KG
11366
v.748

Montreal — Cambridge
Longitude Observations.

1883phae.proj.175ZR

Ka

Observations with the Russian Transit in the Longitude Campaign between Cambridge and Montreal

May 31, 1883

x Drac. B. Obs.
12 28 28
+70 26
Circle E
331 58
A. B C Dh.
Middle w. 1st tally doubtful
Lost last w. 4th tally.

$12^h 35^m$
Level B. Obs.

E	W
19.4	11.3
16.2	14.6
156	59
~~+2.80~~	12.95
17.80	~~+5~~
485	~~+.08~~

$- 2.42 \overset{s}{\times} .13 = -\overset{s}{0}.31$

43 H. Ceph. L.C. R. Obs.
0 53 13
+94 22

308 01

A 2 3 4 5

ε Virginis R. Obs
12 56 23
+11 35

30 48

A B C D E

May 31, 1883

$12^h 40^m$

Level R. Obs.

E	W
16.3	14.2
18.7	12.0
150	62
17.50	13.10

440

−2.20 = −0.~~6~~29

Circle E

δ Virginis R,

12 49 45

+4 2

+38 21

B. C. D.

$1^h 0^m$ Level

E	W
19.0	16.7
17.9	12.8
169	95
18.45	14.75

370

−1.85 × .13 = −0.24

Reversed

$1^h 0^m$

Circle W.

May 31, 1883

circle ~~E~~ West

43 Comae

13 6 27

+28 28

346 5

B. C. D -

$13^h 10^m$ Level

E	W
18.5	12.1
17.3	13.3
158	54
17.90	12.70
5 20	

$-2.60 \times .13 = -0\overset{s}{.}34$

$1^h 25^m$ Level

E	W
16.2	14.9
18.6	12.1
148	70
17.40	13.50
390	

$-1.95 \times .13 = -0\overset{s}{.}25$

17 H. Can. Ven.

17 29 37

+37 47

355 24

A B C D E

May 31, 1883

α Virginis	Gr 2001
13 19 5	13 19 14
−10 33	+73 00
307 4	30 37
A B C D E	B. C. D

b = −.25
−.34
−.24
−.29
−.31
143
~~.286~~
~~b = .29~~ b = −.29^{5}

~~Level~~

~~E~~	~~W~~
~~14.8~~	~~16.0~~
~~16.5~~	~~14.3~~
~~113~~	~~103~~
~~15.65~~	~~15.15~~

~~.50~~

~~−.25 × .13 = −0.03~~

June 1, 1883
Circle E.
Level B. Obs.

$0^h 20^m$ E	W
16.4	14.0
14.1	16.5
10 5	10 5
15.25	15.25

b = 0.00

K Dracon.
12 28 28
+70 26

331 58
B C D
B Obs.

ε Virginis
12 56 23
+11 35

30 48

A B C D E

Level Circ E

E	W
14.8	16.0
16.5	14.3
11 3	10,3
15.65	15.15
50	

−.25 × 13 = −0.03

δ Virginis
12 49 45
+4 2
38 21

ABCDE

1^h pm
Reversed

circle W

43 H. Cephei L.C.
0 53 13
+94 22

308 1

AD C 2 3 4 5

circle W
43 Comae
13 6 27
+28 28

346 5

ABCDE

June 1, 1883

α Virginis	Gr. 2001
13 19 5	13 19 14
-10 33	+73 00
307 4	30 37
CDE	BCD

E	W
16.9	14.5

$1^h 28^m$ Level

E	W
14.8	16.5
17.5	13.7
123	102
16,15	1570
1,05	
−.52	

17 H. Can. Ven.
17 29 37
+37 47

355 24

~~A~~ B C D [illegible]

l = +.00
−.03
−.07

h	6
12.3	+.00⁵
12.5	−.01
12.7	−.02
13.0	−.03
13.3	−.05
13.5	−.07

June 2. 1883

Circle W.

12h 43m Level

E	W
14.6	16.7
17.1	14.1
117	8
15.85	15.40
45	

+.25 ×.13 = +0.0b

+.03

+.22 b = -.03

Circ. W.

ε Urs. Maj.

12 48 53

+56 35

14 12

ABCDE

43 Comae

13 6 25

+28 28

3 46 5

6

13h 11m

E	W
164	15.6
14.3	17.3
15.35	16.45
	+1.10
	+.55 +.06

ε Virginis
12 56 21
+11 35

329 12

A B C D E

44 H Cephei
13 2 12
+100 57

−38 47

B, C, D.

γ Hydrae
13 12 34
−22 34
295 3

A B C, D, E.

13^h 15^m 44
ε
1~~3~~4 2 177
16 4 154
10 6 131
15 ~~20~~ 30 165 5
~~75~~
~~+.67~~ 1.25 +.62

Jan 2

13h 39m

E	W
14.8	17.5
16.8	15.5
11.0	30
15.80	16.50
	~~+.70~~
	+.35
	6-05

13 35

E	W
16.3	15.8
14.9	15.2
11.2	33.0
15.60	16.50
	.90
	+.45

Circle W.

η Bootis
13 49 7
+18 59

336 34

~~C.D~~
~~A~~ B C D E

Reversed - η Bootis
13 49 7
+18 59

η Urs. Maj.
13 42 06
+49 54

−7 31

(A(?)) B C D (E(?))

$13^h 46^m$ Level
E W
16.4 15.8
14.6 17.7
10 13.5
15.50 16.75
1.25
+0.62 ×.13 = +0.08^s

Circle W and E
50 Cass. L.C.
13 53 23
+10 8 9

−65 46

E D Reversed B A

13 55
E W
16.7 15.8
14.5 17.8
11.2 13.6
15.60 16.80
1.20
+0.60 ×.13 = +0.08^s

June 2. 1883

α Dracon.
14 1 13
+64 56

337 27

B C D

14h 5m Level

E	W
15.0	17.7
16.3	16.1
113	138
15.65	16.90
	125

$+\ 0.62 \times .13 = +\overset{s}{0}.08$

l Boötis
14 11 56
+46 37

355 46

A B C D E

ι Cass L.C.
14 19 21
+113 8

289 15

A B C D E
Lost 1st of middle grou
Clf. on part.

K Virginis
14 6 39
-9 44

52 7

4 Urs. Min.
14 9 19
+78 6

324 17

~~A, B, C, D, E~~

C First w. doubtful.

14h 32m E	W
17.2	15.4
15.3	17.2
5	6
16.25	16.30
	+.05 ×1
	+0.02 ×13 = .00

14h 34m E	W
15.3	17.4
17.1	15.9
124	133
16.20	16.65
	.45
	+.22 ×13 = +0.0½

June 2, 1883

109 Virginis
14 40 20
+2 23

40 00

A.B C D E

α^2 Libræ
14 44 24
−15 33

57 56

A B C D E

15h 0m

E	W
178	154
15.9	17.2
16.85	16.30
	−55
	−.27

48 H. Cephei L.C.
15 5 23
+102 42

299 41

B.C.D.

June 2, 1883

Gr. 2164
14 48 28
+59 46

342 37

A B C D

β Ursae Min
14 51 3
+74 38

C

short strokes
for R. long for B
with M.C.

Exchange of
Signals

June 2

β Herculis
16 25 11
+21 45
+20 38

A B C D E.

A Draconis
16 28 13
+69 1
~~+16 3~~ 333 2
B C D
2345

η Herculis
16 38 53
+39 9

A B C D E.

Σ 1640 U

166
18.3
14.9
17.45
~~75~~
~~.87~~ -37

17.6
15.8
13.4
16.0

ζ Oph.
16 30 43
−10 20
C +52 43
2345

Gr 2848
16 33 7
104 16
C 29807

Gr. 2377
16 4 35
B_{2345} C. D.

$16^h 51^m$

18.8 11.3
17.2 16.9
16.0 12.2
18.0 16.10
18.00 ~~18.05~~
16.10
15.0
−.95

9 Aug 1883

E W

16 55

186 156
17.2 16.8
15.8 12.4
17.90 16.20
1.70
-.85

Reversed.

2 Mean Mi

16 55 0

+82 14
-35 51

0

17 18

E W

178 163
16.0 186
13.5
17.40 16.75
.66
-.22 45 349.
17.25 17.45
20
+10

17 22

E W

16.6 186
18.1 15.8
14.0 14.4
17.35 17.20
.15
-.09

19 U Canne
1 7 3 18
100 54
−58 31

B C D.

x Herculis
17 9 18
+12 31

A B C D E

B D Lucy
17 27.4
+5 2 23

17	25	17	26
Σ	U	Σ	U
18.6	15.8	15.8	18.1
16.1	18.0	18.2	16.0
14.1	13.8	1.40	1.41
17.35	16.90	17.00	17.05
− 45			+.05
− ~~.68~~			+.2
.22			

B C D.

June 2

L Oph.

17 29 30

+12 39

B.C.D.

Levels checked

Levels.

h m

13 ~~12~~ 43 ~~+.08~~ −.22 div b −.03

13 11 +.55 +06

CW 13 15 +.62 +05

13 35 +.45 +05

13 46 +.62 +.46 = ~~+.06~~ b = ~~+.0~~ +.06 +08

Red. Trim Curve

139 13 55 +.60 +0 ~~+.07~~ h 13.5 +.68 b = +.08 +08

CE 14.1 14 05 +.62 +.10 14.0 +.56 +.07 +08

14.5 14 32 ~~+.02~~ +.22 −.31 14.5 +.26 +.03 +00

14 34 15.0 −.15 −.02 +01

15.0 15 00 −.27 −.48 15.5 −.38 −.05 −.03

16.0 −.52 −.07

16.5 −.64 −.08

17.0 −.78 −.10

16.7 16 44 −.37 −.05

16.8 16 51 −.95 −.12

16.9 16 55 −.85 −.14 −.11

15 25

CW 17 18 +.10 +01

17 22 −.07 −01

17 25 −.22 −03

17 26 +.02 −.04 b = −.01 +00

June 24 1883 C. E.

h m
12 35

E	W
13.0	15.9
15.2	13.7
82	96
	14.80
14.10	
	.70
	+.35

12 41

E	W
15.2	13.6
13.2	15.7
28.4	29.3
14.20	14.65
	.45
	+.23

E Mean Merid
12 48 13
+56 35

B. C. D.

12 55

E	W
13.2	15.7
15.6	13.4
88	91
14.40	14.55
	+.15
	+.08

June 14/83

ε Virginis
12 56 21
+11 35
A B C D E.

13 4
Σ h
15.7 13.4
13.3 15.8
90 92
14.50 14.60
+.10
+.05

43 Comae
13 6 25
+28 28

A B C D E.

13 10
Σ h
13.2 15.8
15.1 13.8
83 96
14.15 14.80
.85
+.32

ι Hydrae

13 12 34
— 22 34
A B C D E

13 15

Σ	Ul
15.6	13.4
13.3	14.8
89	82
14.45	14.10
	— .35
	— .47

ε Virginis

13 19 2
— 10 33

13 21

Σ	Ub
13.4	15.6
15.8	13.3
92	89
14.60	14.45
	— .15
	— .08

Ulm 4

Br 2001

13 53 9
+73 0

B. C. D.
345

20 Coma Ber.
13 29 11
107 33

BCD

n Ursa Maj
13 42 56
~~##~~
+49 52

A B C D E.

n Bootis
13 49 7
+18 59

13 32

E	W
15.8	13.3
13.2	15.7
90	91
14.50	14.55
	+.05
	+.03

13 36

E	W
13.4	15.7
15.9	13.3
93	90
14.65	14.50
	-.15
	-.08

13 51

E	W
15.9	13.3
13.3	15.7
92	90
14.60	14.50
	-.05

50 Cors Lb.

13 53 23

10 8 09

June 4

C.E.

α Dracon.
14 1 13
+64 56

337 27

A B
~~B~~ Reversed
~~C~~ D E

13 58
E W

139 153
159 132
98 85

14.90 14.25
65
−33

k Virginis

14 6 39
− 9 414

4 Ursae Min
14 9 19
+ 78 6

6

C W
ι Draconis
D.E.

14^h	15
E	W
14.0	15.2
~~16.3~~	~~15.8~~
15.8	13.3
9.8	85
14.90	14.25
	.65
	−.32

λ Bootis
14 11 56
+46 37
B.C.D.

14	14
E	W
13.3	15.8
15.9	13.4
9.2	9.2
14.60	14.60
	±.00

June 4

i Coro.
14 19 21
113 08

ABCDE.

14 23

Σ	M
158	134
135	158
93	92
14.65	14.66
	-.02

109 Virg.
14 40 20
+2 23

AbCDE.

α_2 Librae
14 44 24
-15 33

BCD

14 28

Σ	U
13.3	15.9
15.8	13.4
9.1	9.3
14.55	14.65
	+10
	+.05

14 3 6

Σ	U
15.9	13.5
13.6	15.7
9.5	9.2
14.75	14.60
	−.08

Cu 2164
14 48 28
+59 46

B.C.D

B [illegible] Mi
14 51 3
+74 32

β Bootis
14 57 32
+40 51

$14^h\ 56^m$

E	W
13.0	16.4
15.8	18.7
8.8	0.1
14.40	15.05
	6.5
	+32

δ Scorpii
15 53 25
-22 17
ABCD

$15^h\ 56^m$

E	W
~~13.9~~	16.9
12.9	18.9
15.8	0.8
8.0	15.40
14.35	10.5
	+5.2

θ Draconis
15 59 42
+18 53
ABCDE

15 43

E	W
15.8	13.9
14.1	15.6
9.8	9.5
14.95	14.75
	20
	·10

3 Ursae Mi
15 48 16
+78 9

B. C. D

16h 10m

E	W
15.2	14.5
13.4	16.3
8.6	10.8
14.30	15.40
	1.10
	+.55

C W

19 h Ur Mi
16 14 10
+76 10

C
Reversed
D E
C E

June 4

γ Herculis

B.D. 16 16 45
+19 26

γ Ursae Min
16 20 5 6
+76 2
A B 12345
345
Reversed

λ Herculis
16 35 5 5
+39 9

ABCDE.

16 48

E	W
140	158
158	140
98	96
14.90	14.50

η Ursae Mi
C E
D. E.

16	33
E	W
15.8	15.0
13.9	15.9
9.7	9
14.85	15.45
	.60
	+30

Kopu.
16 52 8
+9 33

AB C D. E.

19 H Camel
10 3 18
100 17

June 4 1883

α Herculis
17 9 15
+14.31

A B C D E.

17	12
E	N
16.2	13.6
14.2	15.8
104	94
15.22	14.70
	50
	— 20

17	15
E	W
14.1	15.7
16.2	13.7
30.3	29.4
15.15	14.70
	.45
	-.23

June 5 / 1883 C.E.

12 40

E	W
14.4	12.7
13.3	13.6
DD	63
13.85	13.15
	70
	-.35

12 44

E	W
13.3	13.7
14.4	12.7
DD	64
13.85	13.20
	-65
	-.33

13 0

E	W
12.9	14.0
14.8	12.3
DD	63
13.85	13.15
	70
	-.35

C.E.

E Vir gins

12 56 21

+11 35

ε Ursae Maj

1 12 48 53
+56 35

A B C D E

1253

Σ	U
142	128
134	136
76	64
1380	1320
	.60
	-.30

C Σ

43 Comae

13 6 25
+28 28

A B C D E

Σ	U
147	124
129	140
76	64
1380	1320
	60
	-.30

Eunes Cr.

ζ Hydrae
13 12 34
−2 2 34

A.B.C.Dr.

13 18
Σ u
13.0 14.1
15.3 12.8
83 69
14.65 13.45
.20
−.35

40 Com.
13 29 11
+107 33

13 35
m
14.9 12.2
13.3 13.9
82 61
14.10 13.05
105
−.52

α Virginis
1 3 12 $\overset{2}{10}$ 23
A B C D E.

η 2001
1323 ?
+D 30
B C D.

1337

E	W
13.4	*13.4
15.0	12.3
8.4	.60
14.20	13.00
	-.60

1340

E	W
15.1	12.3
13.2	13.4
8.3	.60
14.15	13.00
	1.15
	-.57

η Ursae Maj
13 47 56
+49 54
A B C D E

Σ	η
134	139
145	126
1410	1325
	85
	-.42

11 Bootis
13 57 52
+47 57

α Draco
14 1 23
+64 56

η Bootis
13 48 7
+18 59
~~(A)~~ B C D (E)

50 Coma
13 53 23
108 9
@

14 4
Σ W
15.2 12.2
14.1 13.4
93 56
14.65 12.80
185
-.92

14 .6
Σ W
13.9 13.3
15.2 12.2
14.55 12.75
180
-.90

Jan 5

C E
4 Ursae Mi
1 4 9 19
+2 + 6
B C
Reversed

C W
4 Ursae Mi
D 34 E

36 N Camel
14 26 5 6
10 7 42
A B C D E.

14 3²

E	W
143	134
128	15.1
[illegible]	8.5
18.55	14.25
	+2.0
	+3.5

14 17

E W
13.2 14.5
14.9 12.9
81 74
14.05 13.70
.35
-.17

i Cas.
14 19 21
11 3 8
(A) B C D E

14 37

E W
12.8 15.0
14.2 13.8
70 88
13.52 14.40
90
+.45

h 21 64
14 48 28
+59 46
A B C D E

Claves

β Ursae Mi

14 51 3

+74 38

C

14 53

Σ	W
14.3	13.8
12.9	15.1
72	89
13.60	14.45
	85
	+43

ζ Ursae Mi

B C D
2345

15 4+16

78 9

β Scorpii

15 58 25

−22 17

ABCDE

15 h 15 m

E	W
13,0	152
148	134
1390	1430
	+40

15 25

E	W
149	136
128	152
77	88
13,85	14,40
	55
	+28

β Scorpii
15 58 38
−19 29

~~A~~ B C D ~~E~~

θ Draconis
16 5 5
+45 15
b

15 59 42
+58 53

June 5 1883

φ Herculis
16 + 5
+45 15

16 10

Σ M
12 8 16.0
14 8 14.0
7 6 10.0
18.80 15.00
1.21
+.60

γ Herculis
16 16 45
+19 26
A B C D E

η Ursae Min
16 20 56
+76 2
C

16 14

Σ	U
149	14.0
12.9	15.9
7.8	9.9
13.90	14.95
	105
	+.52

19 Ursæ Min

16 14,10

+76 10

☿

B ©

η Draconis

16 22

+61 41

c D (s)

β Herculis

16 25 6 —

+21 45

B, C, D ?

June 5 1883

16 30

ξ ω

128 160
147 142
−75 −02
13.75 15.10
135
+67

Coefficients A B and C for Montreal.

	ε Ursae Maj	ε Virg.	θ Virginis.	43 Comae	γ Hydrae.	α Virginis
α	12h 48m	12h 56	13 3	13 6	13 12	13 19
δ	+56 35	+11 35	−4 55	+28 28	−22 34	−10 33
z	−11 5	+33 55	+50 25	+17 02	+68 04	+56 03
May 30	48m 54.91s	56m 23.68s	3m 56.28s	6m 27.19s	12m 36.77s	18m 4.69
June 4	.78	.64	.24	27.14	.73	.66
June 9	.65	.59	.20	27.08	.69	.62
14	.57	.54	.16	27.02	.64	.58
19	37	.49	.11	26.95	.59	.54
24	23	.44	.06	.88	.54	.49
29	08	.38	.00	.81	.48	.44
l sin z	9.28384n	9.74662	9.88688	9.46676	9.96737	9.91883
l cos δ	9.74093	9.99106	9.99839	9.94404	~~9.5549~~ 9.96541	9.99260
l cos z	9.99182	9.91900	9.80428	9.98052	9.57233	9.74700
A	9.54291n	9.75556	9.88849	9.52272	.00196	9.92623
B	.25089	9.92794	9.80589	.03648	9.60692	9.75440
C	.25909	0.00894	0.00161	.05596	0.03459	0.00740
A	∓.35 ✓	+.57 ✓	+.77 ✓	+.33 ✓	+1.00 ✓	+0.84 ✓
B	+1.78	+.80	→ +0.64 wrong .64	+1.09	+.40	+0.57
C	+1.82	+1.02	✓ +1.00	+1.14	+1.01	+1.02

	Gr. 2001	40 Cam. L.C.	m Virginis	η Ursae Maj.	η Bootis	50 Cas. L.C.
α	13 23	1 29	13 35	13 42	13 49	1 53
δ	+73 0	107 33 72 27	−8 6	+49 54	+18 59	+108 9 71 51
z	−27 30	−62 03	+53 36	−4 24	+26 31	+62 39
May 30	23 11.50s	1 29 12.64	42 58.23	42 58.23	49 9.49	1 58 29.19
June 4	11.24	12.99	14	14	.46	29.57
9	10.96	13.35	05	05	.42	29.85
14	10.67	13.73	57.95	57.95	.38	30.21
19	10.36	14.12	.85	.85	.33	30.58
24	10.05	14.42	.74	.74	.28	30.96
29	9.73	14.73	.63	.63	.22	31.30
l sin z	9.66441n	9.94613n	9.90574	8.88449n	9.64979	9.94852n
l cos δ	9.46593	9.47934n	9.99565	9.80896	9.97571	9.49385n
l cos z	9.94792	9.67089	9.77336	9.99872	9.95173	9.66221
A	0.19848n	.46679	9.91009	9.07553n	9.67408	0.45467
B	.48199	.19155n	9.77771	0.18976	9.97602	0.16836n
C	.53407	.52066n	.00435	0.19104	.02429	0.50615n
A	−1.58 ✓	+2.93 ✓	+0.81 ✓	− ~~.19~~ 0.12 wrong 1.12	+0.47 47	+2.85 ✓
B	+3.03	−1.55	+0.60	+1.55 ✓	+0.95	−1.47
C	+3.42	−3.32	+1.00	+1.55 ✓	+1.06	−3.21

	11 Bootis	α Draconis	κ Virginis	4 Ursae Min.	α Bootis	λ Bootis
	13 55	14 1	14 6	14 9	14 10	14 11
	+27 57	+64 56	−9 44	+78 6	+19 48	+46 37
	+17 33	−19 26	+55 14	−32 36	+25 42	−1 07
	55 54.78	1 15.83	+6 42.44	9 22.24	10 22.19	11 58.66
	.74	15.69	.42	21.90	.16	.60
	.70	.53	.40	21.54	.13	.53
	.65	.36	.37	21.15	.09	.45
	.59	.18	.33	20.73	.05	.37
	.53	.99	.29	20.29	.00	.28
	.47	14.80	.25	19.83	21.94	.18
sin n	9.47934	9.82206 n	9.91460	9.73140 n	9.63714	8.28977 n
sin δ	9.94615	9.62703	9.99370	9.31430	8.97353	9.83688
cos δ	9.97930	9.97453	9.75605	9.92555	9.95476	9.99553
A	9.53319	9.89503 n	9.92090	0.41710 n	9.66361	8.45289 n
B	6.03315	6.34750	9.76235	0.61125	9.98123	0.16305
	.05385	0.37297	.00630	0.68570	.02647	0.16312
C	+0.34	−0.79	+0.83	−2.61	+.46	−0.03
	+1.08	+2.23	+0.58	+4.09	+.96	+1.45
	+1.13	+2.36	+1.01	+4.85	+1.06	+1.46

	i Cor. Le.	36 H Cor. Le.	π Bootis	109 Virg.	α₂ Libræ	Gr. 2164
	2 19	14 26	14 35	14 40	14 44	14 48
	+113 08 66 52	+107 42 72 18	+16 15	+2 23	−15 33	+59 46
	−67 38	−62 12	+29 15	+43 09	+61 03	−14 16

N.A.

May 28.9	19 27.27	26 57.12	35 16.48	40 23.06	44 27.78	48 30.91
2.9		.41	.47	.05	.78	.82
7.9	27.76	.73	.45	.04	.77	.73
12.9		06	.42	.02	.76	.62
17.9	28.31	.42	.39	.00	.74	.50
22.9		.79	.35	97	.71	.37
27.8	28.92	59.18	.30	22.93	.68	.23
sin n	9.96603 n	9.94674 n	9.68897	9.83473	~~9.84527~~ 9.94203	9.39170 n
cos δ	9.59425 n	9.48292 n	9.98229	9.99962	9.98381	9.70202
cos λ	9.58039	9.66875	9.94076	9.86330	~~9.85374~~ 9.68488	9.98640
A	0.37178	.46382	9.70668	9.83511	9.95822	9.68968 n
B	0.00614 n	0.18583 n	9.95847	0.86368	9.70107	0.28438
	.40575 n	0.51708 n	.01771	.00038	.01612	0.29998
C k	+2.35	+2.91	+0.57	+0.68	+0.91	−0.49
b	−1.01	−1.53	+0.91	+~~1.46~~ .73	+0.50	+1.93
c	−2.54	−3.29	+1.04	+~~1.59~~ 1.01	+1.04	+1.99

	47 H Cephei L.C.	β Ursae Min.	β Bootis.	48 H Cephei	β Librae	1 H Draco
	2 14 50	14 51	14 57	15 5	15 10	15 13
	+101 3	+74 38	+40 51	+102 42	−8 57	+67 47
	8 57			78 18		
	−58 3.3	−29 8	+4 39	+54 12	+54 27	−22 17
May 30	50 35.67	51 16.50	57 35.04	5 31.57	10 46.00	13 20.80
June 4	36.09	.30	34.97	31.83	.01	.70
9	36.50	08	.97	32.20	46.02	20.58
14	36.97	15.84	~~.94~~ .77	32.60	01	.44
19	37.48	55	.87	33.03	46.01	20.28
24	38.01	25		33.49	99	.11
29	38.58	14.93	.74	33.97	45.96	19.91
sin n	9.91625	9.68739n	8.90885	9.92457n	9.91042	9.57886n
cos δ	9.28254n	9.42323	9.87877	9.34212n	9.99468	9.57762
cos n	9.75276n	9.94126	9.99857	9.73377n	9.76448	9.96634
	0.63371	0.26416n	9.03008	0.58245n	~~0.08426~~ .91574	0.00124n
					~~8176~~	
	0.47023n	.51803	0.11980	0.39165n	9.76580	0.38872
	.71746n	.57677	.12123	.65788n	.00532	0.42238
A	+4.30	−1.84	+.11	+3.82	+~~1.27~~ .82	−1.00
B	−2.95	+3.30	+1.32	−2.46	+.59	+2.45
C	−5.22	+3.77	+1.32	−4.55	+1.01	+2.64

	γ Ursae Min.	β Coronae.	t, Bootis	α Coronae.	γ Camel.	α Serpentis
	15 20	15 23	15 26	15 29	15 37	15 38
	72 15	+29 31	+41 14	+27 7	+109 2	+6 48
	−26 45	+15 59	+4 16	+18 23	+63 32	+38 42
30	20 58.53	23 3.16	26 46.40	29 46.92		38 33.41
4	.40	.15	.38	92		.43
9	58.25	.14	.36	.92		.44
14	.07	12	.32	90		.45
19	57.86	.09	.28	.88		.44
24	64	.05	.23	85		.40
29	57.39	.01	.17	.81		.34
sin n	9.65331n	9.43990	8.87156	9.49882		9.79604
cos δ	9.48411	9.93962	9.87624	9.94943		9.99693
cos n	9.95084	9.98288	9.99879	9.97725		9.89233
	0.16920n	9.50038	8.99532	9.54939		9.79911
	0.46673	0.04326	0.12255	0.02782		9.89540
	0.51589	.06038	.12376	0.05057		.00307
A	− ~~1.66~~ −1.47	+0.32	+.10	+0.35		+.63
B	+ ~~3.29~~ +2.93	+1.10	+1.03	+1.07		+.79
C	+ ~~3.68~~ 3.28	+1.15	+1.33	+1.12		+1.01

	β Serpentis :	κ Serpentis :	ζ Ursae Mi:	δ Scorpii :	β Scorpii .	θ Draco.
	15 40	15 43	15 48	15 53	15 58	15 59
	+15 47	+18 30	+78 9	−22 17	−19 29	+58 53
	+29 43.	+27 00	−32.39	+68 47	+64 59	−13.23
May 30	40 50.24	.43 31.38	48 19.22	53 28.70	58 41.73	59 44.82
June 4			19.06	28.73	79	.80
9	.26	.40	18.85	.75	79	.76
14			18.61	.77	82	.71
19.	.25	.39	18.32	.78	82	.64
24			18.00	.78	82	.56
.29	.21	.34	17.64	.77	81	.45
	9.695-23 9.98331 9.93876	9.65705 9.97696 9.94988	9.73200n 9.31310 × 9.92530	9.96610 ~~9.57762~~ 9.96629 9.57761	9.95722 ~~9.62544~~ 9.97439 9.62622	9.36449 9.71731 9.98804 ×
	9.81192 9.95545 0.01669	9.68009 9.97292 .02304	0.41890n 0.61220 0.68690	.00021 9.61132 .03371	9.98283 9.65783 .02561	9.64718 0.27073 .28269
A	+0.51	+0.48	−2.62	+0.53 100	+0.96	−0.44
B	+.90	+0.59	+4.09	+ 4 +1.41	+0.45	+0.52
C	+1.04	+1.06	+4.86	+1.0 8 +1.08	+1.06	~~+0.97~~ +1.92

φ Herculis :	δ Ophiuchi :	ε Oph.	19 Ursae Mi	ζ Herculis :	κ Scorpii
16 5	16 8	16 12	16 14	16 16	16 22
+45 15	−3 24	−4 24	+76 10	+19 26	−26 10
+0 15	+48 54	+49 54	−30 40	+26 4	+71 40
16 8 16.16 /	12 11.18 //		14 13.96	16 48.51	22 17.54
.22	.25		87 74	.56	18.03
.25	.28		58 39	.57	18.08
.24	.28		20 12.90	.55	18.10
	9.87712 9.99528 9.81781	9.88362 9.99842 9.80897	9.70761n 9.87858 9.93457	9.64288 9.97453 9.95341	9.97738 9.95304 9.49768
	9.87789 9.81858 .00077	9.88490 9.81025 0.00128	0.32903 2 0.56599 0.62142	9.66835 9.97888 0.02547	0.02434 9.54464 0.04696
	+0.75 +.66 +1.00	+0.77 +0.65 +1.01	−2.13 +3.68 +4.18	+.47 +.95 +1.06	+1.06 +.35 +1.11

	β Herculis.	A Draconis.	ζ Ophiuchi	Gr. 2284.	η Herculis	Gr. 2377
	16 25	16 28	16 30	$\overset{4}{16}$ 33	16 38	16 43
	+21 45	+69 1	−10 20	+104 16 75 44	+39 9	+56 59
	+23 45	~~6 28~~ −23 31	+55 50	−58 46	+6 21	−11 29
May 30	25 1437	28 1605	30 1644	33 680	38 5601	43 773
June 4	41	16.03	.49	6.96	.03	.75
9	43	15.98	.53	7.16	.06	.75
14	45	15.91	.56	7.38	.06	.73
19	45	15.81	.58	7.65	.06	.70
24	45	15.69	.59	7.54	.04	.66
29	43	15.55	.60	8.27	.02	.57
sin z	9.60503	9.60099n	9.91772	9.93200n	9.04376	9.25503n
cos δ	9.96793	9.96862	9.99290	9.39170n	9.88955	9.73630
cos z	9.96157	9.96234	9.74943	9.71477	9.95733	9.99122
	9.63710	9.63237n	9.92482	0.54030	9.15418	9.56270n
	9.99364	9.99372	9.75653	0.32307n	.10775	.25492
	.03207	0.03136	0.00710	0.60830	.11042	.26370
A	+43	−.43	+.84	+ 0.347 n	+ ~~0.0~~ 0.14	−.37
B	+.99	+.99	+.57	− 2.10	+ 1.28	+1.80
C	+1.08	+1.08	+1.02	− 4.06	+ 1.29	+1.84

	49 Herculis.	κ Ophiuchi.	ε Ursae Min.	19 H. Camel.	α Herculis.	θ Ophiuchi
	16 46	16 52	16 58	$\overset{5}{17}$ 3	17 9	17 14
	+15 10	−9 33	+82 14	+100 54 79 06	+14 31	−24 13
	+30 20	+55 03	−36 44	−55 24	+30 59	+70 23
	46 4832	52 1091		53 1732	9 2181	14 5326
		10.96		17.44	.86	30
	.40	11.00		17.61	.91	.40
		11.04		17.83	95	
	45	11.06		18.08	98	.50
		11.07		18.39	02	
	.46	11.05		18.74	22 07	.57
sin z	9.70332	9.91363n	9.77677n	9.91547n	9.71163	9.97403
cos δ	9.98460	9.99394	9.13078	9.27668n	9.98591	9.95769
cos z	9.93606	9.75805	9.90386	9.75423	9.93314	9.82598
	9.71872	9.91969n	0.64599n	0.63899	9.72572	.01634
	9.95146	9.76411	.77308	.47755n	9.94723	9.56829
	0.01540	0.00606	0.86922	0.72332n	.01409	0.04231
A	+0.52	−0.83	−4.43	+4.35	+0.53	+1.04
B	+0.89	+0.58	+5.93	−3.00	+0.89	+0.37
C	+1.04	+1.01	+7.40	−5.29	+1.03	+1.10

M.966 Lc.	β Draco.	ζ Oph.	ζ Draco.	μ Herc.	ψ Draco
5 23	17 27	17 29	17 37	17 41	17 44
+10 5 2 74 58	+52 23	+12 39	+68 49	+27 47	+72 12
~~0 28~~ ~~−59~~ 32	− 6 53	+32 57	−23 19	+18 43	−26 42
24 58.2 .38 .45 77 6.21	27 50.31 .36 .40 .43 .44 .43 .42	29 33.27 34 .40 .45 .49 .52 .54	37 41.53 .64 .64 .54	41 55.73 .85 .94 .98	44 4.70 4.83 4.83 4.71
9.93546n 9.41394n 9.70504	9.07163n 9.78560 9.99686	9.73430 9.98993 9.92433	9.59749n 9.55793 9.96305	9.48332 9.94680 9.97886	9.66255n 9.48529 9.95703
0.52152 .25110n 0.58606n	9.29303n 0.21126 .021440	9.74442 9.93440 0.01007	0.03956n .40572 .44207	9.53652 0.03206 0.05320	0.16726n 0.46574 0.51471
A +3.32	−0.20	+ 0.55	− 1.10	+ 0.34	− 1.47
B −1.96	+1.63	+ 0.86	+ 2.54	+ 1.08	+ 2.92
C −3.86	+1.64	+ 1.02	+ 2.77	+ 1.13	+ 3.27

ξ Draco	γ Draco	γ Sagittarii	ο Herc.	22 H Camel
17 51	17 53	17 58	18 2	18 5
+56 36	+51 30	− 30 25	+28 45	+110 58
−11 06	− 6 00	+75 55	+16 55	69 22 −65 8
~~24 5.82~~ 33.45 51 ~~5.38~~ .56 ~~5.45~~ .62 ~~5.77~~ .69 6.21 .68	53 56.28 .35 .42 .49 .51	58 21.42 .62 .77 .88	3 1.63 1.78 1.89 1.96	5 57.59 .60 .73 .98
9.28448n 9.74074 9.99180	9.01923n 9.79415 9.99761	9.98675 9.93569 9.38620	9.46386 9.94286 9.98079	9.95475n 9.54702n 9.62377
9.54374n 0.25106 .25926	9.22508n 0.20346 0.20555	0.05706 9.45051 ~~0421~~ .06431	9.52100 0.03753 0.05714	.41073 .09675n 0.45298n
A −0.85	D. ~~−1.68~~	+ 1.13	+ 0.33	+ 2.57
B +1.78	~~+1.05~~	+ 2.82 2.82	+ 1.09	− 1.19
C +1.82	~~+1.61~~	+ 1.16	+ 1.14	− 2.84

Meridian June 13

N.A.R. and C.N.M. observe with Meridian Transit for personal equation.

14h 30m

109 Virginis

~~D~~ W	~~[illegible]~~ E
9.7	11.0
11.9	9.0
10.0	11.0
11.8	9.2
43.4	40.2
10.85	10.05
	.80
	+.40

R	M.
A B	C.D.L.

3rd line?

ζ V ~~[illegible]~~ [illegible]

13 ~~1~~9

R	M
C.D.L.	A.B.

Gr 2164

R M.

A B C D

~~Bursaeminor~~

~~R~~

~~B C~~
~~2345~~

β Bootis

14-57-32

40 57

R Mc

A, B, C ~~D~~ D E
~~2345~~

D 2345 E

B Urs. min

R M

B C D.E
2345

3h 0m

W	E
12.5	8.6
~~8.6~~	
10.1	11.0
12.2	8.9
10.2	11.0
56	39 5
1125	9.88
	137
	—.68

Same as B

β Librae

M	R	
A. B.	C 2345	D

1 H Urs. min.

15 - 13 - 17

67 - 47

R	M
A_4, B, C	D E

3^h 17^m

W	E
10.2	11.0
13.0	8.2
10.4	11.0
13.0	8.4
66	38.6
~~41.5~~0	9.65
11.65	200
	−~~4~~1,00

γ Urs. Min.

15 - 20 - 55

72 15

R	M
B. D	C

β Coronae

15-23-0

29 31

out of focus

R m

B.6. D.E.

ν, Bootis

15 26 44

41 14

m R

AB6 DE

α Coronae

15 29 49

27-7

R. m

AB6 DE

W	E
13,0	8,2
10,3	11,0
13.0	8,2
10,5	11.0
68	38 4
11,70	960
	2,10
	-1,05

Jun 13

γ Camel

15 37 55 —

M R

B_{2345} C ~~Da~~ D_{2345}

~~M~~ ~~R~~

~~B & C~~ ~~D-2,3,4,5~~

ht of B mixed

β Serpentis

15 40 47

15 47

R M

A B C ~~D~~ ~~S~~ D_{2345} E

κ Serpentis

15 43 28

18 30

R M

C D E. A B

~~δ~~ ζ Urs. Min.

15 48 16

78 9

R M

B, C. D

June 13

δ Scorpii

15 53 35
−22 17

R M

$B_{2345?}$ C   C D

β Scorpii

15 58 38
−19 29

M R

A B C_{2345} D E

θ Draconis

15 59 42
58 53

R M

D E_1 E_{2345}

last wire very dim.

W	E
10.8	10.9
~~8.7~~	~~13.2~~
13.2	8.2
13.1	8.3
11.0	10.7
41	61
12.02	9.52

2.50
1.25

June 13

Lamp E

Reversed

Lamp W

4^h 10^m

W	E
11.9	10.9
14.3	8.2
14.4	8.2
13.0	11.4
13.2	11.2
14.1	9.2
29	5.1
13.72	10.27

3.45
1.73

4^h 15^m

W	E
15.2	9.2
13.3	11.3
13.1	11.4
15.1	9.3
4.7	5.2
14.18	10.30

3.88
1.94

Sure

η Ursae Min

16 20 56
– 26 10

R	M
6 lost the	0

first 4 or 5 wires

June 13

α Scorpii

16 22 14
-26 10

R M
C D. E.

D & E both bad

β Herculis

16 25 11
21 45

M R
A.B.C. D. E.
missed 1st of A

A [illegible] Draconis

16 28 13
69 1

R M
B C DE
First H of D bad

Little out of focus for R

ζ Ophiuchi

16 30 43
-10 20

June 13

Gr 2848

16 33 7
1014 16

R
D

η Herculis

16 38 53
39 9

R M
ABC D. E.
Second wire of D
bad

Gr 2377

16 43 5—
56 59

M R
A B D E

κ Ophiuchi

16 52 8
9 33

R M
ABC D. E.
late on first
of E ?

June 13

ε Urs. Min.

16 58 0
82 14

R m
B6 ~~6~~ DE

19 Camel.

17 3 18
100 59

M R
A B6 DE

α Herculis

17 9 19
14 31

R m
AB6 DE

5^h 17^m

14.7	10.0
13.0	12.0
14.5	10.3
13.0	12.0
3 2	4.3
13.80	11.08

2.72
1.36

June 13

Gr 966

17 23 58
105 2

M R
ABC D ~~[illegible]~~

Second of C
very bad.
5 only of 6

α Ophiuchi

17 29 30
12 39

R M
6 D 6, 2 3 & 5
very bad!!

β Draconis

17 27 47
52 23

R M
ABC D
first of D late

15h 37m

W	E
14.1	13.6
17.3	11.8
17.7	11.9
14.9	14.4
[illegible].0	7.7
16.00	12.92

3.08
1.54

June 14 Lamp. W

α Virginis
13 19 2
−10 33

R M
AB6 DE

Gr 2001
13 23 9
73 0

R M
B6 DE

h m
13 38

W	E
15.1	12.1
13.9	13.2
14.0	13.1
15.8	11.5
2 8	5.9
14.70	12.47

2.23
+ 1.11

R
=

η Urs. Maj.
13 - 42 - 56
49 54

R M
A B DE

$13^h - 31^m$

	E
$13^w.5$	13.0
15.0	12.0
13.5	13.3
15.0	12.0
5.0	2.3
14.25	12.57

1.68

+ 0.84

m

m Virginis

13 35 25

— 8 6

m R

A_{45} B C, D_{2345} E

$13^h\ 46^m$

15.5	11.7
13.5	13.8
15.4	11.9
13.7	13.5
2.1	2.9
14.52	12.72

m

1.80

+ 0.90

η Boötis

13 497

18 59

R m

ABC DE

June 14

η Cass.

13 53 23
108 9

R m
ABDE C
2 3 4 5
False stroke
in ~~E~~ D

α Draconis

14 1 13
64 56

A B C D

Focus Changed

47 H Cephei

14 50 35
101 3

R m
B E C D

June 14

109 Virginis

14 40 20
2 23

R m
A B CDE

α Librae

14 44 24
-15 33

m R
ABC DE

$14^h\ 55^m$

≢ w E
14.5 13.5
16.0 12.0
m 14.4 13.6
16.0 12.0
4.9 3.1
15.22 12.78
2.44
+ 1.22

48 H Cephei

15 5 23
102 42

R m
AB CDE

Chf.

June 14

β Librae

15 10 43
− 8 57

m R
BCD 0

Chf

3rd Sheet

15h 30m

~~16.8~~ ~~14.9~~

B Serpentis

15 40 47
15 47

m R
A B CDE

K Serpentis

15 43 28
18 30

R m
A B C D E

June 14

15^h 33^m

16.8 11.9

M 14.2 14.0

3.0 3.9

15.50 12.95

2.55

+ 1.28

γ Camelop

15 37 55

109 2

R M

A B ~~D E~~ C D

ζ Urs. Min.

15 48 16

78 9

R M

~~A~~ B C D

δ Scorpii

15 53 25

− 22 17

R M

A B C D E

Last two lines of D & first of E bad

June 14

β Scorpii

15 58 38
−19 29

R   M
D E   A B C
345

θ Draconis

15 59 42
58 53

R   M
~~A~~
D   E 2 345

δ Ophiuchi

16 8 13
− 3 24

R   M
B C   D E

ε Ophiuchi

16 12 8
− 4 24

M   R
B C   D E

June 14

16^h 3^m

w E

15.0 13.7

M

16.7 12.0

1.7 1.7

15.25 12.85

2.40

+ 1.20

16^h 5^m

w E

R

16.7 11.7

15.7 14.9

15.7 15.0

18.4 12.2

6 5° 5.8

16.62 13.45

3.17

+ 1.58

19 Urs. Min.

16 - 1~~4~~ - ~~5~~ 10

76 10

R

6 lost first

2 or 3 lines

M

w

γ Herculis

16 - 16 .. 45

19 26

R M

~~B~~ B60 E, 345

June 14

η Urs. Min

16 20 56

76 2

Reversed

R m

B D 6

16^h 19^m

16^h 38^m

ζ Ophiuchi

16 30 +3

−10 20

W	E
17.6	13.0
15.6	15.1
3 2	2 1
16.60	14.05
2.55	
+ 1.27	

R

June 14

β Herculis

16 25 11
21 45

m R
ABC DE

A Draconis

16 28 13
69 1

R X m
BC X DE

16^{h} 38^{m}

m 15.3 15.0
17.7 13.0
3.0 14.00
16.50
250
+ 1.25

η Herculis

16 . 38 5 3
39 9

R X m
D E 2 3 4 5

June 14

Gr 2377

16 4 35 —
56 59

M R
ABDE C

49 Herculis

16 46 45°
15 10

R M
0 0

19 H Camel.

17 3 18
100 54

R M
BD C

α Herculis

17 9 19
13 31

R M
ABC D.E.

June 14

κ Ophiuchi

16 52 8
9 33

R M

ABG DE

θ Ophiuchi

17 14 49
−24 53

R M
AB G E
first part AG

ε Urs. Min.

16 58 0
82 14

R M

BD G

$17^h 17^m$

W	E
18.1	12.9
15.1	15.8
16.60	14.35

2.7

2.25
+ 1.13

= R

June 14

17h 20m

m

15.2	15.9
18.0	13.0
3.2	2.9
16.60	14.45

2.15
1.08

Gr 966

17 - 2 3-5-8

105 2

m R
BD 6
2345

R

W	E
18.6	12.4
15.8	17.1
15.9	17.1
19.9	13.1
19.4	13.3
16.2	16.9
9.8	12.9
17.63	15.15

2.48
+ 1.24

Collimation

Lamp E
49.9
50.1
49.9
49.9
49.9
9.7
49.94
48.50
98.44
49.97
49.22

~~50.1~~

Lamp W
47.9
48.1
48.8
48.0
48.2
1.0
48.50

R

June 14

β Draconis

17 27 47
5 2 23

R m
A B C D

α Ophiuchi

17 29 30
12 39

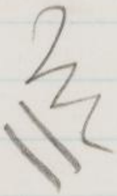
R m
B C ~~D~~ E
W ?. First line
R

Lamp W

47.3
48.0
47.3
47.0
47.7

2.3
47.46
49.14

96.60
48.30



Lamp E.

49.0
48.8
49.3
49.1
49.5

0.7
49.14

June 14

48.0
~~47.9~~
~~47.8~~
~~48.2~~
~~47.9~~
~~4.8~~
~~47.96~~

~~with hole~~
~~R~~

with central hole

52.9	46.9
52.6	47.5
52.5	46.9
2.0	3.3
52.67	47.10

47.10
99.77
49.88 R

52.4
52.5
52.6

1.5
52.50
47.37

9987
49.94
m

47.2

47.4
47.5

.1
47.37

June 16 1883

Ⓒ

Signals sent from Cambridge to Montreal 16h 8m 50s to 16h 21m 10s

35.0
35.2
36.0
35.9
35.9
35.6
336
35.6

52.0
52.0
52.1
52.0
52.1
2
5204
35.60
87.64
43.87

All figures 4/

42.7
43.2
42.8
42.7
43.0
43.0
174
42.90

48.6
48.7
48.3
49.8
48.6
48.3
543
4905
4290
1155
46.00

Found object glass loose in cell

26.7
26.8
26.3
26.60

24.5
23.8
24.7
133
24.43
26.60
10
25.1

26.6
25.7
26.8
26.0
245
26.12
26.00
72
26.36

27.3
27.3
26.6
26.9
281
2702
2660
1342
26.71

26.1
26.3
26.3
26.7

26.6
26.7
10.7
26.5
26.

June 17 1883 pAR from Montreal Transit

L. ~~A~~ E

B Coronae ε Coronae

A B C D E   A B C D E

B Serpentis   K Serp.

A B C D E.   ~~A B C D~~

B C D A

α Serpentis
ABCDa.

$15^h\ 32^m$

W	E
15.2	15.2
17.0	13.6
16.8	13.8
15.1	15.2
24.1	178
160^2	

14.45
1.57
-.78
.22
15.6
15.6

$b = -.17^s$

Lamp E
γ Urs Mi

A^d_{2345} BCDa.

Reversed

Lamp W
β Scorpii
B.C.D.

June 17

16 5

W	E
15.3	15.1
17.8	12.9
17.5	13.2
15.5	15.0
261	16 2
16.5²	1405
	16.5²
	~~057~~
	247
	−1.23
	72
	246
	246
	2706

6
b = −.27

15.3 15.1
5 open;

ABCDE.

20 open

ABCDE

19 [illegible]

6

Jan 17 Morning

⊙ coll'

294 293
29.6 29.8
29.6 30.1
29.2 30.0
29.6 29.7
29.5 29.9

29 578

29.49 29.80
29.49
.29
29.64

26.5
3.1
⊙ = +3.1^{5}

June 19

@ 22h, m

428	487	
424	432	
418	438	
422	429	
425	430	
428	428	
39	179	
42,65	42,98	37,02
	~~42,61~~	42,65
	103	~~37,33~~
	~~42,41~~	37,67
		39,83

370	421
376	422
379	426
382	420
387	423
389	112
37,78	42,24
	37,78
	80,02
	40.01

39,83
40.01
79 84
39.92
Set-of 39.9

11h 40m

357	396	385	397
358	397	39.2	96
35.2	352	393	8
35.2	353	394	7
35.6	357	7	8
	35.3	5	36
25			
39.50	39.43	39.43	39.7

Set-of 39.6

Jun 19

$13^{h}\ 57^{m}$

W	E
14.2	16.1
16.8	13.6
16.8	13.6
14.8	15.8
226	191
15.65	14.78

87

+.43

~~22~~
~~86~~
~~6~~
~~95~~

b = +1.0

α Draconis

~~#~~ ~~64~~ 5 6 14^{h} 1 13

~~14.1~~

~~+6~~ 4 5 6

B
C
D
"

κ Virginis

14 6

− 9° 44′

A. B. C. D. E

4 Urs Min

14^{h} 9

+ 78° 6′

(A)

mid wire of C

reject 1st stroke of mid

June 19

~~λ Bootis~~
~~.14 1~~
~~+46 37~~

Level
hr 14 m 45
14.1 16.2
17.2 12.9
113 51
1565 14.05
160
+80
17.7 b = +18
b

i Boo L. C.
14 19
−113 8
~~A~~ 2,3,4,5′ BCDE
~~B~~
~~C~~
~~D~~
~~E~~

36 N Cor
14 26 56
107 42

B (D_{45} ?)

la.2164

ABCDE
14 48
+59 46

B Ursae Min
14 5 13
+74 38
C

C ?
1

14 31

W E

16.7 13.2

14.3 15.6

110 88

15.50 14.40

110

+.55

110

110

109 buy

1 4 40 20

+2 8 3

ABCDE

14 58

W E

140 159

17.1 127

111 86

1555 14.30

120

+.60

1=43

15 2

W E

17.1 128

14.1 15.9

112 87

15.60 14.35

125

+.62

124

~~124~~

June 19

48 ~~H Cephei~~
~~14 48~~ 28
16 5 23
+10 2 12

1 H Urs Mi
15 13 17
+67 47

α Coronae
15 29 19
+27 7
A B C D E

15 32

W	E
12.2	18.2
12.8	10.1
12.0	8.3
16.00	14.15
	.85
	+.92
	.84
	.84
	1.20

γ Ursae Min

15 20 55

+72 15

C

β Coronae

β Coronae

15 23 0

+25 31

ABCDE.

15 38

195 10.2

120 17.8

115 80

11

1575 14.00

170

+.85

70

170

6=.15

α Serpentis

15 38 30

+6 48

BCD

June 19

β Serpentis
15 40 47
+15 47

ABCDE.

κ Serpentis
15 42 13.28
+18 30

C. DE.

δ Scorpii
15 53 25
−22 17

β. Scorpii
15 58 35
−19 29

C

ζ Ursa Min Le L.W.

15 48 16 40.63

+78 9 39.98

39.80

B. C. D.

Jan 30

Coll,

Sq	Fr.
39.9	39.9
39.9	39.9
40.8	39.8
40.1	39.4
40.1.	39.2
40.6	39.6
39.8	39.2
40.0	39.8
39.9	39.7
40.1	39.7
4012	
40.12	39.62

40.12

79.74

39.87

Set at 39.9

Jun n L W Long. Obs.

W E 13 30 N E

~~12~~ 2 ~~18~~
19.8

14.2 16.2
17.9 12.8
21 9.0
16.05 14.57
1.55
+.77

N E
17.6 13.1
14.2 16.4
11.8 9.3
15.90 14.65
1.25
+.63
126
1267
139
b=+.14

h m
13 35

14.0 16.6
18.0 12.6
12.0 29.2
16.00 14.60
1.40
+.70
b=+.15

τ Bootis
13 49 7
+18 59

C 34, D. E.

June 20

α Draco

14 1 13
64 56

αβγδε.

4 Ursa Mi
14 8 9 19
+78 6

e

ι Cass.

14 19 21
113 8

13 6 25

36 ψ Cass

14 26 56
107 42

A.B6* --

June 20.

$14^h\ 15^m$

π Bootis
14 11 56
+46 37

e Dh.

18.6	13.0
14.8	16.8
5.4	3.8
16.7	14.9

1.8
+ 0.90
[illegible]

$14^h\ 33^m$

14.8		17.0
19.1		12.3
5.9		~~5~~ 3
16.95	~~0.6~~	+ 14.65

~~4~~
+ ~~.15~~
2.3.0
1.15
22
0
230
230
+.25

19.2		12.1
14.8		16.7
6.0		4.8
17.0	~~1.2~~	14.4

+ ~~0.3~~
2.6
1.30

June 20.

α Librae

14 - 44 - 24.
- 15 - 33

A B C D E

$14^h 53^m$

15.0
19.3
4.3
17.15
2.60
1.30
26
26
6 = +.29

16.4
12.7
5.1
14.55

1552
19.7 12.8
15.1 17.1
4.8 59
17.40 1495
245
+1.23
246
246
6 = +.27

~~δ~~ δ Scorpii
15 ~~4~~53 25
— — 22 17
A. B C D E

κ Serpentis
15 43 28
+18 30

O Pg.

γ Ursæ Min
15 48

O

β Scorpii
15 58 38
−19 29

17h 20m

W E

15.2 17.3
20.3 12.2
35.5 95
17.75 14.75
+1.50

L W
Reversed
L E

30
30
+33

Prob. disturbed collimation
and perhaps an error in measuring

Pro. Collimation got before series

Gen. 966
17 23 58
+105 2
☉ to mid. da. win
~~+23~~

17 30
W E
197 128
15.2 17.2
149 100
17.45 15.00
+2.45
+1.23

246
246
+27

Morning June 20

SE
Coll
39.3
38.8
39.4
39.2
39.7
39.1
39.7
39.8
39.9
39.6
39.45

SW
36.2
36.3
36.4
36.0
36.9
36.8
36.0
36.1
35.9
36.4
30
36.30
39.45
1575
3780

LW
36.1
36.0
36.8
36.1
36.1
11
36.22

LE
39.7
40.0
39.7
39.7
40.2
153
39.86
36.22
1608
38.04

37.85
38.04
15.85
37.94
39.9
2.0

June 21 signals from C to M c = .20
16 27 50 16 40 10
16 41 50 16 47 10

NAR Obs.

June 21 Long. Obs. at Montreal

Coll

403
40.9
40.9
41.2
40.8
41.2
53
40.90

33.9
34.1
33.8
34.4
34.0
34.0
.2

34.03
40.90
74.93
37.46
60
00
37.5

37.5
38.1
37.8
37.9
38.2
4.5
37.90

36.9
37.1
37.2
37.7
37.5
1.4
37.30

37.60

Set at 37.5

Lamp E.

α Librae

14 44 24
15 33.

ABCDE

β Ursae Minoris

14 51 3
74 38

BCD

June 21.

Level

W	E
13.2	17.2
17.3	13.2
17.2	13.2
13.1	17.2

0.00

b=00

14h 15m

W	E
13.3	17.0
16.8	13.1
16.9	13.1
13.0	17.1
8.0	8.3
15.00	15.075

0.04 b=-.01

15h 0m

W	E
13.7	17.1
18.1	12.7
5.8	5.8

0.00

b=00

β Bootis

14 57 32

40 51

ABCDE

June 21

48 H Cephei
15 5 23
102 42

A 345 B6 D [illegible]

β Librae

15 10 43
−8 57
B6 D

γ Urs Min
15 20 55
72 15
6.
lost first 3 of 6

β Coronae

15 23 0
29 31

B C D

June 21

1 H Urs. Min.

15 13 17
67 47

13_{45} b, D. E

18.1
13.1
5.2
15.60

126
18.1
7
5.7
14.85

.75
+ 0.37
74
74

b = +0.08

ν, Bootis

15 26 44
41 24

Not seen

α Coronae

15 29 49
27 7

A B C D E

June 21.

W	E
11.1	19.2
19.8	10.6
8.9	9.8
15.45	14.90

.55

+ 0.28

5.6
56/6 = +.06

α Serpentis

15 38 30
6 48

A B6 D E

β Serpentis

15 40 47
15 47

A₂₃₄₅ B6 D E

κ Serpentis

15 43 28
18 30

A B 6 D E

ζ Urs. Min.

15 48 16
78 9

B.C.D.

δ Scorpii

15 53 25
−22 17

A.B.C.D.E.

β Scorpii
15 58 38
−19 29

A.B.C.D.E.

L. W Jun 21

19 H Camel
17 3 18
100 54
BCD

α Hercules
17 9 15
+14 31
BCD

17 W

W	E
20.9	10.3
12.4	18.7
12.2	18.8
21.1	11.1
13.0	18.8
21.0	10.9
1000	286
16.67	14.77
	19.0
	+.95

19.0
19.0
6+21

Ly 9 66
17 3 58
+10 5 2
BCD.

π Herculis
17 10 58
+36 56

θ Ophiuchi
17 14 49
−24 53
A B C D E

β Draconis
17 27 47
+52 23
B C D

α Ophiuchi
17 29 30
+12 39
B C D
34

Jun 21

17 3 ✓

Bv Σ.

13.0 191
4.5 10.8
34.5 25.8
17.25 14.90
1.65
+.82
164
164
6.718

μ Herculis
17 41.5
+27 41

A B C D E

ε Draconis
ε (17 51 3)
+56 5[illegible]

A C D

γ Draconis
17 53.3
+51 3 0

A B C D E
2365

ψ, Draco
17 44 1
+72 12
C

17 46
W Σ
210 112
128 186
338 98
1690 1450
200
+1,00
b=+,22

γ Sagittarii
17 58 16
−30 25
A B C D E.

o Herculis
18 2 59
+28 45
B. C D

22 H Camel
18 5 57
+110 38

δ Ursae Min
18 10
+86 36

Lamp E.

~~Lamp~~

38.2
38.2
38.2
38.2
38.2

38.16

38.6
37.9
38.0
37.7
38.4
.6
38.12

α Lyrae
18 32 58
38 40

ABCDE

Lamp W

2 Lamps
18 15 15
-2 5 5

18 15
N E
14.0 18.5
20.5 12.0

morning
SE Coll W
~~H^h 35^m~~ 3^h 15^m

1 div = .10.5

20.3
14.1
~~6.4~~
34 4
17.20

12.0
18.4
30.4
15.20
+1.40

b = +1.2

37.2
37.2
37.4
37.5
37.5
37,36

39.1
39.1
39.1
39.1
39.2
37,12
37,36
1648
3824
3760
0.64

June 21

Comp. to Montreal
16^h 33^m 50^s to 16^h 45^m 10^s

Jun 23 Lamp E Long. Obs. of Moisture

Coll

38.2	38.0
38.3	37.8
38.2	37.8
38.3	38.0
38.3	37.8
38,26	394

3788
~~38~~26
614
38.06
Set at 38.1

κ Virginis
14 6
−9. 44
ABCDE

109 Virginis
20
14 40
+2 23

ABCDE

2 Libræ
14 44 24
−11 33

ABCDE

W+R drs.

Level

$14^h\ 15^m$

11.7
17.3
19.0
10.1
18.9
10.1
12.1
17.1
14.54

11.7 17.3
10.1 19.0
~~18.0~~

10.1 18.9
12.1 17.1

W		E
11.7	1.6	17.3
19.0	1.7	10.1

1.65 × .073 = 1155 / 50 / + .12

18.9	1.8	10.1
12.1	2.0	17.1

1.9 × .073 = 146 / 7 / +.14

} .13

36 n Cas.
14 26 56
+107 41²

A B C. D E

β Ursæ Min
14 51 3
+74 38

B. C. D,

β Boötis
14 57 32
+40 51

A B C D E.

Jun 23. Dampe 1 div = .146

W	E
11.7	17.7
19.4	9.8
31.1	27.5
15.55	13.75
	1.80
	+ .90 b = +.13

48 N Cephei
15 5 28
102 42
D

J
15 20 5.5
+72 2.5

15 23 40
29 31

B C D

DE

15 – #8

W	E
19.4	9.7
11.8	17.5
15.60	13.60
	2.00
14-8	1.00

b = +15

. 1 Ursae Mi
15 13 17
+67 47
B C D.

15 26 44
A B C D E

α Coronae
15 29 48
+27 7
A B C D E

June 23 1883

1535

18.9 17.3
19.0 10.0
10.9 7.3
15.45 13.65
1.80
+.90 b = +.14

15 38 30
+6 48

15 48 16
+7 59

βeP

15 53 25
−22 17

ABo Dr

15 40 47
+15 47

15 43 24
+18 30

15 58
-19 29

A B C D E

16h 0

W	E
18.8	10.4
12.2	17.2
15.50	13.80
	17.0
	+.85

b=13

Jun 23 1881

ξ Draconis $17^h\ 51^m$
M.C. +1-653
on Montreal ~~Clock~~ R Chron
Mc obs. of Cambridge

ξ Draconis
R
on Montreal ~~Clock~~
Chron

109 Herculis
R
montreal

L.F.

α Lyrae 18 33
~~R~~ M.C. +38 40
Montreal

γ Draco 1754
+51 30
R
mounted

109 Herculis 1819
+21 43
M. C.
~~Cam~~ mounted

α Lyrae
R
mounted

~~44~~ β Lyrae
1846 +33 14
M C
mounted

Jun 13 1883

~~B Lyrae~~ B Lyrae
~~R~~
~~52 Draco.~~ R
Montreal

1852
~~52 Draco~~
~~M.e.~~
120 184
~~8.2~~ 20 10.4
112 88
~~15.60~~ 16.10 14.110
120
+.85 b=713

ε Draco. 19 49
+69 18
M.C.

α Aquila
R

+69 18
Montreal

ABCDE
Montreal

~~B~~ Lyrae
R M
19 12
+37 55
Tried to
send signals
to Cambridge
for the star. Failed.

x Aquilae
Mr C. a m
19 45
+8 34
Montreal

→ On Cambridge Chronograph from here

ε Draco
R

Mr C. observing.
o' Cygni
$20^h\ 9^m + 46^{\circ}\ 23'$

A 2 3 4 5 B C D E

on Cambridge
Chronograph

Also on Cambridge
~~Cl ete~~ Chronograph

Jun 13 1880

R.
Obs, $20^h\ 9^m$
+46 23

on Cambridge
Chronograph,

M.C. Obs.
α Cygni 20 37
+44 51
on Camb
Chronograph

α Cygni 20 53
+40 42
R Obs.
on Camb.
Ch.

20 52 48
+40 43

$20^h\ 55^m$

W	E
193	107
132	167
125	74
16.25	13.70
	25.5
	+1.27 b=+18

R

α Cygni

20 37 26

+44 52

on Cambridge

Chronograph.

~~M C~~

~~α Cygni 20 52 +48 10 42~~

~~at Cambridge~~

~~on Cambridge~~

~~Chronograph~~

M C obs. $21^{h}\ 2^{m}$

61 Cygni +38 10

M C obs

ζ Cygni 21 8

+29 44

R Obs.

61 Cygni

21 1 3

+38 11

Reversed S. W

~~W E~~

α Cephei

21 15

+62 6

A McD

R obs.

ζ Cygni

21 7

~~+57 03~~

+29 45

W E

129 17.3

80.2 16.1

33.1 ~~124~~

16.55 13.70

28.5

+14.2 b=+11

2h 10m

W. E.

12.2 17.8
20.2 9.8
32.4 27.6
16.2 13.80
2.40
+1.20 b = .17

21 13

W E

12.8 17.6
20.1 10.1
32.9 27.7
16.45 13.85
2.60
+1.30 b = .18

B Again
2, 25 24
-6 5

A B C D E

B Copper
21 27 8
+70 3
C D

ξ Aquarii

21 31 31

-8 22

ABCDh

2 Pegasi

21h 38m

+9 20

BCD

μ Capricorni

21 46

-14 6

ABCD

79 Draconis

21 51 24

+73 9

C

11 Cephei
21 40 12
+70 46

B CD
45

π 2 Cygni
21.42 28
+48 46

B CDE
45

21 55
W E
17.4 12.8
15.2 15.0
12.6 7.8
-16,30 13.90
2.40
+1,20 b=.17

α Aquarii
21 59 40
−0 53

A B C D E

Jun 23

π_1 Pegasi

22^h 4 48
+32 36

ABCDE

θ Aquarii
22 10 35
−8 22

BCD.

$22^h\ 33^m$

W. E.

17.9 127
15.0 156.
2.9 8.3
16.45 14.15
2.30
+1.15 k=17

ζ Pegasi
22 35 38
+10 13

ABCDE

22 15

W	E
15.6	14.9
17.4	12.9
30	78
16.50	13.90
	260
	+1.30 =.18

π Aquarii

22 19 18

+0 47

B C D

α Pisces

22 51 10

−30 15

C. D E.

α Pegasi

22 58 56

+14 35

A B C D E

13.5

h m

23 3		23 7	
N	E	N	E
151	156	183	12.6
18.3	12.3	14.9	15.8
134	79	132	84
16.70	13,95	16.60	14,20
	275		240
	+1.37 b=+70		+1,20 =17

13
22
20
20
29

23 10

Cole

357	419
358	418
358	419
357	420
35.7	420
35.74	~~35.92~~
	41.74
	35.74

293
586

43
46

766
38.83
38.1
c = +.07

c = ~~+1.2~~

Jun 28 Observers VAR and C.W.M:

Personal Equation observations of Cambridge

14' 1"
7.M.C.

W	E	R W.	E.
5.0	22.3	20.4	6.8
20.3	6.9	5.0	22.0
25.3	29.2	25.4	28.8
1265	1460	1270	14.40
	1.95		1.70
	−.97		−.85

C. W.
14 30

M W	E	R E	W
5.9	21.5	6.1	21.2
21.2	6.0	21.1	6.0
27.1	27.5	27.2	27.2
13.55	13.75		0.00

~~A D~~ ~~B C D~~

2/.20
−.10

α Librae
14 44 24
−15 33

G. 2164
14 48 28
+19 46

M
A E

R
B C D

M
B C D

R
A E

π Bootis
14 35 14
+16 55

M R

A. E B, C, D.

E_2 too soon

~~15° 33~~ ~~R Libræ~~ 14-44-24
~~15° 33'~~

~~M R~~

~~A. E. B. C. D~~

D_2

~~β Ursae Min~~
~~β Ursae Min~~
~~R M~~

~~Mizar~~

109 Virginis
~~14 35 14~~
14 40 20
+2 23

R M

A E B, C, D,

β Ursae Min
14 51 3
+74 38

R M

C_{2345} D, E,

June 28

R M

R		M	
W	E	W	E
7.0	20.7	21.9	5.7
21.6	6.1	6.7	20.9
28.6	26.8	28.6	26.6
14.30	13.40	14.30	13.30
	-1.00		1.00
	+.50		+.50

- M -

48 Cephei
15 5 23
10 24 2

M R
A (2345) E B C D.

June Mi
15 40 55
+32 15

MR R M
B D

14. η Urs. Min.
15 13 17
+67 47

M
B.C.D.

R
~~A.E.~~
C
(2.3.4.5)

$15^h\ 15^m$

M.C.

W.	E.
8.0	19.7
23.0	4.7
31.0	24.4
15.5	12.2α

3.5
+1.75

γ, Boötis
+41°-14' 15-26-44

γ, Boötis
~~15~~ 26 44
+41 14

R
A.E.

M
B C D.

1st line uncertain

under the beam very dim

α Coronae
15 29 49
+27 7

M
A.E.

R
B C D

15^h 38^m

Level

R

W.	E.
22.9	4.8
7.8	20.0
30.7	24.8
15.35	12.40
	+2.95
	+1.47

M

W.	E.
8.0	19.7
23.0	4.7
31.8	24.4
15.90	12.20
	3.70
	+1.85

R Serpentis

15 43 ^m28

+15 30

M R

A.E. B.C.D.

γ Ursae Mi

15 ~~48~~ 16

+76 9

M R

B. D. E.

α Serpentis
15 38 30
+6 48

M R

A E . B C D .

β Serpentis
15-40-47 +15-47

M R

B C D A E
2345

~~κ Serpentis~~
~~15-43-28 +18°-30~~

~~M R~~

~~A. E. B. C. D~~

δ Scorpii
15-53 25
-22 17

M R

~~A C D~~ A. B.
C. D. E.

~~β Scorpii~~

Level at 15 55

R Io M
w

23.0 4.6
7.9 19.7
30.9 24 3
15.45 12.15
3.30
+ 1.65

B, Scorpii
15 58 38
−19 29

M R
AB C. D. E.

$16^h\ 2^m$

M
W E
7.9 20.0
23.0 5.0
30.9 25
15.45 1250
2.95
+1.47

g ~~Herculis~~

19 Ursae Min
C. W.
M. R
A B

Reversed
C. E.

R M
E

η Ursae Min
16.20 56
+76 2

M [illegible]
B. [illegible] [illegible].

φ Herculis
16 5 5
+45 15

R M
A E B C D.

ν Ophiuchi
16 8 13
−3 24

M R
A E B C D.

α Scorpii
16 22 14
−26 10

R M
B C D. A E.

β Herculis
16 25 11
+21 45
R M
A E B C D.

May 31, 1883

Began preliminary observations with the R.T. in preparation for the Longitude Campaign between Cambridge and Montreal.

For stars observed see page 2-5 this book

~~May 3~~ June 1

~~W.A.B.~~ The observations of ~~May~~ 31 shows that $c = +.25^s$ for C.E. and $a =$ about -1.5^s
Set the R.T. by azimuth with this correction & Adjusted level to nearly zero -
W.A.B. observed same stars as on May 31 using R.T. See pp 6--9

June 2 1883

Began observing with R.T. according to program for Longitude with Montreal. See pp 10-22

The following are the notes for the evening.

4h p.m. M.T. Sent message of form (1) to C.N.M.C.
630 p.m. " " Received message from C.N.M.C. of form (1)

Telegrams and answers during exchange.

(1) Have you an assistant? Ans. Yes
(2) Would it not be well for four of us to record all questions and answers to telegrams? Ans. Yes.
(3) Sent. When you get ready put in your clocks 10 seconds before an even minute. Are you ready? Yes

(4) Go ahead.

10 17 50 = M

The Montreal Clock was then put in circuit and a few irregular breaks were made upon the Cambridge Chronograph. It was soon found that the trouble was with the adjustment of the relay here. In about 5 or 6 minutes the adjustment was completed when the following message was sent

(5) Will you please stop a mere ten seconds before the even minute and keep a record of your minutes. Ans. All right.

Sm $10^h 26^m 50^s$

(6) The Montreal Clock was then thrown into circuit and the signals were beautifully recorded on our Chronograph for a little over 2 minutes, 1327 being out of circuit. Then there was a break.

(6) Sent Give us your clock until we stop you. It is immaterial about starting 10^s ahead. Give us a clear 5^m.

Sm 10 33 50

The ~~Clock~~ Montreal Clock signals were then recorded on our chronograph for about 6 m.

(7) Received Dr Rogers Is it necessary to receive on Chronograph through a Relay. Ans yes. But you had better try it if you have no relay.

(8) Recd We have a relay. Ans. We have relay all ready.

The Cambridge Clock was then put in circuit by Mr. Edmands at $15^h 39^m 41^s$ by Chron 3451

After about 5^m received the following.

(9) Recd. That is good. Give us a few more. We will take off relay.

(10) Please give us 2^m more

1327 was put in circuit at $15^h 51^m 41^s$ by 3451

(11) Please give us a couple more.

1327 put in circuit at 15 56 41 by 3451

(12) Recd Thanks Got them first rate with relay. Could not work without relay.

(13) ~~Recd~~ Sent What was your first minute
Ans. $10^h 15^m$ $10^h 27^m$ and $10^h 34^m$

(14) Sent In working up each nights work provisionally I shall use only 5 or 6 stars. Do you not think that will be sufficient. Ans Should say so. I have not been able to get any more than this for my first set.

(15) How is your seeing Ans. Fair Slight haze

(16) Did you get the noon signal ~~yes at~~ Ans yes at noon Just got it in good time but the Chronograph runs bad.

(17) Have you your new Chronograph. Ans yes. It runs a ribbon like a Morse Machine and has 2 pens. I have taken your signals with the observing pen.

(18) Sent I will send you the copy giving our clocks ~~[illegible]~~ by mail on Monday morning, will you send me yours at the same time, Ans Yes.

(19) Mr Edmands wrote you a postal about ~~a later tel~~ a telegram later than 4 o'clock P.M. What is the latest time you can surely get a telegram about the weather Ans. Recd postal from Mr Edmands. Can get a telegram immediately on its receipt here as we have a telephone connection with the Central Office.

(20) Shall we exchange Monday night. Ans. Yes.

June 4 1883

6^h P.m.
Sent message to C. N. McLeod of form (1)

$8^h 30^m$ P.m. Rec'd fr C N McC message of form (1)

Sent:
I think we had better have 12 full minutes of exchange. Won't you please ~~Sto~~ take out your clock 10s after the 12 minutes are up and note the minute. We will do the same. If there is any trouble here we will break you up. Otherwise you may know that we are ~~[illegible]~~ getting your signals all right.

Ans Very good. I shall do as you say. McLeod

Sent - I did not write you to day
Could not get ready; what was
the error of your Clock Saturday night?

Ans. I have not been able to get time
to work it up. Sorry but could not
help it - will try to send error to you
to morrow

Sent - ~~I will now give you~~ The error of
our Clock on Saturday night
It was 14.46s ~~slow~~ fast at thirteen one half hours
Rate ~~slowing~~ fast half second per day. ~~Send~~
15h 5½ by 3451 began to ~~receive~~
from Montreal. receive

In - 10 3 50
out - 10 16 10

We got your Clock O.K. ~~We will
now put in our Clock~~ Are you
ready for our Clock. Ans. Yes.

Put in our Clock at 15h 19m 40s by 3451 which is
1m 7s slow.
+1 7
15 21

Took out Clock at 15h 32m 03s
1 7
15 33 10

Rec'd Got it first rate. Could not
be better.

June 4

Sent At 10 hours thirty-four minutes 41 seconds 6 tenths by your clock, our clock was fifteen hours twenty nine minutes forty 5 8 hundredths seconds ~~of our sidereal clock~~.

Sent What was your first minute tonight. Ours was $15^h 21^m$

Ans. Our first minute was $10^h 4^m$.

O.K. Good night

Sent Exchange to morrow night

Recd All right will exchange to morrow night.

to use the key,
instrument —

June 5 1883

Rec'd Will be ready in half a~~t~~ minute.

Sent: We send the same as last night: Ans. All ready.

Began to receive Montreal clock about $15^h 7^m$ by 3451 ~~[illegible]~~ Montreal [illegible] 10 0 50 / [illegible] 10 12 1D

Sent Are you ready to receive our clock ~~Ans.~~ Ans. Ready.

Rec'd Now is that. Ans. Good.

Put Cambridge clock in circuit at $15^h 19^m 44^s$ by 3451 which is about $1^m 6^s$ slow = $15^h 21^m$ by 1327

Took 1327 out of circuit at 15^h 32 04
+1 6

Sent: Did you get our clock. Ans. O.K. I have not computed the determination of clock error.

Reading this chronograph is a very slow operation the [illegible] of the chronograph [illegible] [illegible] not expect it without that will set it up for your personal equipment as I fear you would scarcely have time

Sent Shall I ~~come to~~ start for Montreal to Monday night. Ans. Perhaps it would be better to give me a day to catch up ~~Rec'd~~ but if you think best come on. Have you rec'd Dr. Johnsons letter? Ans No.

I will bring my record with me and we can work out our results. Have you a Berlin Jahrbuch for 1883 Ans. No. We have not. I will bring one. It is our cost then will two Effort on work

What was your first minute. Ans.

Our first minute was $15^h 21^m$

Rec'd Our first minute was. $10^h 1^m$

We have your very well but fear it will soon become overcast.

Rec'd He has written to ask you to stay with him (all

Rec'd I will be in Montreal at eleven o'clock on Thursday morning

Sent How many stars have you got to night.

A few ~~att~~ set in one position and two ~~po~~ stars with three thin stars in the other.

Sent That will be sufficient ~~I sent~~ I think.

[illegible] [illegible] [illegible] Montreal [illegible] [illegible]
[illegible] Chicago on Thursday morning

Sept

Mr. Young [illegible] [illegible] [illegible]
[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible]

Thursday
Sent [illegible] [illegible] [illegible] [illegible] [illegible]

Jan 16

Ex change between Montreal and Cambridge

W.A.R. at Montreal.

Sent: Is it clear at Cambridge and have you got stars.

Ans. No it is cloudy here. No observations here nor prospect. How is it with you.

Sent: There is a thunder shower here. No stars yet but it will probably clear. ~~I think~~ shall we exchange.

Ans. No use of exchange. No prospect of clearing here. How are you to-night. Mr Rogers inquired after you this p.m. Have you any word to send.

Tell him I am feeling well, wrote both yesterday and to-day. I [illegible] them

Ans. Tell the prof. I am right here, [illegible] and I hope he is happy to-night.

Sent. I think we had better exchange so as to be sure that Mr. Chandler has the connections all right.

Rec'd. Mr. Rom[illegible] not here, Edmunds gone, will lay chronometer and give the signals. How long do you want them.

Sent— Three or four minutes.

Rec'd. Will you send first ans., we will send first

~~Rec'd.~~ I will tell you when

Rec'd. Now let it come

Sent: six ~~points~~ tics to C. at 10h 12m 50s
by Chronometer 664
. : 30
10 12 20

Took out Montreal clock at 10h
16m 18s.

Sent: Did you get it ~~Ans~~
Ans. Got it first rate. Do you want any now.

Sent Go ahead.
Rec'd. About 3/4 minute.

Sent. We got you O.K. I shall observe here if it clears to night.

Ans. I have no hopes of its clearing
I will keep a look out for a short time. But there is not the slightest

prospects. Please report that I am quite happy

~~Sect. All right let go~~

that I have not written home yet —

Sect ~~Ans~~ All right — at the observing for the observatory Thursday night bad. Object glass loose in cell. I

Read. Is the work on Thursday as good

Ans. Yes it will serve the purpose I think being relative.

Read. Is it understood we exchange Monday night.

Ans Yes if clear.

June 10 1883

Re'd. Suddenly Cloudy, not a star since I have been here.

~~Sent~~ Sent- I have a dozen stars to night so far. Prospect good for more.

Rec'd We have none but may possibly get some later on.
Had we better exchange.

~~Tell me~~

Sent Certainly. Are you ready.

Recd. Yes. Go ahead.

Put in Montreal Clock at 10h 9m 50s ~~[illegible]~~
~~664 when on 195 for 4~~
Took out Montreal Clock 10h 20m 10s

Sent. Did you get ~~the~~ our Clock O.K.

Rec'd Yes. Got it first rate. Are you ready for ours

Sent ~~Now put~~ ~~Are you ready to put in the Cambridge Clock. Ans.~~ ~~[illegible]~~

Sent- Yes Go ahead.

Cto no first minute 4 28½

Sent. Got it first rate! end 4 39 18 } 3451 = 4-40-10

Try and observe some stars to night if possible
will send you some Chicken & coffee if you will stay up all night.

Recd. Will do my best. ~~I am~~ Are you getting tired of this work. Everybody wants you to stay away as long as possible. M. C.

Sent ~~Is~~ Is Mr Brown there. Ans. No. He has gone home, so as to be able to get up in the morning. ~~Ple~~

Please have him tell Mrs R. that I am am well that I sent a card to day and that I am willing to tie down the line or plum pudding till after I get home and no longer. Ans. Mr. Edmonds will inform Mrs R. Thanks. We presume there is to be no observing Friday. ~~No.~~ Ans. No. exchange Friday night.

1st set sent from C to me) 4 26 58 by 3451 ? = 4 27 50
+31
End 4 39 18 " " ? 4 40 10

2nd set To be void. Beg. 4 40 58 by 3451 4 41 50
End 4 46 18 4 47 10

3451 = 51s. slow

June 21 1883

Montreal.

Sent: Ask him to say to Mrs Rogers that I wish she would go to the University Press in the morning and ask Wilson to send Proof the Saturday night and not to send copy. as arranged. Got Proof & letter to day. Write me how the work is getting on.

Recd. We are ready for your clock.

Put in Montreal Clock at $10^{h}\,12^{m}\,10^{s}$ E 664 which is 20^{s} fast of Clock R

Took clock out at 10 22 30

Sent: Did you get the clock o.k.

Ans. Got it beautiful.

Sent Are you ready to put in your clock

Ans.

Sent Go ahead.

Sent. Got it first rate. Is it clear at Cambridge and have you got any stars

Ans

Recd

Our signals to you began at 16h 25m last night and at 16h 34m tonight.

Our signals last night at 10h 10m and tonight at 10h 12m

Prof. McLeod asks please bring down with you the new level of my small transit. I wish to have it tested

~~Sent: Where is it~~.

Recd McL has a full set of stars in one position and last night each plus a complete set in both positions after exchanging

Is it clear now. ~~I ho~~ Some. ~~Yes~~ Slightly cloudy. How with you.

Sent I have 15 stars in one position. Prospect fine for the other position but last night got no stars after exchange. Good set before.

Recd Do you count as having the free value of one night: Yes This will make two. Saturday night next.

OK. Keep the ~~Cloop~~ Clouds away
McLeod! Good Night

June 23 1881

Re'd Q: Is it clear in Cambridge sufficiently to exchange star key sigs to night on any clock?

Sent: Clock first. Are you ready?

~~Recd~~ Re'd: Put in mean time Clock ~~&~~ at 10h 23m 10s by 664 which is 21s fast of Clock 10 22 50

Took out Clock at 10h 34m 30s

~~Fair~~ Cambridge found 10h 34 10 to get the [illegible]

Put in mean time Clock at 10 42 15 by 664 Took out at 10 52 35

~~Re~~ Sent: Did you get it

Re'd Got it all O.K. Are you ready

~~Ans~~ Ans yes

C to M Beg. 17 12 50
End 17 25 10

McLeod observed ξ Draconis at Cambridge which was recorded on the Montreal Chronograph. Rogers observed same star.

Rec'd second set of signals of Cambridge for 5 minutes the minute not having been recorded by mistake on Montreal Chronograph.

Sent I understand that tonight completes the work.

Rec'd Mc observed 109 Herculis 17h 18m R.A. Record both observations there. Nice you have it there. No.

Did you send Sk's Program. That was the one I received. Will send star to you immediately.

Sent ~~Last~~ star you 10h 9m

June 28 1.A. ○ Personal Equation between

A. Procyon
16 28 13
69 1

R M
B.C. D

ζ Ophi
16 30 43
-10 40

M R
C D.E.

Cu. 2377
16 43 5
+56 59

R M
A.E. B.C.P.

M & R and C.U.M. of Cambridge with R.P.

Gr. 848　　　　　　　　λ Herculis

16 33 7　　　　　　　　16 38 53

104 16　　　　　　　　+39 9

R　M　　　　　　　　M　R

C　D.E.　　　　　　　A.E.　B.C.D.

New zero
for sheet

Level

— R — M —

W — E —

5.9	22.2
21.2	6.9
27.1	29.1
13.55	14.55
	1.00
	–.50

Jan 28 1883

K O Minor
16 5 28
+9 33

R M
A E B @ D
345 – 2345

h m
16 55

M

W	E at 16^{55}
21.1	7.0
5.1	23.0
26.2	30.0
13.10	15.00

2(1.90
–0.95

– R – at 16^{55}

W	E
5.1	23.0
21.1	7.0
26.2	30.0
13.1	15.0

(1.90
–0.95

R

W	E at 17^{00}
21.2	7.0
6.0	22.2
27.2	29.2
13.6	14.6

2(1.00
–0.50

W	E
6.0	22.1
21.3	6.9
27.3	29.0
13.65	14.00
	.35
	–.18

$17^h 5^m$

M

W E

219 64

58 226

277 290

1385 1450

.65

−.32

ε Herculis

17 9 19

+14 31

M R

A E

B 34

~~B~~ le D.

very wild strokes (cloudy)

θ Ophiuchi — Seeb $17^h 18^m$

17 4 49

−24 53

R N	R S	M N	M S
6.1	22.1	21~~8~~4	64
21.4	6.6	6.0	22.5
27.5	28.7	27.7	28.2
13.76	14.35	13.85	14.60
	.59		.75
	−.29		−.37

R M

AB ② D E

Jun 28 1883

β Draconis
17 27 47
M R +52 23
B.P. @

α Ophiuchi
17 29 30
+12 39
M R
B D @

17 30

M

N	E
60	221
203	80
~~261~~	~~307~~
~~130~~	~~153~~
263	301
13.15	1505
	1.90
	−.95

R

N	E
6.1	22.1
20.2	8.1
26.3	30.2
13.15	15.1

1.95

−.97

June 30 8 [illegible] C. M

M Circ East

W	E
20.4	9.0
7.0	22.4
27.4	31.4
13.70	15.70
	2.00
	1.00

R Circle West

W	E
20.3	9.1
7.4	22.0
27.7	31.1
13.85	15.55
	1.70
	.85

— Circle West —

Gr. 2164
14 48 28
+~~57~~ 59 46

β Ursae Min
14 51 3
+74 38

M	R
A.E.	B.C.P.

M	R
ⓒ	D

no [illegible] for beginning

109 Herculis
14 40 20
+2 23

M R
A E B C D
2345

no ~~[illegible]~~ rattle

2 α Librae
14 44 24
−15 33

R M
A B C D E.

— Level — 15h 0m

R M.

W	E	W	E	W. E. M	
8.4	21.3	210	90	~~80 221~~	
20.6	9.2	80	221	15.8	14.4
290	305	290	311	13.3	16.9
14.50	15.25	14.50	155	91	313
	.75		1.00	14.55	15.65
	−.37		−.50		1.10
					−.55

Level Skram

June 30 188B

48 H Cephei
15 5 23
+102 42

M R
A E B C D
2345 .. 123 5

1 H Ursae Min
15 13 14
+64 47

R M
A, E. B, C, D.

15 30

M W	M E	R W	R E
14.0	17.0	16.2	14.6
16.1	14.7	13.6	16.9
30.1	31.7	29.8	31.5
15.05	15.85	14.9	15.75
	80		
	.40		

0.85
−.42

α Serpentis
15 38 30
+6 48

R M
B C D A, E.

γ Ursae Min
15 20 55
+72 15
M R
BD C

α Coronae
~~δ Bootis~~
15 29 49
+27 7
R M
A, E. B, C, D.

β Serpentis
15 40 47
+15 47
M R
A E B C D

κ Serpentis
15-43-28 +18° 30'
R M
A E B C D
~~2345~~ 2345

Ursae Min

ζ ~~Serpentis~~ +78°-9'

15-48 16

R 9m

BD C

δ Scorpii

15-53-25

-22°-17'

M R

A.C. B.C.D.

φ Herculis

16 5 5

+45 15

M

C R/DE

Rej before C

δ Ophiuchi −3°-24'

16h-8m-13

M R

A.B.C. ~~B C D.~~

D E

(2345)

B, Scorpii

15 53 25

−22 17

R M

AE BbD

$16^h 0^m$

R

W	E.	W	E
14.1	16.8	16,2	14.9
16.2	14.6	13,8	17.1
30.3	314	100	120
15.15	1570	15.00	16.00
	35		1.00
	−.28		−.50

M above the last two columns.

$3^h 10^m$

R

W.	E.
14.0	16.8
16.1	14.7
30.1	31.5
15.05	15.75

70

.35

.19 Ursa Min

C m

M

B

Reversed E

M

C ⊕

45

June 30 1883

C Σ.

η Herculis

16 16 4 5

15 26

M R

~~B D~~ D

~~B~~ C Σ

Seed

— R —

W	E
13.4	17.4
15.9	14.9
29.3	32.3
14.65	16.15
	1.50
	—.75

Arch East

RG Move Min

16 20 56

76 2

M R

B D C

2nd Strokes 5

h 848

16 33 7

104 16

M R

C D

β Herculis
16 25 11
+21 45
R M
A.C. B.C.D

ζ Ophiuchi
16 30 43
+10 20
M R
~~A~~E B.C.a.O

η Herculis +39°-09'
16-38-53
M R
B.C.D. A.C.

Gr 2377
16 43 5
+56 59
M R
A.~~D~~E. B.C.d.H.
(2345)
Rattle after @

June 30 1883

49 Herculis

16 46 45

+15 1 0

M R

~~A~~ 138 ~~AC.~~

Level 16h 48m

~~M~~

E	W
15.4	15.7
18.2	13.0
33.6	28.7
16.80	14.35
	2.45
	−1.23

ε Urs ~~ae~~ Min.

16-58-00 | +82°-14'

R

E

19 H Camel D.C.

17-9-19 +100°-54

R M

BD – E –

R Ophiuchi

16 5 28

+7 33

M R

CDE, A.B.

h m

16 5 5

R

W E

M

W E

15.7
13.2
89
14.45

15.4
18.0
34
16.70
225
−1.12

α Herculis

17-9-19 +14°31'

R M

BCD A.B.

2345

θ Ophiuchi

17 14 19

−24 53

M R

AE, B.C.D.

June 30 1883

Gm. 7h 6b
17 23 57
+10 5 2

17 18

M		R	
W	E	W	E
13.0	18.8	15.9	16.0
15.9	16.0	12.9	19.0
28.9	34.8	28.8	35.0
14.45	17.40	14.40	17.50
2.95		3.10	
− 1.475		− 1.55	

~~A~~ R M
A B C

17 30

M		R	
W	E	W	E
12.9	18.2	15.8	16.1
15.9	16.2	13.0	19.0
28.8	35.4	28.8	35.1
14.4	17.7	14.40	17.55
3.3		~~3~~	3.15
− ~~1.10~~	−1.65		~~1.57~~

β Draconis

17 27 47

+52 23

M R

BCD AE

α Ophiuchi

17 25 30

+12 39

R M

D E

Reinvestigation of mural level.

Aug 4

Line E of north	Line north	Line W of north
2.53	2.46	2.53
2.59	2.59	2.57
2.53	2.52	
2.52	2.56	
2.54	2.48	

Aug 5

2.63
2.44
2.54"

Elliott Bros. callipers v cm

$\frac{1}{10}$ in = 100.04 div

100.00
100.30
100.20
100.10
100.128