reversed on April 17. B North pole

Face South 90° Above & Below Azimuth = 81 35'

mag merid Face West	74	50
	74	35
	74	23
Mean =	74	49

Face East	74	2
	74	18
	74	15
Mean	74	12

Face North 90° Above & Below Azimuth = 80 30

Face East mag merid	74	21
	74	15
	74	25
Mean =	74	20

Face West	74	35
	74	44
	74	50
	74	43

Mean Result = 74 29

April 19 A.M. Transits variation
20 feet South of Transits circle

line merid.				mag merid			diff		
	A	B	C	A	B	C			
	176	25	20	165	46	00	= 10	39	20
	86	25	10	45	46	10	= 10	39	00
	296	25	30	285	46	20	= 10	39	10
							Mean	= 10	39 10

line merid.	Reversed			mag merid			diff		
	A	B	C	A	B	C			
	356	27	00	345	45	20	= 10	41	40
	236	25	30	225	44	00	= 10	41	30
	116	26	40	105	45	10	= 10	41	20
							Mean	= 10	41 33

Mean Result = 10 40 21

April 19. P.M. 2^h 30^m

Have reversed the poles of Middle A.1 A.1 north pole

Due North 90 Above Azimuth = 80 34

Due East
 74 16
 74 3
74 20
 74 13

Due West
 74 27
 74 30
74 30
 74 20

Due South 80 30 90° Above & Below

Due West
 74 30
 74 30
74 25
 74 28

Due East
 74 21
 74 24
74 16
 74 20

Magnetic Dip

Mean Result due = 74⁰ 22["] By Barrow's Dip Circle

1858. Nov. 30 11 o'clock A.M. Variation Transit (W Wing)

True Merid	A	180°	34'	0"	M. Merid	A	168°	50'	30"	11	43	30
	B	060	33	50		B	48	49	50	11	43	00
	b	3 00	34	30		b	288	51	07	11	43	30
										11	43	20

Reversed

True Merid	A	360°	33'	40"	M. Merid	A	349	6	0	11	27	40		
	B	240	32	20		B	229	4	30	11	27	50		
	b	120	34	10		b	109	6	10	11	28	00		
												11	27	50
												11	35	35

Dec 7, 1858.

Variation Transit (Wing)

9.15 to 9.40 a.m.

True Merid A	360.	33	30	Mag. Merid A.	249	6	40	11	26	50
B	240	32	20	B.	229	5	40	11	26	40
b	120	34	0	b.	109	6	30	11	27	30
								11	27	0

Reversed.

True Merid A	180	33	20	Mag. Merid A	169	3	40	11	29	40
B	60	33	20	B	49	3	30	11	29	50
b	300	33	50	b	289	4	10	11	29	30
								11	29	40
				Mean				11	28	20

Jan 24 1859, Variation Transit (M. Wing)

3 o'clock P.M.

Asc

True Merid A 180 34 30
B 60 34 50
C 300 35 00

May Merid A 169 11 10 11 23 20
B 49 11 00 11 22 50
C 289 11 50 11 23 10
11 23 6

Reversed

True Merid A 360 35 40
B 280 35 00
C 120 35 30

May Merid A 349 13 40 11 22 0
B 239 12 30 11 22 30
C 109 14 00 11 21 30
11 22 0
11 22 33

True Merid A 360 35 20
B 240 34 40
C 120 35 20

May A 349 12 00 11 23 20
B 229 11 00 11 23 40
C 109 12 30 11 22 40
11 23 13

Reversed

A 180 35 00
B 60 34 30
C 300 34 50

A 169 12 50 11 22 10
49 12 00 11 22 30
289 13 00 11 21 50
11 22 10
11 22 28

30
30
0
3

Equatorial Intervals of the wires in the Transit Instrument.

Transit of Polaris. S. P. July 7th 1857. Observed by W.C.B.

	observed intervals	eq intervals.
13 ^h 02 ^m 24 ^s 5	4 ^m 34 ^s 1	6 ^s 96
4 44 4	2 14 2	3 ^s 40
6 58 6	0 00 0	0 00
9 12 2	2 13 6	3 ^s 39
11 33 4	4 34 8	6 ^s 97
34 53 1		
13 ^h 06 ^m 58 ^s 6		

Dec of Polaris July 7th 1857 = 88° 32' 42"

cos Dec = 8.4046937+

$$4^m 34^s 1 = 1^\circ 8' 31.5''$$

$$2^m 14^s 2 = 0^\circ 33' 33.0''$$

$$2^m 13^s 6 = 0^\circ 33' 24.0''$$

$$4^m 34^s 8 = 1^\circ 8' 42.0''$$

$$\sin 1^\circ 8' 31.5'' = 8.2995464$$

$$\cos Dec = 8.4046937$$

$$1^\circ 44' 39.3''$$

$$\sin eq interval = 6.7042401 = 6.96$$

$$\sin 0^\circ 33' 33'' = 7.9894117$$

$$\cos Dec = 8.4046937$$

$$51.1135$$

$$\sin eq interval = 6.3941054 = 3.40$$

$$\sin 0^\circ 33' 24'' = 7.9874658$$

$$\cos Dec = 8.4046937$$

$$30^\circ 885$$

$$\sin eq interval = 6.3921495 = 3.39$$

$$\sin 1^\circ 8' 42'' = 8.3006539$$

$$\cos Dec = 8.4046937$$

$$1^\circ 44' 66$$

$$\sin eq interval = 6.7053476 = 6.97$$

Equatorial Intervals of wires in Transit Instrument.

The order of the wires is taken in the direction that a star south of the zenith crosses the field of the telescope. Lamp West.

to be reversed.

Observed intervals.

Eq intervals

A to B.	2 ^m 21.19	mean of 9 observations.	= 3.587
B to C.	2 " 13.96	mean of 7 "	= 3.401
C to D.	2 " 13.46	mean of 7 "	= 3.389
D to E.	2 " 21.31	mean of 9 "	= 3.588

$$\begin{aligned}
 2^m 21.19 &= 35' 17.85'' \\
 2 " 13.96 &= 33' 29.40'' \\
 2 " 13.46 &= 33' 21.90'' \\
 2 " 21.31 &= 35' 19.65''
 \end{aligned}$$

$$\text{Dec of Polaris July 7th 1857} = +88^{\circ} 32.42''$$

$$\cosine \text{ Dec} = 8.4046937+$$

$$\begin{aligned}
 \sin 35' 17.85'' &= 8.0114624 \\
 \cos \text{ Dec} &= 8.4046937
 \end{aligned}$$

53.77.

$$\sin \text{ eq. interval} = 6.4161561 \quad \text{in time} = 3.587$$

$$\begin{aligned}
 \sin 33' 29.4'' &= 7.9886344 \\
 \cos \text{ Dec} &= 8.4046937
 \end{aligned}$$

51.02.

$$\sin \text{ eq. interval} = 6.3933281 \quad \text{in time} = 3.401$$

$$\begin{aligned}
 \sin 33' 21.9'' &= 7.9870105 \\
 \cos \text{ Dec} &= 8.4046937
 \end{aligned}$$

50.83.

$$\sin \text{ eq. interval} = 6.3917042 \quad \text{in time} = 3.389$$

$$\begin{aligned}
 \sin 35' 19.65'' &= 8.0118313 \\
 \cos \text{ Dec} &= 8.4046937
 \end{aligned}$$

53.82

$$\sin \text{ eq interval} = 6.4165250 \quad \text{in time} = 3.588$$

Oct. 10th 1857.

Asaph Hall.

To find the zenith distance and altitude of α Lyrae when on the prime vertical.

$$\text{Dec} + 38^{\circ} 39' 20''$$

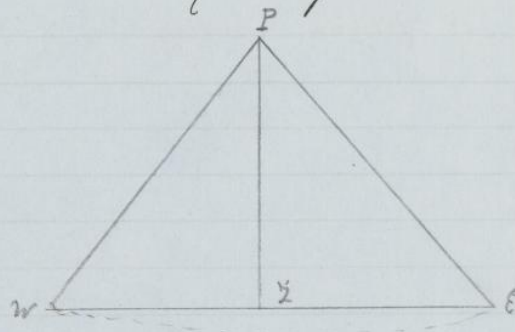
$$\text{assumed Latitude } 42^{\circ} 23'$$

$$\cos 2\epsilon = \frac{\cos PE}{\cos PZ}$$

$$\cos 2PE = \tan PZ \cdot \cotan PE$$

$$\cos \text{zen. dis.} = \frac{\sin \delta}{\sin L}$$

$$\cos \text{hour angle} = \cotan L \cdot \tan \delta$$



$$\sin \delta = 9.7946278 +$$

$$\sin L = 9.8287163 +$$

$$\cos \text{zen. dis.} = 9.9659115$$

$$\text{zen dis} = 22^{\circ} 24' 20''$$

$$\text{refraction} = -24''$$

$$22^{\circ} 23' 56''$$

$$\cotan L = 10.0347233$$

$$\tan \delta = 9.9030234$$

$$\cos \text{hour angle} = 9.9427472$$

$$\text{hour angle} = 28^{\circ} 46' 41'' = 1^{\text{h}} 55^{\text{m}} 06.733^{\text{s}}$$

Zenith distance and altitude of β Persei when on the prime vertical.

$$\text{Dec} = +40^{\circ} 21' 26''$$

$$\cos \text{zen dis} = \frac{\sin \delta}{\sin L}$$

$$\cos h = \cotan L \cdot \tan \delta$$

$$\sin \delta = 9.8112741$$

$$\sin L = 9.8287163$$

$$\cos \text{zen. dis.} = 9.9825578$$

$$\text{zen dis} = 16^{\circ} 07' 48''$$

$$\text{refraction} -17''$$

$$16^{\circ} 07' 31''$$

β Persei

$$\text{AR } 2 \ 58 \ 56$$

$$1 \ 25 \ 31$$

$$\text{East} = 1 \ 33 \ 25$$

$$\text{West} = 4 \ 24 \ 27$$

$$\cotan L = 10.0347233$$

$$\tan \delta = 9.9293066$$

$$\cos h = 9.9690299 \quad h = 21^{\circ} 22' 53'' = 1^{\text{h}} 25^{\text{m}} 31.667^{\text{s}}$$

1857.

Nov 24th

Zenith distance and altitude of Aldebaran when on the prime vertical.

$$\cos \text{zen dis} = \frac{\sin \phi}{\sin L}$$

$$\cosh = \cotan L \cdot \tan \phi.$$

$$\phi = +16^{\circ} . 13' . 23''$$

$$L = +42^{\circ} . 23'$$

$$\sin \phi = 9.44618$$

$$\cotan L = 10.03972$$

$$\sin L = 9.82872$$

$$\tan \phi = 9.46384$$

$$\cos \text{zen dis} = 9.61746$$

$$\cosh = 9.50356$$

$$Z \text{ dis} = 65^{\circ} . 30' . 00''$$

$$h = 71^{\circ} . 24' . 20'' = 4^{\text{h}} . 45^{\text{m}} . 37^{\text{s}}$$

$$\text{refrac} = \frac{-2 . 05}{65^{\circ} . 27' . 55''}$$

$$\text{AR of } \alpha \text{ Tauri } 4^{\text{h}} . 27^{\text{m}}$$

$$4 . 46$$

$$\text{E. } 28 . 41 = \text{Sidereal time of transit over prime vertical}$$

$$\text{W. } 9 . 12$$

$$\text{AR of } \alpha \text{ Lyrae } 18^{\text{h}} . 32^{\text{m}}$$

$$1 . 55$$

$$\text{E. } 16 . 37$$

$$\text{W. } 20 . 27$$

Antares
Dec = +19° 55.2'

$$\begin{aligned}\tan \delta &= 9.55918 \\ \cot \delta &= 0.03972 \\ \cos h &= 9.59890\end{aligned}$$

$$\begin{array}{r} h = 66^{\circ} 36' \\ \quad 4'' \quad 24'' \quad 9'' \\ \hline 14 \quad 9 \\ 18 \quad 33 \\ 9 \quad 45\end{array}$$

$$\begin{aligned}\sin \delta &= 9.53238 \\ \sin \delta &= 9.82872 \\ \cos \delta &= 9.70366\end{aligned}$$

$$\begin{aligned}Z &= 59^{\circ} 38' \\ &\quad 90 \quad 60 \\ \text{alt} &= 30 \quad 22\end{aligned}$$

1858 Oct 2.

Several readings for Prime Vertical

A. G. obs.

Ill South

before obs.

Ex. ther 57.9

S.	N.
106.2	X 106.2
104.4	X 106.2
105.0	X 105.5
X 103.2	106.3
X 103.8	106.2
X 103.0	106.3
6.1	.7
104.35	106.12
	104.35
	<u>1.77</u>

Ill North

before obs.

Ex. ther 50.2

South	North
X 101.0	111.5
X 100.0	113.0
X 101.0	111.5
100.5	X 112.5
100.0	X 113.0
<u>101.0</u>	X 112.5
3.5	4.0
100.58	112.33
	100.58
	<u>11.75</u>

Ill North

X Synae obs. on East Prime Ver.

after obs.

Ex. ther 57.6

S.	N.
X 97.0	111.0
X 96.0	111.5
X 97.5	109.3
96.5	X 110.0
97.0	X 110.0
<u>97.1</u>	X 109.0
.1	0.8
96.85	110.13
	96.85
	<u>13.28</u>
	1.77
	11.75
	<u>2.92</u>
	29.72

3.715 North end high

Ill South

X Synae obs. on W Prime Ver. 2 wires

after obs.

Ex. ther 48.8

South	North
101.5	X 117.0
101.5	X 118.0
104.0	X 116.2
X 116.0	104.5
X 115.0	105.8
X 113.5	107.5
1.5	69.0
108.58	111.50
	108.58
	<u>2.92</u>

Oct 2. 1858 A. H. obs. Prime Vertical α Lyrae

East Vertical

West Vertical

Wires Ill. South

Ill. South

I $\epsilon\delta$ = 16 31 50.7
II 16 32 49.5

I 20 25 46.4
II $\epsilon\delta$ = 20 24 47.7

Ill North
II $\epsilon\delta$ = 16 34 41.5
I 16 35 41.6

Ill North
II lost.
I lost.

Corr. of $\epsilon\delta$ for W-E = $+0.13$

Oct 4. 1858

Level Readings for Prime Vertical

All obs
Ill South

before obs. Ex ther. 73.6

S	
87.5	X 84.4
87.2	X 84.9
85.5	X 84.8
X 83.8	86.5
X 82.0	87.8
X 83.3	85.6

clouded up suddenly.

Oct 5 1858

All obs

Ill South

before obs. Ex ther 64.3

S	N	
X 95.0	100.2	
X 96.8	99.0	
X 95.1	99.0	16.75
95.8	X 97.5	2.75
95.3	X 97.2	14.00
<u>95.2</u>	<u>X 96.8</u>	<u>4.37</u>
3.2	589.7	
95.53	98.28	8) 37.87
	<u>95.53</u>	4.734 X high
	2.75	

Ill North & Lysae

after obs. Ex ther 63.9

S	N
88.5	X 102.5
88.1	X 103.0
88.0	X 102.5
X 88.2	102.4
X 88.5	101.5
<u>X 88.1</u>	<u>101.5</u>
.4	13.4
88.23	102.23
	<u>88.23</u>
	14.00

Ill North

S	N
91.0	X 108.0
90.5	X 109.0
X 91.5	X 108.0
<u>X 92.0</u>	<u>107.0</u>
5.0	108.00
91.25	<u>91.25</u>
	16.75

much troubled by
mist in the
even was too short for getting a
full set of level readings

Ill South & Lysae

S after obs. Ex ther 54.0

S	N
X 100.0	103.0
X 101.5	101.5
X 99.5	103.5
98.0	X 105.5
100.0	104.2
<u>98.0</u>	<u>105.5</u>
597.0	23.2
99.50	103.87
	<u>99.50</u>
	4.37

Oct 5. 1858 A.H. obs. Prime Vertical & Lyrae

East Vertical

Ill. South

I $\epsilon\epsilon = 16^h 31^m 48.2$
II $16 \quad 32 \quad 46.3$

West Vertical

Ill. South

I $20^h 25^m 41.2$
II $20 \quad 24 \quad 42.8$

18 29 23.70

18 32 9.32

$dt = 2 \quad 45.62$

Ill. North

II $\epsilon\epsilon = 16 \quad 34 \quad 38.6$
I $16 \quad 35 \quad 38.4$

Ill. North

II $20 \quad 22 \quad 53.9$
I $20 \quad 21 \quad 53.8$

Dec of α Lyrae $= +38^\circ 39' 25''.83$

corr. of $\epsilon\epsilon$ for W-E $= +0.15$

Wire I

$2T = 3 \quad 53 \quad 53.15$
 $2T' = 3 \quad 46 \quad 15.55$
 $7 \quad 40 \quad 8.70$
 $7 \quad 37.60$
 $\frac{1}{2}(T+T') = 1 \quad 55 \quad 2.175$
 $\frac{1}{2}(T-T') = 0 \quad 1 \quad 54.400$

$\frac{1}{2}(T+T') = 28^\circ 45' 32''.63$
 $\frac{1}{2}(T-T') = 0 \quad 28' 36.00$

$\log \cos \frac{1}{2}(T+T') = 9.9428265$
 $\log \cos \frac{1}{2}(T-T') = 9.9999850$
 $\log \cot \delta = 0.0969509$
 $\log \cot \phi' = 0.0397624$
 $\phi' = 42 \quad 22 \quad 50.74$
 51.48

$\phi' = 42 \quad 22 \quad 51.11$
level corr. $= +5.30$
azim. corr. $= -7.46$
 $\phi = 42^\circ 22' 48''.95$

Wire II.

$2T = 3 \quad 51 \quad 56.65$
 $2T' = 3 \quad 48 \quad 15.45$
 $7 \quad 40 \quad 12.10$
 $3 \quad 41.20$
 $1 \quad 55 \quad 3.025$
 $0 \quad 0 \quad 55.300$

$28 \quad 45 \quad 45.37$
 $0 \quad 13 \quad 49.50$

9.9428119
 9.9999965
 0.0969509
 0.0397593

$\cot \phi' = 0.0397608$
 $\cos dt = 9.9999685$
 0.0397293

51.11
 58.57
 -7.46

Oct 6. 1858

Level Readings for Prima Vertice

Ill South
before obs & the 59.6

S	N	
X 104.8	106.8	
X 104.8	106.5	
X 105.5	106.0	
103.0	X 107.5	13.17
103.2	X 107.0	2.37
104.4	X 106.5	12.75
5.7	9.8	2.55
104.28	106.65	8) 30.84
	104.28	3.855
	2.37	65.11

Ill North & the 59.5

S	N	
96.0	X 100.5	3.85
95.2	X 110.5	39
96.5	X 108.6	19
X 94.8	109.8	2
X 96.0	107.3	4.45
X 94.2	108.5	
2.7	55.2	
96.45	109.20	
	96.45	
	12.75	

Ill North
before obs & the 50.2

S	N	
96.2	X 115.0	
97.0	X 114.0	
95.8	X 116.0	
X 102.0	109.5	
X 101.3	110.0	
X 102.2	109.0	
594.5	73.5	
99.08	112.25	
	99.08	
	13.17	

Ill South after obs & the 48.5

S	N	
X 109.2	105.0	
X 100.2	106.5	
X 111.0	107.0	
105.0	X 114.0	
105.5	X 116.0	
107.3	X 113.0	
48.2	63.5	
108.03	110.58	
	108.03	
	2.55	

Oct 6. 1858

A.H. obs.

Prime Vertical & Lyrae

East Vertical

Ill South

I $\epsilon c = 16 \quad 31 \quad 48.5$
 II $16 \quad 32 \quad 47.3$

West Vertical

Ill South

I $20 \quad 25 \quad 41.1$
 II $20 \quad 24 \quad 43.2$

18 29 23.97

18 32 9.30

 $d\tau = 2 \quad 45.33$

Ill. North

II $\epsilon c = 16 \quad 34 \quad 36.4$
 I $16 \quad 35 \quad 35.9$

Ill North

II $20 \quad 22 \quad 52.9$
 I $20 \quad 21 \quad 53.1$

Dec of α Lyrae = $+38^\circ 39' 25''.82$ corr of ϵc for $W-\epsilon = +0.11$

W.I

22 = 3 53 52.71

22' = 3 46 17.31

7 40 10.02

0 7 35.40

 $\frac{1}{2}(2+2') = 1 \quad 55 \quad 2.405$ $\frac{1}{2}(2-2') = 0 \quad 1 \quad 53.85$ $\frac{1}{2}(2+2') = 28^\circ \quad 45' \quad 36''.07$ $\frac{1}{2}(2-2') = 0 \quad 28 \quad 27.75$ $\log \cos \frac{1}{2}(2+2') = 9.9428228$ $\log \cos \frac{1}{2}(2-2') = 9.9999851$ $\log \cot \delta = 0.0969510$ $\log \cot \phi' = 0.0397587$ $\phi' = 42 \quad 22 \quad 51.61$

52.00

 $\phi' = 42 \quad 22 \quad 51.80$

Decl = + 4.45

azim = - 7.44

 $\phi = 42 \quad 22 \quad 48.81$

W.II

22 = 3 51 56.01

22' = 3 48 16.67

7 40 12.62

0 3 39.40

1 55 3.155

0 0 54.85

 $28^\circ \quad 45' \quad 47''.33$

0 13 42.75

9.9428096

9.9999965

0.0969510

0.0397587

 $\cot \phi' = 0.0397579$

corr 9.9999686

0.0397265

51.80

59.24

- 7.44

Oct 8 1858

Level Readings for Prime Vertical

Ill South

before obs ex then 30.8

S	N	
X 110.0	109.0	
X 111.3	112.5	
X 111.2	112.5	
110.0	X 108.3	
109.3	X 108.5	11.81
110.4	X 111.8	0.06
62.2	62.6	11.63
110.87	110.43	2.95
	<u>110.37</u>	8) 26.45
	0.06	3.31
		<u>93.21</u>

Ill North

after obs ex 30.6

S	N	
104.8	X 117.0	
105.0	X 115.0	
105.0	X 115.0	
X 104.1	104.8	
X 102.4	116.2	
X 102.5	115.6	
23.8	3.6	
103.97	115.60	
	<u>103.97</u>	
	11.63	

Ill North

before obs ex then 43.0

S	N	
104.5	X 118.0	
104.5	X 118.0	
105.0	X 117.0	
X 106.0	116.2	
X 105.4	116.0	
X 105.3	116.4	
.7	1.6	
105.12	116.93	
	<u>105.12</u>	
	11.81	

Ill South

after obs ex then 41.5

S	N	
X 112.5	112.2	
X 113.0	114.5	
X 116.2	116.0	
113.0	X 119.0	
114.0	X 119.2	
113.0	X 120.5	
3.7	701.4	
113.95	116.90	
	<u>113.95</u>	
	2.95	

Oct 8. 1858 A.H. obs. Prime Vertical. & Lyrae

East Vertical

I $EC = 16$ 31 48.3
II 16 32 46.4

II $EC = 16$ 34 36.1
I 16 35 35.6

Dec of α Lyrae = +38 39 25.80

W.I.

27 = 3 53 50.93
27' = 3 46 16.83
7 40 7.76
0 7 34.10

$\frac{1}{2}(2+2') = 1$ 55 1.94
 $\frac{1}{2}(2-2') = 0$ 1 53.525

28° 45' 29.10
0 28 22.87

$\log \cos \frac{1}{2}(2+2') = 9.9428307$
" $\cos \frac{1}{2}(2-2') = 9.9999852$
" $\cotg \delta' = 0.0969510$
" $\cotg \theta' = 0.0397669$
 $\theta' = 42$ 22 49.68

$\theta' = 42$ 22 49.87
Decl = +4.10
azim = -7.44
 $\theta = 42$ 22 48.53

West Vertical

I 20 25 39.2
II 20 24 40.9

II 20 22 52.3
I 20 21 52.4

corr. of $Eb.$ for $W-E = +0.03$

W.II.

3 51 54.53
3 48 16.23
7 40 10.76
0 3 38.30

1 55 2.69
0 0 54.575

28 45 40.35
0 13 38.62

9.9428176
9.9999966
0.0969510
0.0397652

$\cotg \theta' = 0.0397661$ 49.87
 $\theta' = 42$ 22 49.87
0.0397346 7.44

Oct 9 1858. A.H. obs. Prime Vertical & Lyrae

Ill South before obs	
S	N other 528
x 108.0	112.5
x 108.6	112.0
x 109.7	110.5
110.0	x 109.5
109.3	x 109.8
109.2	x 109.5
54.8	683.8
109.13	110.63
	<u>109.13</u>
	1.50

East Vertical			
I	EC = 16	31	47.2
II	16	32	45.7

II	EC = 16	34	35.0
I	16	35	35.7

Ill North & Lyrae obs. after obs	
S	N other 51.7
103.0	x 114.5
103.0	x 114.8
104.0	x 113.5
x 102.0	116.0
x 102.5	115.0
x 103.0	114.5
17.5	8.3
102.92	114.72
	<u>102.92</u>
	11.80

These readings were taken about any hour and a half after the observation.

Oct 9, 1858

Prime Vertical & by the All

Ill North
 before obs
 D E & thes

105.0	x 116.0
106.0	x 115.0
105.0	x 115.2
x 104.5	116.0
x 103.2	117.0
x 105.0	115.5
28.7	4.7
104.78	115.78
	104.78
	11.00

West Vertical
 I list by pen faulting to
 II no word

II	20	22	50.6
I	20	21	52.1

corr. of 86 for W - E = 0.12

