

346

015

Chronograph Record

1867 July 31

tw

1867 Dec 19

Also instrumental corrections to
E. Transit. Level from July 31
Coll. Oct 25

KG 11365.346

78
29

1867 July 31 Wednesday

Check 20 14

Obsns. of Mcmene and (92)
Check

Aug 2 Friday

Check 21 22

Obsns of Mcmene

Check 21 58

Aug 5 Tuesday 1327

Comparison of Frodsham ~~check~~ . 8

Minute break Frodsham 16 55

Check 16 56

Minute break 19 21

Check 19 22

Aquilae Sp E last tally

2 Aquilae " C₄-B₁ reject C₅

E Draconis Rev. to W F_{1,2} reject.

Check 19 52

KG 11365-346

Level Lp w at 20 10
 E 43.8 W 26.5
30.8 39.3
 74.6 65.8 - 2.20



New sheet

Frodsh. 3242 11^h 10^m 50^s 55^s 65^s 70^s3220 11^h 10 50 55 60 65 70Check 20^h 14^m

Check 20 32

3220 11^h 40^m 20^s - 40^s

1867 Aug 8 Thursday

Frodsham (South Clock)

1st min 17^h 25^m

μ' Herculis 5 J Lp w.

Lp w at 17 47

E 43.2 W 24.0

29.0 38.2
 6 72.2 62.2 - 2.50

Rev. to E.

γ Draconis 5 J. Lp E.

Lp E at 18^h 0^m E 42.0 W 25.0

29.0 38.4
 71.0 63.4 - 1.90

Frodsh. 3220 $8^h 54^m 15^s - 35^s$ 30^s perhaps bad
 3242 $8 56 40 - 60$
 8421 $8 58 55 - 75$

Last min 18 7

Aug 9 Friday (South Clock)
 Lp. E at 19 55

E 41.2 W 24.7

28.2 37.7

69.4 52.4 -1.75

τ Aquilae Lp E m J

Rev. to W

Lp W at 20 5

E 42.0 W 25.2

30.0 36.9

72.0 62.1 -2.48

Frodsh 3220. 10 54 5 - 25

8421 10 57 10 - 30

κ Cephei Lp W m J

last thread perhaps a little late.

Chron 236 20 18 0 - 20

Last min. 20 19

Aug 10 Saturday new sheet
1st min 19 52

East Transit.

τ Aquilae corr. to setting 0'
Lost from clouds.

Aug 11 Sunday

Check 19 34

Obsns of Undina (92)

Check. 20 28

Aug 16 Friday

Check 18 45

East. Transit 4p E.

50 Drac. last two wires not lost from clouds.

ζ Aquilae last four wires star faint "

~~Check~~ Frodsh 8421 5 3 0 — 30

3220 9 23 35 — 55

Check 19 7

δ Draconis well obsd.

New sheet

γ Aquilae lost from clouds

Check 19 21

κ Aquilae lost two threads

α Aquilae well obsd.

Frodsh 8421 5 45 35 — 55

Check 19 47

β Aquilae well obsd.

Level ~~19~~ ~~52~~

19 52 Id. 5. C L. E.

20 15 E 37.7 W 64.0

" " C L W

21 10 48.3 52.3

86.0 116.3

$\bar{m} = +0.68$

Saturday Aug 17

Started 20 24^m

Obsns of (92) Andromeda.

Check 21 2

Aug 18 Sunday S. Clock. E. Transit.
1st min 17^h 5^m

α Herculis.

Frodsh 3220 7 21 | 35 - 55

8421 7 22 | 30 35 40 60 70

6 Ophiuchi

Last min 17. 19

Level

17 21^m C L E Tel S.

41 25.7 57.2

" C L W

18 55 41.0 43.8

66.7 101.0 $\bar{m} = +0.77$

New sheet

Obsns. of comet 1867 II

Last min 18 52

Comp of clocks. min. not given.

Started
again

1st min 20 16

Chron 236 20 19 10 - 30

Last min 20 18.

Started again 1st min 21 26

Chron 236 21 28 40 - 60

Last min 21 27

Aug 19 Monday

1st min 17 43
 Frodsh 8421 7 56 0 — 20
 3220 7 57 25 — 45
 y Draconis seeing very bad
 Stopped.

Started again

22 Camelopard. L. C., well observed.

Last min 18 15

Clock rate retarded. Two divisions on head of pendulum.

Set about 0.^s3 ahead of East Clock
 (eye & ear.)

C level E. Tel N.

18 55 E 27.7 W 58.5

" C to W

19 50 E $\frac{41.8}{69.5}$ W $\frac{45.0}{103.5} + 0.77$

New sheet 1st min 20 25

Obsns. of (92)

last min 20 58

Aug 20 Tuesday

18^h 30^m C L E Tel N.19^h 36^m E 30.3 W 63.2

" 6 L W

20	25	45.7	49.0	$\bar{m} = +.81$
		<u>76.7</u>	<u>112.2</u>	

1st min 20 27

8421 10 32 30 — 50

3220 33 20 — 40

East Clock Check 20 32 40

α Cygni
 ✓ Cygni

Started again 1st min 21 31

Aug 21 Wednesday

18^h 25^m C L E Tel S.19^h 0^m 29.5 64.2

" 6 L W

19	35	45.3	48.2	$+ .85 = m$
		<u>74.8</u>	<u>112.4</u>	

1st min 19 34

East Clock

Check 19 38

γ Aquilae

8421 9 ~~41~~ 30 - 50

3220 9 42 25 - 45

α Aquilae

ϵ Draconis

Undina

Last min. 20 17

Aug 24 Saturday new sheet
Various clock comparisons.

1st min. 20 29

East Clock. Check 20 29

α Cygni very ft. through clouds!
4th wire lost.

Frodsh. 3220 10 26 0 - 20

8421 10 27 40 - 60

Last min 21 10

Aug 25 Sunday

19 20 6 L E Tel S.

50 35.0 68.0

" 6 L W

20 30 51.5 53.0

1st min 20 30 $\frac{86.5}{121.1}$ $m = +.77$

East Clock Check 20 34

α bygni

Frodsham 3220 10 21 20-40

8421 10 23 5-25

γ bygni

Last min 20 54

Aug 26 Monday

19 15 C L E Tel. N.

20 30 29.0 69.8

20 55 C L W

22 35 51.2 51.7 80.2 121.5 +.94

East block Check 20 31

α bygni

Frodsh. 3220 10 17 50-70

8421 10 19 50-70

γ bygni last min 20 55

Started again 1st min 22 5
 Undina.
 Last min 22 32

Aug 27 Tuesday

19 35 16 1/2 E Tel S.

20 25 32.0 69.0

20 55 C L W Tel N.

22 30 55.0 48.0

87.0 117.0 +.68 = m

1st min 20 31

East Clock pencil mark at 20 33

Check 20 34

α Cygni

Fr. 3220

10 13 35 — 55

8421

10 15 45 — 65

μ Cygni

ν Cygni

Last min 20 55

Aug 28 Wednesday

19 35 C L E Tel. N.

20 30 27.5 69.0

20 55 6 L W Tel S.

21 35 51.5 48.2

79.0 117.2 + .85 = $\bar{m}$

S. & E. Clocks. Check 20 33

α Cygni

Fr 3220 10 9 20-40

8421 10 11 55-75

μ Aquarii

ν Cygni

Last min 20 54

Aug 30 Friday

Personal Equation.

New sheet.

G W Dean & S Newcomb.

BAC 6084 N leads

lost. pen not marking.
star very faint.

6129 D "

6157 N "

6178 D "

1st that. of 5th lost

6203 N "

6231 D leads

6289 N "

 G W D. & G W. Hough.

6318 D leads

Obsns. by H poor C₃ lost.
Reject.

6357 D leads lost

6387 H

C₁ lost (H not very well obs.)

6429 D

6460 H

6497 D

6528 H

D₃ at 18 59 30
59 18

6556 D

6571 H

6595 D

H not in good condition being unaccustomed to instrument.

 G W H & S N.

6646 H leads

Cost

6670 H "

C₁ lost

6690 H "

6715 N

C₁ late

57 52

6740 N

6772 H

6802 N

last min 19 48

19 50 b to E Tel S.

20 30 39.2 75.0

20 55 C to W Tel S.

22 40 58.2 57.0

$$\begin{array}{r} 97.4 \\ 132.0 \\ \hline 229.4 \end{array}$$
 1st poor. $\bar{m} = +.77$
 E Transit switched out.

East block Check 20 40

8421 10 5 15 - 35

3220 10 5 0 - 25 reg. 10

 μ Aquarii $\checkmark$ Cygni

last min. 20 53

New sheet 1st min 21 10

Obsns of Leda.

2c

Last min 23 30

Aug 31 Saturday (new sheet)

19 35 6 L E Tel. S.

20 25 41.0 75.5

20 55 C L W

23 10 $\frac{59.2}{106.2}$

$\frac{59.2}{134.7} + .77$

α Cygni lost pen not marking

1st min 20 39 E Clock on

μ Aquarii (record very faint.)

ν Cygni

Last min 20 53

Sept 1 Sunday

20 10 6 L E Tel S

20 30 40.5 77.2

20 55 6 L W

22 5 $\frac{58.1}{98.6}$ $\frac{59.7}{136.9}$

East Clock + .86 = m

α Cygni

Pen taken up

Fr. 8421 9 56 20-40

3220 9 55 45-70 reject 45

μ Aquarii very ft. poorly observed.

ν Cygni

Last min 20 55

Sept 3. Tuesday
Chron 236 19 15 10 - 30

19 42 6 L E Tel S.

20 30 40.3 74.3

20 55 6 L W

21 35 54.7 58.2

95.0 132.5 +.85 = $\overline{m}$

1st min 20 28

α Cygni

Fr. 8421 9 48 10 - 30

3220 9 47 40 - 60

γ Cygni lost from clouds

last min 20 54

Sept 4 Wednesday

19 0 C L E Tel S.

20 25 33.2 68.3

21 0 6 L W

21 35 51.8 51.0

85.0 119.3 +.77 = $\overline{m}$

α Cygni

Fr 8421 9 44 20 - 40

3220 9 44 0 - 20

 μ Aquarii

East Clock

 ν Cygni

Chronograph stopped

Fr 3242 10 5 50 - 70

Last min 21 1

Chron 236 21 32 30 - 50

Sept 6 Friday

20 0 C & E Tel S

20 30 35.7 69.3

20 55 6 L W

21 25 51.7 53.2

87.4

122.5

+ 79 = $\overline{m}$ α Cygni

8421 9 36 0 - 20

3220 9 35 5 - 25

3242 9 38 0 - 20

236 20 41 45 - 65

East Clock Check 20 43

 μ Aquarii ν Cygni Last, from. not marking

Wednesday
Sept 11 ~~Tuesday~~

19 50 6 6 0 Tel. S.

20 25 47.0 75.0

21 0 6 6 W

21 45 58.2 65.5

105.2 140.5

+ .79 = $\bar{m}$

1st min 20 29

East clock check 20 31

α Cygni

Fr 3242 9 17 5 — 25.

236 20 41 10 — 30

μ Aquarii

γ Cygni

1867phae.proj...347S

Sept 12 Thursday

18 55 b l e Tel S

20 30 48.8 74.5

20 55 b l w

21 30 55.5 65.5

104.3

140.0

+ .80 = $\overline{m}$

East. Clock

α Cygni

Fr 8421 9 13 35 - 55

3242 9 14 15 - 35

236 20 42 0 - 20

μ Aquarii

Pen taken up & chronograph stopped.
Started again

ν Cygni

Chron 236 22 18 0 - 20

" " 0 6 40 - 85

20. 16 55 $\pm$ 2^s

Sept 14 Saturday

Chron 236 18 55 35 - 55
" 20 20 40 - 60

18 55 b h E Tel S.

20 30 45.3 71.7

20 55 b h w

21 25 62.5 58.0

107.8 129.7 + 49 = m

α Cygni

Fr. 8421 9 6 0 - 20

236 20 41 25 - 35

Fr 3242 9 7 15 - 35

μ Aquarii
East Clock

Sept 15 Sunday

19^h 10^m C L E Tel. S.

20 30 48.0 84.0

20 55 C L W

21 25 $\frac{66.2}{114.2}$ $\frac{64.5}{148.5}$

+ 77 = $\overline{m}$

1st min 20 32

α Cygni

East Clock Checks 20 41

3242 9 4 20 - 40

μ Aquarii

236 20 47 50 - 70

ν Cygni

236 21 57 20 - 40

Last min 21 57

236 23 47 40 - 60

Last min 23 47

Sept 16 Monday

19 30 Lp w. C L E. Tel S.
 20 20 41.2 76.3

21 20 C L E

21 50 41.0 76.5

22 20 56.5 61.0

α Cygni 97.5 137.5 +.90 = $\bar{m}$

E Clock

μ Aquarii lost through haze

Fr. 3242 9 6 30 - 50

σ^2 Urs Maj.

E Clock again.

ζ Cygni

α Lephei

Sept 18 Wednesday

19 30 6 L E Tel 5

20 30 31.0 71.0

20 55 C L W

21 25 50.0 52.8

81.0 123.8 + 96 = $\bar{m}$

α bygni

E Clock Check 20 39

Fr 3242 8 50 30-50

236 20 42 5-25

μ Aquarii

ν bygni

Last min 20 54

Chron 236 3 35 30-50

E Clock check 3 37

Chron 236 5 6 0-20

Sept 19 Thursday

19 20 6 6 E - 7d S.

20 25 37.2 75.3

20 55 6 6 W

21 40 58.2 57.8

95.4

133.1

~~00~~ .85 = $\overline{m}$

Chron 236 19 24 45 - 65

" " 20 15 15 - 35

Last min 20 15

α bygni

Fr 3242 8 45 55 - 75

μ Aquarii

E Clock (check 20 47)

ν bygni

Last min 20 55

of artificial horizon

Iron tray put in clock at the foot
of pendulum after conclusion of obsns.

1st min 22 11
Leucothoe

Last min 22 46

Sept 20 Friday
19 10 6 6 E Tel. S.

Sept 21 Saturday
New sheet

Obsns. of 93?
Last min 23 26

Sept 22 Sunday
20 0. C 6 E Tel 5

20 30 37.0 76.0

20 55 6 6 W

21 25 56.0 58.5

93.0 134.5 + 94 = $\overline{m}$

α Cygni
 μ Aquarii

Fr 3242 8 42 35-55

γ Cygni
 E Clock check 20 54

Obsns of 93
 Last min 22 47

New sheet first min 22 50
 pen taken up 2d " 22 51

Leucothear
 Last min 23 41

Sept 23 Monday

19	50	6 to E	Feb S.	
20	25	43.0	82.0	97.5
20	55	C L W		97
21	25	63.5	63.5	
		<u>106.5</u>	<u>145.5</u>	+ 88 = <u>m</u>

1st min 20 28

α bygni
 μ Aquarii

Fr 3242 8 38 50 - 70
8421 8 38 55 - 65

γ bygni

E Clock

Last min 20 59

1st min 22 17

Leucothæa.

Last min 22 44

Sept 24 Tuesday

19 30 66 E Tel S.

20 30 43.8 79.5

21 25 57.8 67.8

101.6 147.3 + 1.03 = $\bar{m}$

1st min 20 32

& bygni

8 25 50 — 70 Fr. 8421

8 27 20 — 40 " 3242

μ Aquarii

E Clock check 20 48

& bygni

Last min 20 55

First min 22 25

Proserpina

Leucothea

Last min 23 39

First min 0 35

Themis

Last min 1 5

Sept 25 Wednesday
1st min 0 26

Chron 236 0 28 35-55

Pen taken up (too much ink)

" 0 30 50-70

Themis

Last min 0 58

Sept 27 Friday

19 10 6 6 8 Id 8
 20 25 44.5 72.5

20 55 6 6 w

21 30 54.0 66.0

98.5 138.5 + 90 = $\overline{m}$

α bygni

Fr 3242 8 18 15 - 35

μ Aquarii

E Clock (check 20 47)

γ bygni

1st min 23 38

Proserpina

Leucothoe

Daphne

Last min 1 6

Sept 28 Saturday

1st min 22 41

Proserpina - Leucosthen.

last min 23 43

1st min 1 19

Chron 236 1 21 30 - 50

last min 1 20

Sept 29 Sunday

19 20 6 6 E Tel S

20 30 40.0 70.0

20 55 6 6 W

21 35 46.0 65.0

86.0 135.0 + 1.10 = $\overline{m}$

q Lygni

E Clock check 20 42

Fr 3242 8 10 10 - 30

μ Aquarii

v Lygni

Eugenia Chronograph stopped.

Started again 1st min 23 21

Eugenia

Last min 23 42.

Chron 236 1 28 20-40

Pen taken up at 28^m 3^s

Sept 30 Monday

1st min 22 28

Leucothoe

Eugenia

pen taken up after 23 20 for a few sec.

Last min 0 14

Started again 1st min 0 54

Aglaiia

Last min 1 39



Oct 1 Tuesday

19 10 6 to E Tel S.

20 30 55.0 73.0

20 55 6 to w

21 45 57.0 75.0

112.0 148.0 + 81 = $\overline{m}$

α bygni

μ Aquarii lost through clouds.

Fr 3242 8 8 10 - 30

236 20 51 20 - 40

γ bygni

Started 1st min 22 4

Massalia

Lutetia.

Last min 23 42

New sheet 1st min 0 0

Daphne

Last min 0 37

Oct 2 Wednesday
1st min 0 10

Massalia

Daphne

Last min 1 41

Oct 3 Thursday

20 0 C L E T d S

20 30 54.8 69.3

20 55 b b w

21 40 $\frac{53.0}{107.8}$ $\frac{73.0}{142.3}$

+ 77 = $\overline{m}$

α Cygni (extremely faint through clouds)

Fr. 3242 7 51 15 - 35

μ Aquarii lost through clouds
v Cygni " " "

Oct 6 Sunday

17 45 C L E Tel S.

20 30 58.0 74.0

21 10 C L W

22 5 59.8 77.2

 117.8 151.2 + 75 = $\overline{m}$

 v Cygni
 61' Cygni

Fr. 3242 8 4 0-20

236 21 7 25-45

L Cygni

 Started again 1st min 23 40
 Masochia

pen taken up

Lutetia

pen taken up 1st min 0 20

Leto

last min 1 7

Oct 7 Monday
1st min 23 56

Lutetia

Daphne

Leto

Last min. 1 25

Oct 10 Thursday

19 55 L L E Feb S

20 30 49.5 68.3

20 55 L L W

21 35 49.0 68.0

98.5 136.3 + 85 = $\overline{m}$

α Cygni

Fr 3242 7 25 55 - 75

236 20 45 30 - 50

Oct 14 Monday

20 50 C L E Tel S.

22 20 57.5 74.0

22 45 6 to w

23 15 50.2 84.0

107.7	158.0	+ 1.13 = $\overline{m}$
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1st min 22 22 η AquariiMolyneux 8 58 10 ~~58~~ bad

14

18

22

26 bad

8 59

0

4

8

12

47.2 58.0

16 bad

20 bad

 ζ Pegasi ι Cephei

last min 22 46

Oct 15

Molyneux 1481 3 59 14-26
 Last min 17 26

Oct 16

22 10 6 to 2 Tel S

22 40 65.7 69.3

22 0 6 to w

23 30 54.0 81.3

119.7 150.6 + 69 = m

v. baphu

2 Pisc Auct

Chron 236 22 55 30-50

2 Pegasi

Last min 23 1

1 st min 0 1

Imm. of Rumb. 1283

Daphne

Last min. 0 53

New sheet 1st min 0 57

Daphne

Emersion of Rumker 1283

Last min 1 33

Oct 17

21 45 6 6 E Tel. S.

22 40 57.8 65.2

23 0 6 6 W

23 30 43.7 80.2

101.5 145.4 + 99 = $\overline{m}$

✓ Cephei

α Pisc. Aust (4th wire about 0.3 too

α Pegasi soon)

Last min 23 1

1st min 23 39

Imm. 130 Tauri

Daphne

Em. 130 Tauri

Last min 0 46

Oct 18 Friday

New sheet

1st min 1 13

Saphire

Last min 1 46

Oct 19 Saturday

1st min 23 37

Lutetia

Last min 0 7

1st min 0 48

Leto

Nemausa

Last min 1 48

Oct 20 Sunday

22 20 6 6 E Tel. S.

Oct 23 Wednesday

21. 15 6 6 E Tel. S.

22 35 65.6 68.2

23 0 6 to W

0 5 57.8 81.3

123.4 149.5 + 59 = m

✓ Cephei lost pen not marking
& Pisc. Aust.

Molyneux 1481 8 43 30-50

Fr 3242 8 46 20-40

α Pegasi

1st min 0 34

Lete

Last min 1 14

Lill W

Oct 24 Thur

1867

 α Aquariichuck 22^h 3^m π Aquarii α LacertaeBAG 7888, 1st & 3^d wires too soon β Pegasi γ " 2^d wire double break
lost sight λ Aquarii ψ "

BAG 7996

 ϵ^2 Aquarii β Pegasi

BAG 8085-

 γ Piscium δ Cephei θ V Pegasi ϕ Piscium

BAG 8212

 ν Andromedae ι Piscium δ 1st 5^m $\checkmark$ Sculptoris

Gr 4163

Oct 24 1867 Ill W

W Piscium

30

4

2 Ceti

2 Andromedae

γ Pegasi

stop 0 h 8 m

New sheet 1st min 2 4

Aqlaia

Letu

last min 3 5

Oct 25 N. mer. mark 18^h 25^m

73 .02

Middle wire E of mark

72 .00

71 .01

Seeing poor.

70 .00

69 .01

$$0.710 - 0.008 = 0.702$$

Oct 25 7 1867 All W
 20 50 C L E Tel S.
 21 25 61.5 72.2

~~E Pegasi~~ δ Capricorni

π^2 Cygni

$1\frac{1}{2}$ Pegasi

" Capricorni

" Cephei

γ Pisc Aus

α Aquar

δ "

ϵ Pegasi

θ "

ζ Cephei 2^d mine 1st soon

θ Aquarii

ζ "

γ "

π "

ζ " double (mean of the two)

δ Lacertae

γ Aquarii

K "

Oct 25 1867 J. M. W.

5 Pegasi

7 "

2 " "

2 Aquarii

2 Piscis Austr

0 Andromedae

out 22^h 57^m

cross sheet

start 23^h 1^m

4 Aquarii

7 Piscium

7 Pegasi

2 "

0 Piscium

2 Andromedae

1 Piscium

2 "

4 Andromedae

4 Pegasi

3 Cassiopeae

2 Piscium

30 "

2 Ceti star faint obs. nothing seen for

Oct 25 1867 Ill W

2 Andromedae

22

u

2 Pegasi

45-40 0 Andromedae

ant 0ⁿ 11^m

D 15 C L W

0 40 64.0 81.2

32 Camelopard. lost through cloud.

Polaris

Chron 236

Wire

1

2

3

4

5

lost through cloud.

Oct 25^h 1867 Jll $\frac{W}{E}$
26

13^h 4^m started

Palmer's Lc

Out 13^h 20^m

N Mer. Mark Oct 26 17^h 20^m

0.68 0.02^{conc}

70 02

72 02

73 03

Seeing fair.

69 01

0.705 0.020 = 0.685

69 01

70 02

70 03

71 03

0.702 0.021 = 0.681 wire E of mark

Reversed to Lp. E.

-0.14 +0.01

14 00

18 02

16 01

18 01

-16 +01

16 -01

12 +01

14 03

-0.12 +0.009 = 0.159

-08.5 +003

117 25

98 12

101 18

401 48

100 12

0.112

Oct 26 1867 Jll E

Started 21^h 5^m

1 Draconis H

24 Ursae Maj (d) mid wire last row

3 Aquarii

3 Cephei

3 Aquarii

6 Pegasi

1 Capricorni

7² Cygni

14 Pegasi

8 Out 21 49

In 21 5-2 new sheet

0 Aquarii

2 "

1 Pegasi

4 "

3 Cephei

0 Aquarii faint clouds
clouded upout 22^h 20^m

Oct 27 1867 Ill E

Started 21ⁿ 26^m

§ Aquilae Aquarii

E Pegasi

♂ Capricorn

π² Cygni

14 Pegasi

Started anew 21 3-1

γ Piscis Austral

24 & subtetiles no account

§ Cephei

♂ Aquarii

♂ "

γ "

π "

§ " double mean taken

♂ Lacertae

γ Aquarii

K "

§ Pegasi

γ "

λ "

μ "

♂ Aquarii

Oct 27 1867 Ill E

2 Picis Austrinis

0 Androm

2 Pegasi

C² Aquarii

4 "

7 Piscium

2 Pegasi

h' Aquarii

v Pegasi

4 Piscium

out 23 22

started over sheet 23 25-

h' Aquarii

2 Androm

1 Piscium

2 "

4 Andromedae

1 Sculptoris

4 Pegasi

3 Cassiopeae

w Piscium

30 "

2 Ceti

Oct 27 1867 Jll E

2 Androm

22 "

γ Pegasi

4 Androm

1 Ceti

1 Sculptor

BAG 103

12 Ceti

K Cass

13 Ceti

Pi 0 130

2 Cassiopea

21 "

32 Camelopard H both stars

Chronograph stopped

Started again

Polaris (GMS) 3 taps on each wire

Last min. 1 18

Started 1st min 1 57

Daphne. last 2 16

New shed 1st min 2 19

Aquila Leto Nemousa last min 3 30

Oct 28 1867 JH E

Sept 23 18

v Pegasi

θ Piscium

b⁴ Aquarii

λ Androm

ι Piscium

λ "

ψ Androm

δ Sculptoris faint ^{no sword} last merest

φ Pegasi

g Cassiopeae

w Piscium

30 "

2 Ceti

2 Androm

22 "

γ Pegasi

θ Androm

ι Ceti

12 Cassiopeae

Out 0^h 24^m

Oct 29 1867 Ill E
 New sheet 1st min 18 15
 for 8421 3 45 0 -20

Oct 30
 1st min 3 28

Oct 31
 1st min 2 36
 Nebula, Daphne, Aglauria.
 last min 4 11

Nov 1 1867
 started 21^h 5-6 m

2 Agauria

1 Pegasi

4 "

3 Cephei

4 Agauria

* "

$7\frac{1}{2}$ m W XXII 223

8 "

8 "

8 "

8 "

Nov 1 1867 Ill E

2 Lacertae

7 Aquarii

K "

5 Pegasi

7 "

12 "

14 "

17 Aquarii

18 "

2 Piscis Austr

6 Androm

2 Pegasi

C Aquarii

9 "

12 Piscium

17 Pegasi

18 Aquarii

19 Pegasi only lustre in clouds

20 Piscium

21 Androm

1 Piscium

2 "

4 Androm

Nov 1 1867

M E

S Sculptoris

P Pegasi

g Cabb

W Piscium

2 Androm

22 "

2 Pegasi

4 Androm

1 Ceti

out 0^h 18^mNew sheet 0^h 21^m

K Cassiopeae

13 Ceti

32 Camel ^{α Cassio.} ze latter x'o

2 Sculptoris

* fr 3' S W O 95.6 B.A.C. 281(?)

E Piscium

μ Cassiopeae

B Androm

X Piscium

Polaris last more last m clouds
out 1^h 18^m

Nov 2 1867

Ill E

1st min 2 0

Nov 2

started 22^h 6^m

θ Aquarii

δ "

γ "

π "

ε "

γ Pegasi

λ "

μ "

λ Aquarii

✓ "

λ Pis austr

α Androm

λ Pegasi

C² Aquarii

φ "

γ Piscium

α Cephei

ν Pegasi

λ Dracon aut 23^h 24^m

Nov 2 1867 Ill. E.
 cum sheet 28^h 27^m

1 Androm

1 Piscium

2 "

4 Androm

1 Sculptoris

1 Pegasi

3 Cassiopeae

10 Piscium

30 "

2 Ceti

2 Androm

22 "

7 Pegasi

4 Androm

1 Sculptoris

} also four
 stars not
 visible at times

ant 0^h 29^m

Nov 4 1867

Ill E

2 30 P M

Lh. E.

S Mer mark

Seeing very fine

3.49

4.00

3.83 3.94 4.06

48

01

80

94

.07

48

01

83

96

.06

49

02

82

95

.06

49

01

83

95

.05

48

02

3.822 3.948 4.060

49

02

48

00

49

01

.50

4.02

Means.

3.487

4.012

3.943

Wire E of N mark 0.069

i E of S mark 0.525

Measurement of + rotation Therm. 55

Eastern wire	diaphragm			
0.86	2.43	4.02	5.59	7.19
85	43	01	58	17
86	43	02	59	17
85	42	02	58	18
85	43	02	58	19
0.854	2.428	4.018	5.584	7.180

Nov 4

1867 J. L. W.

Reversed to w.
wire E of
N mer mark

4.60	4.70	4.81	4.01	5.17
61	73	83	00	18
62	73	84	00	18
60	71	83	01	16
62	71	80	01	18
<u>4.608</u>	<u>4.716</u>	<u>4.822</u>	03	15
			01	17
			02	19
			01	15
			01	17
			<u>01</u>	<u>17</u>
4.715			4.011	5.170

coll.
 wire E of N mark .704 | 0^r.318
 E of S mark 1.159 | .317

Western wire

7.18	5.59	4.03	2.44	0.86
18	58	4.01	43	.87
18	58	3.99	44	87
18	57	4.01	43	86
16	57	02	43	86
<u>7.176</u>	<u>5.578</u>	<u>4.012</u>	<u>2.434</u>	<u>0.864</u>

Sept 17

0.859	-3.154	0.840	-3.160
2.431	-1.582	2.421	-1.579
4.015	+0.02	4.005	+0.05
5.581	+1.568	5.568	+1.568
<u>7.178</u>	<u>+3.165</u>	<u>7.167</u>	<u>+3.167</u>
20.064	-4.736	20.001	-4.739
4.013	+4.735	4.000	+4.740

Assuming mean - middle $LpW = -0.003$
 Hence coll. of mean of threads LpW .
 $+ \tau^{321} = +0.733$

or with diam. aberr. $+ .72 w$
 $- .75 \varepsilon$

Nov 4th 1867 at star
 Start 13^h 6^m
 Pulsis 2 3 4 wires
 & Wiggins
 Out 13^h 21^m

Nov 5 Tuesday 1867 Ill W

17 10 6 L E 7d S

17 45 58.7 73.1

" " 6 L W

18 20 55.3 74.7

$$\begin{array}{r} 114.0 \quad 127.8 \quad \bar{m} = +.76 \end{array}$$

d Lyrae

Last min 18 33

3242 3 39 0 -20

8421 3 37 40 -60

Last min 18 36

Shut 21^h 45^m

m Cephr

γ Pis cels

o Aquar

d "

l Pegasi 1st m last

θ "

γ Cephei

w XXII 223

θ Aquar x full body 0 79.5

2 74.5

8 Aquar 1.95.0

Nov 5 1867 Ill W

S Aquarii

d Locertae 1st m East

γ Aquar

x "

S Pegasi

γ "

new about 22ⁿ 48^m

d Piscis Aust

o Androm

d Pegasi

c² Aquarii

φ "

γ Piscium

γ Peg

b₁ Aquar* Pr & V Pegasi 5th m{ Rump 11133
Arg Z +22° 4829 }

v Pegasi

θ Piscium

b² Aquarii

λ Androm

i Piscium

λ " "

Nov 5th 1867 Jll W

4 Androm

1 Sculptoris

4 Pegasi

3 Cassiopeae, 1st wire, 1st too soon

10 Piscium

30 "

2 Ceti

2 Androm

22 "

7 Pegasi

4 Androm

1 Ceti

1 Sculp

12 Cassiopeae

BAC 103

12 Ceti

4 Cass

13 Ceti

P₁₀ 130

2 Cass

3 Ceti

3 Androm

x 7 Pa x Androm 10" cr W₂ O 1062

x Androm

Nov 5th 1867 Jll W

32 Camelaf H butter x s

2 Sculptorass

C. Roseum

lost ch 0⁴ 5-6

1st class 1^h 2nd

X Ricinus

Polaris

last thin 1ⁿ 18^m

New sheet

1st min 2 8

Euphonia

Europa

Euryptome again

last min 4 6

Nov 6 1867

22h 15m

π σφραγί

2

3

1 K

4

h f Pegasi

Nov 6 1867 Ill W

2 Pegasi mid morning clouds faint
 n " "
 2 Aquarii
 v " "
 0 Androm
 2 Pegasi
 9 Aquarii 1st W lost cloudy
 7 Pisc 1 2 m lost
 7 Peg
 6 Aquarii mid m only
 v Pegasi
 0 Piscium
 6 4 Aquarii
 absent 23^h 3 4^m

1st min 2 30

This be

Immersion of

Last min 3 14

New sheet 1st min 3 16

Eurynome

Europa

1st min 4 15 Chron 236 4 16 40 - 60

Nov 9

Fr 8421 21 51 40 - 60
 Last min 13 10

Nov 11 Monday

21 10 6 L E Tel S.

23 10 60.8 76.5

23 35 6 L W

0	10	65.0	81.8
---	----	------	------

125.8	158.3	+ .73 = $\overline{m}$
-------	-------	------------------------

- δ Piscium

2 Draconis L C tremulous

Chron 8421 8 3 0 - 20

3242 8 7 0 - 20

 γ Cephei tremulous

last min 23 35

Started 0 52 1st min 0 53

Nov 11 1867 Jll W
G de S observer

χ Piscium

37 beti

ξ Androm

δ beti

ω Androm

α Androm

η Piscium

ν Perseus

τ Androm

ν Piscium

θ Piscium

χ beti

β Arietis

50 Cassiopeia

$\nu\gamma$ Androm

New sheet 1st min 2 0

α Draconis L C

ξ_1 beti

δ Trianguli

θ beti

κ Fornacis

ξ_2 beti

δ beti

Nov 11 1867 Jlt W G M S obs

 γ beti ϵ , Eridani poorly observed α beti β Persei δ Arctis ζ Arctisstar n.p.; ζ Eridani B46 10 10 ζ Eridani κ' beti α Persei σ Tauri

Moon II Te.

 f Tauri ϵ Eridani

Last min 3 27

Nov 12

8421 3 53 30 — 50

Last min 19 21

Nov 12

8421 22 3 50 — 70

3242 22 8 15 — 35

~~Last min 13 34~~

Pen up 13 36 20

Nov 13 1847 Jll W
 1st min 23 55
 Imm III Tauri
 last min 0 12

0 15 66 E Tel S.

1 0 77.5 87.3

1 25 61 W

2 0 77.2 89.0

154.7 176.3

+ .49 = $\overline{m}$

1st min 0 37

Em III Tauri

last min 0 55

New sheet 1st min 0 58

θ' beti

A Cassio

η Piscium

8421 9 55 25 - 45

3242 59 45 - 65

236 1 31 5 - 25

Imm 115 Tauri mean of two taps

Em " "

Last min 2 9

Nov 17 Sunday

0 50 66E Tel S.

1 25 75.0 86.0

2 0 66W

2 40 77.2 86.5

$$\begin{array}{r} 152.2 \\ 172.5 \end{array} + 46 = \overline{m}$$
 β Arietis

50 Cassiope

Fr. 8421 10 6 5-25

3242 10 10 45-65

236 1 58 10-30

 α Arietis last tap 0.2 too soon

last min 2 0

Nov 18 Monday

8421 2 6 45-65

last min 17 58

on all W	Nov 21	Thurs
8.2	84.2	all W.
7.2	83.6	Sat Time
8.0	84.0	19 h 25 m
6.5	81.8	
6.0	80.5	
7.5	82.0	
<u>43.4</u>	161	
72	82.7	75.5

Nov 21 1867 full W E Med
 Started 23^h 21^m also

h^o Aquarii

λ Androm

ι Piscium

λ "

γ Androm

δ Sculptoris

φ Pegasi

g Cassiopeae

W Piscium

30 "

2 βeti

2 Androm

22 "

γ Pegasi

θ Androm

ι βeti

ι Sculptoris

12 Cassiopeae

BAC 10 3

12 βeti

x Cassiop

13 βeti

Nov 21 1867 Jll W

Pi 0 130

d Cassiopea

γ Beta

δ Androm

ϵ m

32 Camelopard hatta x 5

d Sculptoris

e Piscium

n Cassiopeae

β Androm

x Piscium

Polaris

out 1^h 15^m

crew shut 1^h 19^m

A Androm

γ Piscium

Bet G 466

v Persei

(pr 5' m 1st m last Lat 3023

(x Androm

x Piscium

(⁰ pr 2' d S miles 123 WI 753

(X Beta

Nov 21, 1867 Ell M

B. Arctis

(X at m

* 7 m fol & 1.5- W I 1172

v Ceti

Andromeda double both * 0 taken
& Arctis

B. Trianguli

65-8' Ceti

✓ Trianguli

0 Ceti 4 m

K. Harnacis

Out 2 h 17 m

Euryome

Last min 5 17

let down on 5 18 45

Lines Mar 26 1867 JWW

start 1^h 5^m

Palanis miss 3, 4, 5-

A ceti

W Androm

A "

γ Piscium

BAC 466

ν ~~Pegasi~~ Persi

ε Androm

γ Piscium

ant 1^h 36^m

new shoe 1 45

B Arctis

{ ² ~~W.I. 1172~~ 2 x 0 better taken

ν ceti

γ Andromedae 2 x 0 better

2 Arctis miss 4, 5-

B Trianguli

3' ceti

δ Trianguli

o ceti 3, 4, 5- miss

F K Fornacis

{ 2 ceti

Nov 26 1867 JLM

 σ beta γ " $\checkmark$ " γ " γ Eridani

41 Arietis

 ϵ Persi γ Eridani θ " both stars. δ beta3^h 7^m new start

Europa

Euryome

last min 4 15

Nov 27

M M or all

43 82.5

58 78.0

50 81.5

61 81.2

60 81.2

48 82.5

56 80.9

47 79.9

403 7.7

53 81.0

.758

Nov 27 1867 Ill W

Nov 27 Start

Start 22^h 5-6^m

ϵ^2 Aquari

BAG 8073

* 7 hr & of edge 18' cr 1st in last.

ϕ Aquarii

γ Piscium

* 7 hr 10 cr γ Pegasi

γ Pegasi

δ^1 Aquar

{ * 7 $\frac{1}{2}$ 8' cr hr Rump 11133

{ ϕ γ Pegasi

δ Piscium

γ Draconis

γ Androm

γ Cephei

ψ Androm

δ Sculptoris

ϕ Pegasi

Gr 4163

ω Piscium

γ Beti

δ Androm

22 "

Nov 27 1868 J. L. W.

r Pegasi

t Androm

l Centi

14 Sculpt

12 Cassiope

B+C 203

12 Centi

K Cassiope

13 Centi

Pi O 130

B Centi

g Androm

r "

(9) B+C 237

20 Centi

r Cassiope

d Sculptoris

SE Pis 4 " W O 95-6

G Pisc

2616 Centi 1273 Piscium

m Cassiope

Palanis

t Centi

w Androm

A "

10 Centi 12 25 Piscium

Dec 2 Monday
New sheet.

Tr. 8421 3 11 0-20

Last min 19 58

19 40 6 L E Tel S.

20 10 78.8 88.5

20 10 6 L W

20 35 79.0 88.0

157.8 176.5

+ ⁵⁰43 = m

1st min 4 4

Euryome

Galateu

Antiope

Last min 6 9

Dec 3 Start 23 47^m
 2 Ceti
 2 Androm
 7 Pegasi
 8 Androm faint clouds
 clouded up

1st min 2 45

1st min 5 57

Dec 3 Med
 Started 1^h 30^m

7 Androm
 7 Piscium W 12 last } poor

0 4

X Ceti

B Arctis

2 "

7 Androm

2 Arctis

3 Trianguli

65 Ceti

out 2^h 7^m

Observations
 of the account
 Dandy

Dec 5- 1867 Ill W
 Started 0^h 33

20 Ceti

x Cassiopee

d Sculptoris

E Piscium

n Cassiopeae

B Andromedae

x Piscium

Polaris 4th wire last

w Androm

A "

γ Piscium

B 46 466

v Persei

γ Androm

x Piscium

o "

no 25- = Bet 6 55-1

{ 3 m 6.5^m W I 753

{ x Ceti

B Arctis

x "

v Ceti

Dec 5-7 1867 Ill 17
~~Antiope~~

1st min 6 25

Antiope

last min 7 18

Dec 7 Sub

Planted 0^h 10^m

✓ Cete

✓ Sculptor

44 Pis

BAC 103

12 Cete

{ K. Cass 1.2. last

{ 3 fol 7^m Arg Z+62 no 107

{ 1st fol 7^m 109

Pi 0 130

2 Cass

3 Cete

{ 1st Pr 7^m

W 0 1008

{ 2 And

{ 1st Pr 7

W 0 1057

{ 2 Pr 7 345

" " 1062

2 Androm

Dec 7 1867 Ill W

BAC 237

20 Ceti

10

W O 870

2 Sculptoris

e Piscium

26 Ceti

73 Piscium

77 " double better X 5

33 Ceti

Polaris

b Ceti

w Androm

A "

70A Pisc

v Pisc 466

(20 Pisc 6 m Lat 3023

i Androm

v Pisc

WI 679

Lat 3226

BAC 551

Ceti 1 h 42 m

Dec 7 1867 Jll W
 crew sheet # 47^m

v Ceti

x Androm dupl hatter *

2 comets

3 pangs

✓ " "

32 BAC 708

o Ceti

4 Harpocis

5² Ceti

34 BAC 776

o Ceti

r " "

36 W II 523

s Ceti

37 W II 585

r Ceti

r Eridani

41 comets

8 Peas

40 W II 795

η Eridani

2 Ceti 1st in last
 out 3h 1m

Dec 8 Sunday

2 45 66 E Tel. S

3 35 85.5 92.0

" 66 W

5 35 82.0 99.0

167.5 191.0

+ 53 = $\overline{m}$

1st min 5 1

Egeria

1st Drac. pr. L.C.

α Orionis

Chron 3242 12 39 30-50

Last min 5 50

Dec 9

1st min 19 59

Fr 8421 2 45 30-50

Dec 9 1867 Ill W

Start 9^h 5^m

Lat 163 BAG 42 BAG 57

2. 3. 4.

Ceti

C Sculpt

12 Cass

BAG 103.

K Cass

19^h 163

Arg Z + 62° no 107

13 Ceti

PKO 130

2 Cass

B Ceti

5 And

19^h

PKO 1057

19 Androm

9 BAG 237

20 Ceti

Y Cass

10 W O 870

2 Sculpt

C^{rise} 26 Ceti

713 Piscium

77 Piscium d

Dec 9 1967

Jll W

X Perseus

Palmer

A Ceti

W Androm

V Perseu

(Pr Lal 3023

X Androm

r Perseus

0 4

25 Bet 6 551

(Pr W I 753

X Ceti

Betriet

27 W I 865

(X Androm

fel

W I 1172

N Ceti

X Androm 1st w 1st in right

2 Arietis

B Thang

30 W II 7

05 Ceti

J Thang

Dec 9 1867 Jll W

32 B&C 708

o Ceti

K Harnacis

32 Ceti

34 B&C 776

o Ceti

r u

36 W II 523

✓ Ceti

37 W II 585

r Ceti

ant 2ⁿ 3ⁿ 4ⁿNew sheet 1st min 3 28

Calliope

last min 3 53

1st min 4 41

β Camel

✓ Tauri

2 Endiam

Dec 9 1867 Ill W

λ Aurigae

Star hr 0 Orionis = BAC 1657

β Tauri

Chronograph ran down

1st min 5 25

δ Orionis

α Leporis

ϵ Orionis middle of tap on wire 2

σ Orionis

ζ Orionis

γ Leporis

ζ Leporis

τ Aurigae

ξ Aurigae

β Columbae

α Orionis

β Aurigae

γ Columbae

χ^4 Orionis

BAC 1946

ν Orionis

22 Camelopard

last min 6 8

825

Dec 10 Tuesday Ill W

started 0 h 4 m

1st W last W O 99

Lul 163

2 3 4 B46 42 B46 57

1 Sculptor 2^d W 2 break mean right

12 Cassiope

5 44 Piscium

12 Centi

13

7 B46 161

A d Cassiope

B Uti

y Ande

(Pr W O ~~1057~~ 1062

(x Ande

9 B46 237

20 Cent

x Cas

10 W O 870

e Psc

M Cassiope

B Androm

Polaris

Dec 10 1867 Jll W

o Ceti

w And

A 4

y Rise

BAC 466

v Regulus

L = Jul 30 23

v A And

v Rise

$$\left(\begin{array}{l} \text{o} \\ \text{p} = \text{W} \text{I} 753 \end{array} \right. \begin{array}{l} 4 \text{ mins} \\ 5 \text{ "} \end{array}$$

B And

L " daphnia both taken

o Ceti 1st m lost

x Andromeda dup

d And

B Huang

65 Ceti

o Rising

o Ceti

x formica

3² Ceti

34 = BAC 776

Dec 10 1867 Ill W
 5- Ursae Min
 ✓ Ceti

37 = W II 585-

✓ Ceti

out 2^h 37^m

New sheet

1st min 3 19

Dec 11 Wed
 start 0^h 2^m

✓ Pegasi
 W 099 Lat 163 BAC 42 BAC 57
 1. 2. 3. 4

✓ Ceti

5. 6 44 Piscium BAC 113

13 Ceti

7 BAC 161

✓ Cassiopea

3 Ceti

8 BAC 221

E Pisc W 1.2 lost

Polaris W 3.4.5. out 1^h 15

Dec 11 1867 Ill W

started 2^h 25^m

✓ Ceti

r "

r' Eridani

41 Antri

r Persi

γ Erid

2 Ceti

44 W II 1008

B Persi

✓ Antri

3 "

(Pr = BAC 1010

5 Eridan

K' Ceti

2 Persi

0 Lani

ant 3 18

Dec 16 1867 Jll W

Dec 16 1867 Monday

started at 3 4^m

t Piscium

M Cassiope

B Androm

33 Ceti 1st W last

Polaris

4th Ceti

21 W I 322

γ Risc

BAL 466

(Pr = Jul 30 23

γ Androm

o Risc

BAL 551

(Pr = W I 753

× Ceti

B And

W I 865

(x Androm

Jul W I 1172

ant, 1^h 5-2^m

Dec 17

8421 | 3 24 50 — 70.

Myrky

~~last min~~ 21 13 40 45 50 55.

New sheet 1st min 5 34

Galatea

Thiober

Pen put down at 7 48

Antwpe

last min 8 36

Dec 18 Wed

0^h 26^m

M M M M

8.9 84.2

5.8 79.7

5.8 81.5

6.4 82.5

7.0 83.3

7.5 85.3

6.6 84.3

7.1 87.0

6.5 88.5

6.6 84.3

6.8 84.3

.77 5

Dec 28 1867 Jll W

Start 0 h 5^m

No 4 BAC 57

✓ Sculpt

44 Piscium

BAC 113

13 Ceti

BAC 161

2 Cassiope

3 Ceti

BAC 221

W Oⁿ 870

ε Pisc

77 Pisc & fol

14 = 29 Ceti

16 = 33 "

17 = 35 "

Polaris W 2 3 4

20 = BAC 405

θ Ceti

21 = W I 322

η Pisc

Dec 18 1867 Ill W

102 = Lat 3023
x Ande

x Piscium

23 = WI 679

o Piscium

02 = WI 753
1-4 miles

x luti 2-5 "

26 = $\frac{8}{3}$ Piscium

27 = WI 865

12 Ande

fol = WI 1172

28 = 112 Piscium

29 close double x Piscium

8 m fol

Lat 3772

8 m fol same for Arg 2 + 2 no 322

Ande

3 Luang

30 1st m last W II 7

65 luti

8 m 3' or 02 Lat 4150

o Friary

32 = BAC 708

o luti

x fornacis

Dec 18 1867

 γ^2 Ceti

34 = BAC 776

 δ Ceti γ^4 ~~34~~ ~~W 36~~ W II 523 δ Ceti

37 = W II 585

 γ Ceti

39 = BAC 852

out $2^h 30^m$ New Sheet $2^h 44^m$ γ Eridani θ " dup δ Ceti

44 = W II 1008

 β Persi

48 Cephei

 γ Arctis ρ

BAC 1010

 γ Eridani κ^1 Ceti α Persi

47 W III 277

 α Fauri

Dec 18 1867 JLE

{ Zauri

48 = W III 376

f Zauri

e Eridani

10 Zauri

s Persi

s Eridani

(Pz W 1.2 BAC 1164

y Zauri

r' Eridani

s 2 = W III 836

{ Persi

s 3 = 1st W III 915 -
W best 2^d late

e Persi

r' Eridani

out 3^h 52^m4^h 0^m

C L E Tel S

5^h 0^m

94.2 92.8

11

C L W

6 0

82.3

99.8

176.5

192.6

+ 36 = m

1st min 5 28

Galatea

Antiope

last min 6 47

New sheet

1st min 10 51

1st min 12 13

last 12 38

$$\begin{array}{r}
 7 \quad 26 \\
 + 6 \quad 38 \\
 \hline
 - 23.5
 \end{array}$$

Dec 19 Lhox Jct W

start 0^h 40^m(or 0^h 8^m W₂ 0 956

E. Piscium

74 30^h 30^m dst
29 30^h 30^m 12^h 12^m lost33 30^h 30^m 12^h 12^m lost35 30^h 30^m 12^h 12^m lostH = WI III 2^m

H = Palanis W 3, 4

20 = B46 405

21 = WI 322

y Piscium

out 1^h 27^m

1.57

2.28

1256

314

314

3.5796

1.7300

5.3144

6.4156

1.7782

8.1938

.0157

3.58

1.79

53.7

