

KG  
11366  
181

Ida E. Woods  
Bk. 5  
Cluster Variables.



KG 11366, 187

I.E.W. Book No. 5.

1917phae.proj.1183W



KG 11366.181





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530

December 6, 1917.

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M15

Excellent light

Plate No. Var. Est. Plate No. Var. Est. Plate No. Var. Est.

Var. No. 30 MW 3439 15.6 H 1716 15.45 MW 2626 15.95

See faint  
stars close  
to Var.

3444 15.55 1728 " H 1732 "

especially  
well shown  
in MW 3432

3441 15.35 1722 " MW 2587 15.85

3432 16.2<sup>1</sup> 1745<sup>about</sup> 15.65 2606 15.55

2628 15.65 1737 " 2610 15.75

2613 15.35 MW 3395 15.9 2618 15.75

2620 15.95 2592 15.65 2582 16.2

2595 15.2 2600 15.6 3429 16.0

2619 15.7 2608 15.6 2588 16.0

2593 15.65 3394 15.7 2607 15.85

H 1746 <sup>about</sup> 15.7 2585 16.1 2596 15.4

1733 15.9 2624 15.6 2598 15.3

1724 " 3401<sup>on</sup> 15.75 3396 16.2

1725 " 2401 2584 15.85 2590 15.6



December 6, 1917.

M 15

| Var. No. | Plate No. | Var. Est. | Plate No.             | Var. Est.              | Plate No. | Var. Est.   |
|----------|-----------|-----------|-----------------------|------------------------|-----------|-------------|
| 30       | MW 2621   | 16.15     | H 1715                | "                      | MW 2614   | about 15.45 |
|          | 2616      | 15.85     | 1719                  | 15.8 or 9              |           |             |
|          | 2609      | 15.65     | MW 3434               | 15.7                   |           |             |
|          | 2612      | 15.8      | 2629                  | 15.55                  |           |             |
|          | 3447      | 15.75     | 2623                  | 16.05                  |           |             |
|          | 3446      | 15.7      | 3428                  | 16.0?                  |           |             |
|          | 2604      | 15.6      | 2631                  | 15.6                   |           |             |
|          | H 1720    | 15.6      | <del>2590</del> 15.7? | = Var. 3.              |           |             |
|          |           |           | Scratch close to Var. |                        |           |             |
|          | MW 2602   | 15.45     | <del>3396</del> 15.85 | Transferred to page 7. |           |             |
|          | 3437      | 15.25     | <del>2598</del> 15.3  |                        |           |             |
|          | 2580      | 15.9      | <del>2596</del> 15.45 | Continued on p. 11.    |           |             |
|          | 2632      | 15.3      | <del>2607</del> 15.78 |                        |           |             |
|          | 2597      | 15.15     | <del>2588</del> 15.9  |                        |           |             |
|          | H 1726    | "         |                       |                        |           |             |

6✓

December 7, 1917

| M15               |         |       | Excellent light |       |              |
|-------------------|---------|-------|-----------------|-------|--------------|
| Plate No.         | Var.    | Est.  | Plate No.       | Var.  | Est.         |
| Var. No. 3        | MW 3429 | 15.25 | MW 3428         | 15.15 | MW 2620 16.1 |
| Thing Sep. 3      | 2582    | 15.85 | 2623            | 16.05 | 2628 15.55   |
| Var. 3 is         |         |       |                 |       |              |
| very far          | 2618    | 16.05 | H 1719          | "     | 3432 15.6    |
| from sequence     |         |       | perhaps         | 15.5  |              |
| Stars blit        | 2610    | 15.35 | 1715            | "     | 3441 15.85   |
| Seq. 1 is equally |         |       | T.p.            |       |              |
| far from Var.     | 2606    | 15.7  | 1726            | "     | 3444 15.7    |
| and Seq. 1 on     |         |       | T.p.            |       |              |
| most plates       | 2587    | 15.9  | 1728            | "     | 3439 15.7    |
| seems to be       |         |       | T.p.            |       |              |
| more distorted    | H 1732  | "     | 1725            | "     | 2629 15.65   |
| being further     | T.p.    |       | Var. ft.        |       |              |
| from center.      | MW 2626 | 15.88 | 1724            | "     | 3434 15.75   |
|                   |         |       | T.p.            |       |              |
|                   | 2624    | 15.9  | 1733            | "     | 2631 15.45   |
|                   |         |       | T.p.            |       |              |
|                   | 2585    | 16.05 | 1746            | "     | H 1745 "     |
|                   |         |       | T.p.            |       | T.p.         |
|                   | 3394    | 15.85 | MW 2613         | 15.48 | 1737 "       |
|                   |         |       |                 |       | T.p.         |
|                   | 2608    | 15.35 | 2593            | 15.45 | 1716 "       |
|                   |         |       |                 |       | perhaps 15.7 |
|                   | 2584    | 15.78 | 2619            | 16.0  | 1722 16.1    |
|                   |         |       |                 |       |              |
|                   | 3401n   | 15.65 | 2595            | 15.55 | MW 2604 15.6 |
|                   | 2401    |       |                 |       |              |



December 7, 1917

M 15

| Var. No. 3 | Plate No. | Var. Est. | Plate No.             | Var. Est. |
|------------|-----------|-----------|-----------------------|-----------|
|            | MW 3395   | 15.55     | H 1720                | 15.45     |
|            | 2592      | 15.6      | MW 2614               | 15.6      |
|            | 2600      | 15.4      | 2590                  | 15.7?     |
|            |           |           | Scratch close to Var. |           |
|            | 3446      | 15.55     | 3396                  | 15.85     |
|            | 3447      | 15.7      | 2598                  | 15.3      |
|            | 2612      | 15.5      | 2596                  | 15.45     |
|            | 2609      | 15.3      | 2607                  | 15.78     |
|            | 2616      | 15.7      | 2588                  | 15.9      |
|            | 2621      | 15.9      |                       |           |
|            | 2597      | 15.15     |                       |           |
|            | 2632      | "         |                       |           |
|            | T.H.      |           |                       |           |
|            | 2580      | 15.75     |                       |           |
|            | 3437      | 15.7      |                       |           |
|            | 2602      | 15.55     |                       |           |

Continued on page 12

Copied

December 7, 1917.

M15

|                           | Plate No.                          | Var. Est.       | Plate No.       | Var. Est.        | Plate No.       | Var. Est.  |
|---------------------------|------------------------------------|-----------------|-----------------|------------------|-----------------|------------|
| Var. No. 22               | MW 2588                            | 15.15           | MW 2597         | 15.45            | MW 2600         | about 15.5 |
| Var. very far from center | 2607                               | 15.75           | 2621            | 15.85            | 2592            | 15.15      |
| and far from Sequencer.   | 2596                               | about 15.5      | 2616            | 15.78            | 3395            | "          |
|                           |                                    |                 |                 |                  | 15.9 or fainter |            |
|                           | 2598                               | 15.48           | 2609            | 15.9             | 2631            | 16.05      |
| Seq. No. 3 used.          | 3396                               | 15.7            | 2612            | 15.9             | 3434            | 15.3       |
|                           | 2590                               | 15.15           | 3447            | 16.05            | 2629            | 16.0       |
|                           | <del>2614</del>                    | <del>15.5</del> | 3446            | 15.9             | 3439            | 15.25      |
|                           | H 1720                             | "               | 2604            | 15.7             | 3444            | 15.78      |
|                           | Th                                 |                 |                 |                  |                 |            |
|                           | MW 2602                            | 15.6            | H 1722          | "                | 3441            | 15.7       |
|                           |                                    |                 | Th              |                  |                 |            |
|                           | 3437                               | 15.22           | 1716            | "                | 3432            | 15.12      |
|                           |                                    |                 | perhaps 15.65   |                  |                 |            |
|                           | 2580                               | 15.65           | 1737            | "                | 2628            | 16.15      |
|                           |                                    |                 | Variable faint. |                  |                 |            |
|                           | 2632                               | "               | 1745            | "                | 2620            | 16.1       |
|                           | Apparently very faint. Poor plate. |                 | Th              |                  |                 |            |
|                           |                                    |                 | 1737            | "                | 2595            | 15.18      |
|                           |                                    |                 | Var. faint      |                  |                 |            |
|                           |                                    |                 | <del>1716</del> | <del>15.6?</del> | 2619            | 15.9       |



December 7, 1917.

M 15

Plate No. Var. Est.

Var. No. 22 MW 2593 15.15

2613 15.88

H 1722 "

about 16.0 or

fainter.

MW 2604 15.7

3446 15.9

3447 15.88

2612 15.7

2609 15.7

2616 15.7

2621 15.8

2597 about  
15.25

Continued on page 13.

Saturday, December 8, 1917.

Continued from M15

Bb. p. 218 Plate No. Var. Est.  
Var. No. 2 X 7986 15.65

8912 15.85

7985 15.7

12162 15.7

8664 16.1?

8014 "

T.p.

10893 "

T.p.

7767 15.85?

8780 15.7

10897 15.6

8869 about 15.8

8920 15.7



Dec. 8, 1917.

Continued from M15

~~Page~~ page 5

Var. No. 30

Plate No.

Var. Est.

I 10897

15.7

8780

15.3

7767

15.9

10893

15.3

8014

15.7?

8664

15.48?

12162

15.7

7985

15.55

8912

15.45

7986

15.6

8920

15.45

8869

15.75

December 8, 1917.

(continued  
from page 7)  
Var. No. 3

M15

Plate No. Var. Est.

X 7986 16.0

8912 15.6

7985 15.65

12162 15.42?

8664 15.48

8014 16.2

10893 15.7

7767 about  
16.0

8780 about  
16.0

10897 15.7

8869 16.05

8920 15.98



December 8, 1917.

(Continued M15  
from page 9) Plate No. Var. Est.  
Var. No. 22 MW3396 15.9

2632 "  
Var. very faint.  
2580 15.65

3437 15.2 or brighter?

2602 15.75

H1720 16.05

MW 2614 15.75

2590 15.2

2598 15.6

2596 15.52

2607 15.6

~~2588~~

(Continued on page 16.)

w  
CopiedDecember 10, 1917.

M15

| Var. No. 31.<br>Using Seq.<br>No. 3 | Plate No.       | Var.   | Est. | Plate No.               | Var.          | Est. | Plate No.               | Var.                | Est. |
|-------------------------------------|-----------------|--------|------|-------------------------|---------------|------|-------------------------|---------------------|------|
|                                     | MW 2614         | 15.98  |      | MW 2623                 | 15.48         |      | MW 3429                 | 15.2<br>or brighter |      |
|                                     | 3441            | 15.7   |      | 3428                    | about<br>15.3 |      | H 1726                  | 15.8?               |      |
|                                     | 3439            | 15.65  |      | 3401                    | 15.65         |      | 1715                    | 15.9?               |      |
|                                     |                 |        |      | or 2401                 |               |      |                         |                     |      |
|                                     | 2629            | 15.55  |      | 2584                    | 15.4          |      | MW 3444                 | 15.95               |      |
|                                     |                 |        |      |                         |               |      | Defective image of var. |                     |      |
|                                     | 2631            | 15.65  |      | 2608                    | 15.75         |      | 2613                    | 15.9                |      |
|                                     | 2592            | 15.8   |      | 3394                    | 15.3          |      | 2588                    | 15.7?               |      |
|                                     |                 |        |      |                         |               |      | Defect on Var.          |                     |      |
|                                     | 2600            | 15.65  |      | 2585                    | 15.55         |      | 2607                    | 15.22               |      |
|                                     | H 1746          | "      |      | 2624                    | 15.48         |      | 2596                    | 15.9                |      |
|                                     | Var. faint      |        |      |                         |               |      |                         |                     |      |
|                                     | 1733            | "      |      | 2626                    | 15.5          |      | 2598                    | "                   |      |
|                                     | perhaps = 15.6  |        |      |                         |               |      | T.p. Var. faint         |                     |      |
|                                     | 1724            | "      |      | 2587                    | 15.6          |      | H 1745                  | "                   |      |
|                                     | perhaps = 15.45 |        |      |                         |               |      | perhaps 15.7?           |                     |      |
|                                     | 1725            | "      |      | 2606                    | about<br>15.2 |      | or fainter              |                     |      |
|                                     | perhaps = 15.6  |        |      |                         |               |      |                         |                     |      |
|                                     | 1728            | "      |      | 2610                    | 15.95         |      | MW 3434                 | 15.3H               |      |
|                                     | T.p.            |        |      |                         |               |      |                         |                     |      |
|                                     | 1719            | 15.7   |      | 2618                    | 15.6          |      | 2590                    | 15.75               |      |
|                                     | 1732            | 15.45? |      | 2582                    | 15.65         |      | 3395                    | 15.3                |      |
|                                     |                 |        |      | Defect close to<br>var. |               |      |                         |                     |      |



December 10, 1917.

M 15.

|             | Plate No. | Var. Est. | Plate No.                                 | Var. Est. |
|-------------|-----------|-----------|---|-----------|
| Var. No. 31 | H 1716    | 15.6      | MW 2628                                   |           |
|             | MW 2597   | 15.85     | Bad spot in film covering                 |           |
|             | 2602      | 15.75     | Variable. Too poor to make safe estimate. |           |
|             | 3437      | 15.5      | 3432                                      | 15.2      |
|             | H 1720    | 15.6 ?    | 2580                                      | 15.3      |
|             | MW 3447   | 16.1      | 2632                                      | "         |
|             |           |           | T.h                                       |           |
|             | 3446      | 15.95     | 3396                                      | 15.2      |
|             | 2604      | 15.65     | 2621                                      | 15.6      |
|             | H 1722    | "         | 2616                                      | 15.7      |
|             | T.h       |           |   |           |
|             | 1737      | "         | 2609                                      | 16.05     |
|             | T.h       |           |   |           |
|             | MW 2593   | 15.65     | 2612                                      | 16.2      |
|             | 2619      | 15.48     | (Continued on page 17)                    |           |
|             | 2595      | 15.75     |   |           |
|             | 2620      | 15.65     |   |           |

December 15, 1917.

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M15

| from page 13) |  | Plate No.              | Var. Est.        | Plate No.              | Var. Est. | Plate No.          | Var. Est.                |
|---------------|--|------------------------|------------------|------------------------|-----------|--------------------|--------------------------|
| Var. 22       |  | MW 2623                | 15.85            | H 1732                 | ..        | <del>IX</del> 8869 | 16.05                    |
|               |  | 3428                   | 15.12            | probably brighter than |           | 4986               | 15.45                    |
|               |  | 3401 or<br>2401        | about<br>15.15   | MW 2587                | 15.15     | 8912               | 16.15                    |
|               |  | 2584                   | 15.12            | 2606                   | 15.95     | 7985               | 15.25                    |
|               |  | 2608                   | 15.85            | 2610                   | 15.75     | 12162              | ..                       |
|               |  | 2618                   | 16.0             | 3429                   | 15.15     | 8664               | var. very faint<br>16.1? |
|               |  | H 1719                 | 15.9 or fainter? | 2582                   | 15.45     | 8014               | 15.3                     |
|               |  | 1728                   | ..               | 2585                   | 15.15     | 10893              | 15.15                    |
|               |  | T.p. perhaps 15.6?     |                  | 2624                   | 15.55     | 7767               | ..                       |
|               |  | 1725                   | ..               |                        |           | T.p.               |                          |
|               |  | 1733                   | ..               | 8394                   | 16.05     | 8780               | about<br>16.0            |
|               |  | var. faint.            |                  |                        |           |                    |                          |
|               |  | 1746                   | ..               | H 1715                 | ..        | 10897              | 15.3                     |
|               |  | about 16.0 or fainter. |                  | T.p.                   |           |                    |                          |
|               |  | 1724                   | ..               |                        |           | 8920               | 15.7                     |
|               |  | Var. very faint.       |                  | 1726                   | 15.75     |                    |                          |
|               |  | MW 2626                | 15.9             |                        |           |                    |                          |



December 15, 1917.

(Continued M15  
 from page 15) Plate No. Var. Est.  
 Var. No. 31 X 8920 15.65

10897 15.85

8780 15.7

7767 "

Tip. about  
 10893 15.2

8014 15.7

8664 "

Haggimages.  
 12162 15.6

7985 15.75

8912 15.12

7986 "

var. quite faint  
 8869 16.1

December 17, 1917.

See stars near  
Brighten on 3396?

M15

|                    | Plate No. | Var. | Est.  | Plate No. | Var.         | Est.  | Plate No. | Var. | Est. |
|--------------------|-----------|------|-------|-----------|--------------|-------|-----------|------|------|
| Var. No. 36        | MW 2608   |      | 16.2  | MW 2621   |              | 16.2  | H 1732    | "    |      |
|                    |           |      |       |           |              |       | T.h.      |      |      |
| Using              | 2584      |      | 16.10 | 3396      |              | 16.6  | MW 2600   |      | 15.8 |
| Sequence No. 2     |           |      |       |           |              |       |           |      |      |
| except for         | 3401a     |      | 15.95 | 2580      |              | 16.3  | 2607      |      | 16.0 |
| some intervals     | 2401      |      |       |           | or fainter   |       |           |      |      |
| where stars        | 3428      |      | 15.18 | 2632      |              | "     | 2588      |      | 15.3 |
| of other sequences |           |      |       |           | Var. Bright. |       |           |      |      |
| would give         | 2623      |      | 16.3  | 2606      |              | 15.9  | 2613      |      | 16.5 |
| better comparison. |           |      |       |           |              |       |           |      |      |
|                    | 3447      |      | 16.4  | 3432      |              | 15.58 | 2602      |      | 15.9 |
|                    |           |      |       |           |              |       |           |      |      |
|                    | 2593      |      | 15.4  | 2628      |              | 15.85 | 2631      |      |      |
|                    |           |      |       |           |              |       |           |      |      |
|                    | 3429      |      | 15.55 | 2620      |              | 16.12 |           |      |      |
|                    |           |      |       |           |              |       |           |      |      |
|                    | 3434      |      | 15.52 | 2595      |              | 15.48 |           |      |      |
|                    |           |      |       |           |              |       |           |      |      |
|                    | H 1745    |      | "     | H 1726    |              | "     |           |      |      |
|                    | T.h.      |      |       | T.h.      |              |       |           |      |      |
|                    | MW 2598   |      | "     | MW 2582   |              | 16.0  |           |      |      |
|                    | T.h.      |      |       |           |              |       |           |      |      |
|                    | 2596      |      | 15.52 | 2610      |              | 16.0  |           |      |      |
|                    |           |      |       |           |              |       |           |      |      |
|                    | 2609      |      | 16.6  | 2587      |              | 15.18 |           |      |      |
|                    |           |      |       |           |              |       |           |      |      |
|                    | 2616      |      | 16.15 | 3394      |              | "     |           |      |      |
|                    |           |      |       |           |              |       |           |      |      |
|                    |           |      |       |           | T.h.         |       |           |      |      |



December 17, 1917.

M 15

Plate No. Var. Est. Plate No. Var. Est.

Suspected Var.

Gears up.

Probably slight  
if any. Reject  
at present.

2588 15.28

37  
36

2607 about 15.8

:

2600 15.55

→ :

bz.

ft.

2600

\*2602

2588

2616

2610

\*2593

\*2582

\*3429

\*2620

\*2621

\*3394

2631

December 18, 1917.

Dark day.

M15

Plate No. Var. Est.

Var. No. 36

MW 2631

15.85

(Continued)

2624

16.6

2585

15.7

3395

16.7?

Blurred images  
Difficult.

2590

15.15

2592

15.18

2629

15.6



December 19, 1917.

M15

Dark day

| Plate No.           | Var. Est. |
|---------------------|-----------|
| Var. No. 36 MW3437. | 16.05     |

continued

|      |       |
|------|-------|
| 2619 | 16.7  |
| 3439 | 16.05 |

or fainter

|      |       |
|------|-------|
| 2604 | 16.10 |
|------|-------|

|      |       |
|------|-------|
| 3446 | 16.45 |
|------|-------|

|      |            |
|------|------------|
| 2612 | about 16.5 |
|------|------------|

|      |      |
|------|------|
| 3444 | 16.2 |
|------|------|

|      |      |
|------|------|
| 2614 | 16.2 |
|------|------|

|        |   |
|--------|---|
| H 1720 | " |
|--------|---|

|           |   |
|-----------|---|
| Hazy 1722 | " |
|-----------|---|

|      |   |
|------|---|
| 1737 | " |
|------|---|

|         |   |
|---------|---|
| Th 1715 | " |
| Th      |   |

December <sup>21</sup> 1917.

Darks Day

M15

Plate No. Var. Est. Plate No. Var. Est.

Var. No. 36.  
Cont.

H 1716

"

~~X~~ 8869

about  
16.6

H plate =  
blurred

1719

"

7986

"

for. Var. rather bright.

1724

"

8912

16.2

images.  
No estimate  
advisable.

1725

"

7985

15.7

1728

"

12162

"

Var

1733

"

8664

"

1745

"

8014

"

Defective?

1746

"

10893

"

Var. faint.

MW 2618

16.10

7767

"

Var. bright.

2596

15.5

8780

15.5

2597

15.6

10897

"

Var. faint

2626

16.15

8920

15.9

3441

16.4

2598

15.55



reject

December 21, 1917.

Darb.

|           |                |               |
|-----------|----------------|---------------|
|           | M 15           |               |
|           | Plate No.      | Var. Est.     |
| J.E.W.'s  | <u>X</u> 8920  | 15.55         |
| Star near |                |               |
| No. 36.   | 10897          | 15.55         |
|           | 8780           | 15.5          |
|           | 7767           | "             |
|           | T <sub>n</sub> |               |
|           | 10893          | "             |
|           | T <sub>n</sub> |               |
|           | 8014           | "             |
|           | T <sub>n</sub> |               |
|           | 8664           | "             |
|           | 12162          | about<br>15.6 |
|           | 7985           | 15.65         |
|           | 8912           | 15.65         |
|           | 7986           | 15.45         |
|           | 8889           | 15.55         |

copied

December 21, 1917.

M 15

Plate No. Var. Est.

No. 34. V 8869 14.95

34 is a very bright  
star and 7986 14.8very close  
to another star. 8912 15.05

Very difficult 7985 15.0

to measure 12162 15.0

and probably 8664 15.0

not separated  
on X & H plates 8014 14.8

10893 14.7

shall it  
be measured 7767 14.95  
?

Yes. 8780 14.90

10897 about  
15.0

8920 14.8

1 MW 2612

Continued on page 55.



December 21, 1917.

M15

|           | Plate No. | Var. Est. | Plate No. | Var. Est. |
|-----------|-----------|-----------|-----------|-----------|
| J.E.W.'s  | MW 2604   | 15.5      | 2595      | 15.7      |
| star mean |           |           |           |           |
| No. 36.   | 2619      | 15.9      | 2606      | 15.4      |
|           | 2596      | 15.55     | 2588      | 15.25     |
|           | 2612      | 15.6      | 2626      | 15.65     |
|           | 2613      | 15.65     |           |           |
|           | 2602      | 15.9      |           |           |
|           | 2608      | 15.55     |           |           |
|           | 2584      | 15.62     |           |           |
|           | 2623      | 15.5      |           |           |
|           | 2607      | 15.7      |           |           |
|           | 2621      | 15.7      |           |           |
|           | 2598      | "         |           |           |
|           | Poor.     |           |           |           |
|           | 2609      | 15.55     |           |           |
|           | 2604      | 15.55     |           |           |

Is there real variation?

26

Copied  
= No. 59December <sup>22</sup>~~21~~, 1917.

star near

see  
3429  
3432  
2621

M15

no. 6, page 54

J. E. W. (glass  
up)

Plate No. Var. Est.

MW 3432 16.4

2626 16.3

2596 15.95

2604 16.4

2609 16.1

2598 "

T<sub>p</sub>  
2621 15.8

2607 15.95

3429 16.0

3434 about  
16.0

3447 "

Blurred

2623 15.7 or 8

3428 15.7

2619 15.95

Plate No. Var. Est.

3401 "

22401

Blurred

2584 15.55

2602 16.1

2608 15.8

2613 15.45

Continued on  
page 38.Using  
Sequence No. 2.  
also No. 3





*copied*

December 24, 1917.

M15.

M15 Plate No. Var. Est.

Var. No. 26

X 8869 15.6

7986 "

T.p.

8912 15.15

7985 15.45?

12162 "

8664 "

8014 15.6

10893 "

Var. faint.

7767 "

8780 about 15.5

10897 "

T.p.

8920 15.55

Continued on page 42



December 24, 1917.

M 15

Plate No. Var. Est.

Var. No. 48 MW 2626. 16.0

2602 15.65

Continued on page 31.

3447 16.3

3434 15.9

2607 15.4

2598 15.7

2609 15.9

2604 15.3

2596 16.2

3428 ..

scratched in region.

2619 16.0

2608 15.7

2613 15.55-

2621 16.2

*copied*  
No. 58

December 24, 1917.

M 15

Plate No. Var. Est. Plate No. Var. Est.

Var. No. I 8920 16.2 MW 2623 16.1

10897

"

3447 16.0

Var. very faint  
or defective

3434 16.4

8780

"

2607 15.45

7767

"

2598 "

10893

"

Var. faint.

2609 16.7

8014

"

2604 15.42

8664

"

2596 16.35

12162

"

2626 16.4

7985

15.7

2602 15.7

8912

16.2

Continued on  
page 39

7986

"

8869

16.55



copied

December 24, 1917.

Continued M15  
 from page 29 Plate No. Var. Est.  
 Var. No. 48 X 8869 15.7

This var 7986 " "  
 is close Hazy  
 to two other 8912 15.6  
 stars.

Difficult 7985 " "  
 to separate Blurred images  
 on X plates 12162 " "  
 except where Var bright  
 images are 8664 " "  
 very distinct  
 and clear. 8014 " "

10893 " "

7767 " "

8780 " "

10897 " "

8920 16.1

Continued on page 48

copied

December 24, 1917.

M15

Plate No. Var. Est.

Plate No. Var. Est.

Plate No. Var. Est.

Plate  
Var. No. 49

I 8920

15.0

MW 2587

14.8

MW 3396

15.15

10897

15.15

3441

14.7

2632

14.45

8780

15.15

2610

15.15

2628

14.42

7767

15.15

2631

14.7

3429

15.15<sup>2</sup>

10893

15.12

3437

14.42  
14.10

2612

14.95

8014

15.12

brighter.  
no comp. star brighter than c?  
3401 14.95  
2401Compare with  
stars brighter  
than c

8664

..

3395

15.15

3432

about  
14.1

12162

14.95

1

2624 ✓

3437 ✓

7985

15.12

3439

15.0

2621

15.15

3446

3446

14.45

2613

15.05

2584 ✓

8912

about  
14.9

2432 ✓

3394

15.12

2608

15.18

2626 ✓

7986

15.15

2614

15.08

2602

14.8

2623 ✓

2580 ✓

8869

14.55

3444

14.45

2619

14.95

H1720 ✓

2629

14.3

3428

15.15



Copied

December 24, 1917.

M15

Plate No. Var. Est.

Var. No. 49 MW 2596 15.15

2604 14.7

2609 15.2

2598 15.15

2607 14.75

3434 14.8

3447 14.7

~~2623~~2626 about  
14.1

2624 14.0 or brighter?

2580 14.0 or brighter?

2623 14.2?

2584 14.0 or 14.1

See page { 34  
37

XmascopiedDecember 25, 1917.

M 15

| V           | Plate No. | Var. Est. | Plate No. | Var. Est. |
|-------------|-----------|-----------|-----------|-----------|
| Var. no. 49 | MW 2600   | 14.8      | H 1746    | 15.05     |
| continued   |           |           |           |           |

|      |       |      |            |
|------|-------|------|------------|
| 2595 | 14.85 | 1719 | about 15.0 |
|------|-------|------|------------|

|      |       |      |            |
|------|-------|------|------------|
| 2618 | 15.12 | 1733 | about 15.0 |
|------|-------|------|------------|

H Plates

are difficult.

Image is

always large

and usually

blurred.

|      |       |      |      |
|------|-------|------|------|
| 2597 | 15.12 | 1725 | 14.8 |
|------|-------|------|------|

|      |      |      |   |
|------|------|------|---|
| 2606 | 15.0 | 1728 | " |
|------|------|------|---|

|      |       |      |      |
|------|-------|------|------|
| 2592 | 14.90 | 1724 | 14.8 |
|------|-------|------|------|

|      |       |      |        |
|------|-------|------|--------|
| 2590 | 14.88 | 1716 | 15.15? |
|------|-------|------|--------|

|      |       |      |       |
|------|-------|------|-------|
| 2585 | 14.92 | 1745 | 15.15 |
|------|-------|------|-------|

|      |      |      |   |
|------|------|------|---|
| 2616 | 15.0 | 1732 | " |
|------|------|------|---|

|      |       |      |      |
|------|-------|------|------|
| 2620 | 15.12 | 1726 | 14.8 |
|------|-------|------|------|

|      |      |      |       |
|------|------|------|-------|
| 2582 | 14.1 | 1720 | 14.45 |
|------|------|------|-------|

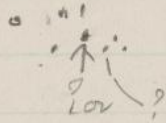
|        |       |         |      |
|--------|-------|---------|------|
| H 1722 | 14.7? | MW 2588 | 15.0 |
|--------|-------|---------|------|

|      |   |      |      |
|------|---|------|------|
| 1715 | " | 2593 | 15.0 |
|------|---|------|------|

|      |       |  |  |
|------|-------|--|--|
| 1737 | 14.95 |  |  |
|------|-------|--|--|



Dec. 25, 1917



Bright

2608

2614

3396

Faint

3429

2612

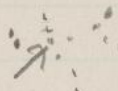
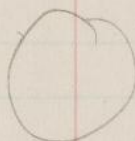


December 27, 1917

M15

Supported, J.E.W.

= No. 58.



2584 15.15

3432 = 15.6



December 29, 1917.given to  
Prof. B.  
expired

Continued 1415

Dark day.

from page 33

Var. 49 MW 3434 14.85

Remeasures. 3437 14.45

3428 15.12

3429 about 15.1 or a little brighter

3432 14.48

3439 14.55

~~Spied~~

December 29, 1917.

No. 59

M15

Continued

Plate No.

Var. Est.

Plate No.

Var. Est.

Plate No.

Var. Est.

from page 26

MW 2584

15.65

MW 2620

15.85

MW 2616

15.85

Repeated

2597

"

2628

"

2582

13.6

Blurred images

2588

15.75

3446

15.8

2618

15.8

2609

(perhaps, 16.0)

2600

16.2 or

2592

16.15

2614

15.4

2598

"

2606

16.1 or

Repeated

16.2

2612

15.35

2619

16.15

2631

"

2609

16.0

3394

"

2624

16.2

3444

"

3396

16.3?

2590

"

Var. faint

Blurred images

2593

16.15

3437

16.25

2629

"

2595

16.2

3439

16.3

2632

"

2610

15.65

or fainter

2585

15.7

2587

15.6

4 plates too close

3441

"

Too poor to est.

to measure

Var. very faint

3395

2580

15.7

Blurred images -

Var. probably bright.



*copied*

December 29, 1917.

No. 58

M15

Continued

Plate No.

Var. Est.

Plate No.

Var. Est.

from page 30

MW 2597

16.2

MW 3394

16.4?

Poor images

2588

16.0

3396

16.3

2609

about 16.5

2593

16.35

3444

16.0

2595

16.4

2629

"

Var. faint

continued on p. 40.

2632

"

2585

15.95

3441

"

2580

15.85

2620

15.95

2628

"

Var. faint

3446

15.85

2600

15.65

2619

16.2

Copied

December 31, 1917.

Sp. 58

M 15

Plate No. Var. Est.

Plate No. Var. Est.

Continued from  
page 39.

MW 3428

16.35

MW 2614

15.9

3429

16.2

2587

15.7

2613

16.15

2612

16.0

2608

16.2?

3395

"

3401

"

2610

about  
16.2

Var. very faint

2618

15.85

2582

15.9

2592

15.85

2616

15.7

2584

15.75

3432

16.5

2590

16.0

2621

15.8

2631

16.4 or fainter

Blurred images -

2606

15.4

1

2624

16.2

3439

16.4

3437

16.45



suspected, see page 24.

December 31, 1914.

rejected

M15

Plate No. Var. Est.

MW3432

15.8

2587 "

2602

15.8

2614 15.8

3447

"

3437 15.8

2621

15.6

Is there any variation?

2623

15.6

3396

15.85

3434

15.7

2598

"

2595

15.7

2616

15.7

2582

15.8

2610

15.9

3395

"

2612

15.85

copied

December 31, 1917.

M15

Continued from  
page 28.  
No. 26

Plate No. Var. Est.

MW 3428 15.55

2604 15.9

Very far  
from

2626 15.6

Center and  
from Comp.  
Stars.

2632 ..

2585 15.5

Used Seq.  
2 & 3.

3429 15.4

2613 16.3

2608 16.15

3401 15.65

2588 15.4

2597 15.95

2607 15.5

2593 15.65

Continued on page 47.



— 1918 —

44

copied

January 1, 1918.

M15

| No. 61         | Plate No.             | Var. Est.          | Plate No. | Var. Est.  | Plate No. | Var. Est. |
|----------------|-----------------------|--------------------|-----------|------------|-----------|-----------|
| J. E. W's Var. | MW 2592               | 15.55              | MW 3394   | "          | MW 2606   | 16.10     |
| glass up       | 2616                  | 16.80 <sup>2</sup> | 2600      | 16.05      | 2624      | 16.2      |
| →              | 3428                  | "                  | 2618      | 16.10      | 3439      | 16.2      |
| Using Sequence | Var. probably bright. |                    |           |            |           |           |
| No. 1          | 2604                  | 16.2               | 2584      | 15.75      | 2596      | 15.57     |
| Bk - p 156     | 2626                  | 15.5               | 2619      | 16.6 ?     | 3432      | 16.4      |
|                | 2632                  | "                  | 2580      | 16.4       | 2602      | 15.95     |
|                | 2585                  | 15.7               | 2629      | "          | 3447      | "         |
|                | 3429                  | 15.6               | 3444      | about 16.1 | 2621      | 16.05     |
|                | 2613                  | 16.4 ?             | 2620      | 16.1       | 2623      | 15.7      |
|                | Blurred images        |                    |           |            |           |           |
|                | 2608                  | 15.9               | 3441      | 16.4       | 3396      | 16.4      |
|                | 3401                  | "                  | 2590      | 15.32      | 2598      | "         |
|                | 2588                  | 15.2               | 3446      | 15.9       | 2595      | 15.6      |
|                | 2597                  | 15.55              | 2628      | 15.3       | 3434      | 16.05     |
|                | 2593                  | 15.55              | 2631      | "          | 2610      | 16.2      |

Continued on page 416



January 1, 1918.

M15

Suspected Variable

Marked on 2582

Confirmed  
D.L.B.

January 5, 1918.

= No. 65

B. \*2606

\*2612\* (155)

2607

2616 (1555)

fr.

\*2602 (1585)

\*3439

2623

3396

\*2595\* (15.9)

\*2582\* (160)

\*2587\*

\*3441\*

\*2623

2612

3429

fr. \*2621

on print

\*3434

\*2614

46

w  
epied

January 1, 1918.

M15

No. 61. Plate No. Var. Est.  
Continued MW 3395  
from  
page 44

2612 16.10

2587 15.4

2616 16.2

2614 16.10

3437 16.20

2607 16.2

~~2580~~ 15.55 reject. What plate no.?  
2580 already meas. Confirmed,  
var. faint.

Jan 1918 Additional plates, same var.

2582 16.4

2628 15.42

2631 ..

4 plates not to be meas.; too close

Continued on page 50.



spid

47  
w

January 1, 1918.

Continued  
from page 42.

M15

| Plate No.   | Var.    | Est. | Plate No. | Var. | Est.    | Plate No. | Var. | Est. |
|-------------|---------|------|-----------|------|---------|-----------|------|------|
| Var. No. 26 | MW 2592 | 15.7 | MW 3432   | 15.0 | MW 2624 | 15.15     |      |      |

Continued  
on page 49.

|      |                          |      |                 |      |      |
|------|--------------------------|------|-----------------|------|------|
| 3437 | 15.15                    | 2602 | 15.95           | 2616 | 15.6 |
| 2614 | 15.9                     | 2629 | 15.55           |      |      |
| 2612 | 16.05                    | 3444 | 15.95           |      |      |
| 2587 | 15.6, perhaps<br>fainter | 2620 | 15.55           |      |      |
| 3395 | ..                       | 3441 | 15.45           |      |      |
| 2610 | 16.1                     | 2590 | 15.8            |      |      |
| 3434 | ..                       | 3446 | 16.0            |      |      |
| 2595 | 15.85                    | 2628 | perhaps<br>15.7 |      |      |
| 2598 | ..                       | 2631 | 15.45           |      |      |
| 3396 | 15.85                    | 2606 | 15.6            |      |      |
| 2623 | 15.6 ?                   | 2582 | perhaps<br>15.3 |      |      |
| 2621 | 15.7                     | 2596 | 15.8            |      |      |
| 3447 | 15.95                    | 3439 | 15.15           |      |      |

copied

January 1, 1918.

Continued from  
page 31.  
Var. No. 48

M15

Plate No. Var. Est.

MW 3428 15.7

Scratch on var. probably affects estimate

Sequence  
2 used

2592

16.5

Repeated

2604

15.45

2626

16.25

2632

"

2585

15.85

3429

15.65

Repeated

2613

15.85

Repeated

3429

15.6

Continued on page 53.



copied

January 2, 1918.

| 1415                           |                 |               |                     |
|--------------------------------|-----------------|---------------|---------------------|
| No. 26                         | Plate No.       | Var. Est.     | Plate No. Var. Est. |
|                                | MW 2618         | 15.45         | H 1737 15.6         |
| Continued<br>from page 47      | 2580            | 15.4          | 1716 15.6           |
|                                | 2584            | 15.5          | 1724 "              |
|                                | 2600            | 15.7          | 1728 "              |
|                                | 2619            | 15.2          | 1726 "              |
|                                | 3394            | 15.7          | 1715 "              |
| H plates H                     | 1746            | 15.45 ?       | 1722 "              |
| very difficult,<br>hazy images | 1719            | 15.45         |                     |
|                                | 1720            | ? 15.6 ?      |                     |
|                                | 1745            | 15.7          |                     |
|                                | 1732            | about<br>15.8 |                     |
|                                | 1733            | "             |                     |
|                                | Scratch on Var. |               |                     |
|                                | 1725            | 15.9          |                     |

January 2, 1918

no. 61.

M15

Plate No. Var. Est.

J E W. I 8920 16.4

see page 46

10897

8780

7767

10893

Var. probably bright

8014

8664

12162

7985

8912

7986

8869



copied

January 3, 1918

| No. 62 M15                 |           |                              | Dark day     |           |                     |
|----------------------------|-----------|------------------------------|--------------|-----------|---------------------|
| J.E.W. Bk.<br>page 64      | Plate No. | Var. Est.                    | Plate No.    | Var. Est. | Plate No. Var. Est. |
|                            | MW 3432   | 16.0                         | MW 2592      | 16.05     | MW 2629 "           |
|                            | 2584      | 15.75                        | 2619         | 16.2      | 3444 16.35          |
|                            | 2608      | "                            | 2618         | 15.65     | 2614 15.9           |
|                            | (16.4 ?)  |                              |              |           |                     |
| Using<br>Sequence<br>No. 2 | 2593      | 16.4                         | 2600         | 16.45     | 3437 15.7           |
|                            | 2597      | "                            | 2580         | "         | 2587 15.65          |
|                            | 2632      | "                            | Blurred.     |           |                     |
|                            | 2588      | 15.7                         | Var. bright. |           | 2612 16.4           |
|                            | 3401      | "                            | 2628         | 16.6 ?    | 2628 "              |
|                            | 2613      | 16.55 ?                      | 3439         | 16.4      | 2582 15.65          |
|                            | 3429      | 15.85                        | 2606         | 15.7      | 2631 "              |
|                            | 2585      | 15.5<br>+ 5.6 or<br>brighter | 3396         | 16.35     | 3394 "              |
|                            | 2604      | 15.95                        | 2590         | "         | 3447 "              |
|                            | 2626      | 15.95                        | 3446         | 16.4 ?    | Var. faint          |
|                            | 3428      | 15.7                         | 2620         | 15.7      | 2621 15.7           |
|                            |           |                              | 3441         | "         | 2623 15.7           |
|                            |           |                              | 2607         | 15.7      | 2598 "              |

copied

January 3, 1918

No. 62.

M15

Plate No. Var. Est.

p. 51 continued MW 2595 15.85

2616 15.65

2602 15.9

3434 15.65

3395 "

2610 16.35

H & ~~K~~ plates  
not measured.

2596 16.4



copied

January 3, 1918.

53  
W

| Continued M15 |           | Plate No. Var. Est. |                        | Plate No. Var. Est. |                    |
|---------------|-----------|---------------------|------------------------|---------------------|--------------------|
| from page 48  | Plate No. | Var. Est.           | Plate No.              | Var. Est.           |                    |
| Var. No. 48   | MW 3439   | 15.9                | MW 2582                | 15.7                | MW <del>2580</del> |
|               | 2606      | 15.7                | 2631                   | "                   | <del>2584</del>    |
|               | 3396      | 15.7                | 3394                   | 15.75               | <del>2586</del>    |
|               | 2590      | 16.0                | 2623                   | 15.95               | <del>2593</del>    |
|               | 3446      | 16.35               | 2595                   | 16.3                | <del>2597</del>    |
|               | 2620      | 16.0                | 2610                   | 15.65               | <del>2598</del>    |
|               | 2612      | 15.7                | 3395                   | "                   | <del>2600</del>    |
|               | 2587      | 15.9                | Blurred.               |                     | <del>2600</del>    |
|               | 3437      | 15.95               | 2616                   | 15.7                | <del>2607</del>    |
|               | 2614      | 15.7                | 2596                   | 16.3                | <del>2608</del>    |
|               | 3444      | 16.25               | H plates not measured. |                     | <del>2618</del>    |
|               | 2629      | "                   |                        |                     | <del>2619</del>    |
|               | 3441      | 15.9                |                        |                     | <del>2621</del>    |
|               | 2628      | 16.0                |                        |                     | <del>2624</del>    |

January 8, 1918.

M15

| Var. No. | Plate No.        | Var. Est. | Plate No.        | Var. Est. |
|----------|------------------|-----------|------------------|-----------|
| 48.      | Repeated<br>3434 | 15.85     | MW258.0          | 15.82     |
|          | 3401             | "         | Repeated<br>2602 | 15.8      |
|          | 3432             | 15.65     | Repeated<br>2621 | 16.3      |
|          | Repeated<br>3447 | 16.15     | 259.8            | "         |
|          | 2584             | 15.65     |                  |           |
|          | 2593             | 16.4      |                  |           |
|          | Repeated<br>2619 | 15.82     |                  |           |
|          | 2597             | 15.9      |                  |           |
|          | 2588             | 15.95     |                  |           |
|          | 2618             | 15.7      |                  |           |
|          | 2600             | 15.75     |                  |           |
|          | Repeated<br>2607 | 15.45     |                  |           |
|          | 2624             | 16.2      |                  |           |
|          | Repeated<br>2608 | 15.75     |                  |           |



*exposed*

January 4, 1918.

ser. 2593

Continued M15

from page 24. Plate No. Var. Est.

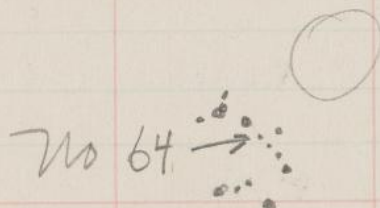
Var. No. 34 MW 2584  $\frac{14.55}{15.0} = \text{double image}$   
 $\text{No. 34}$

2593

Is there a var ~~near~~ <sup>on 2593</sup>? See p. 56.

January 4, 1918.

M 15

unfixed  
S.I.B.

January 5, 1918.

br.

2596  
\* 2595  
2618  
3429  
2616

ft. 3439  
2584  
2587  
2582  
3434



copied

January 5, 1918.

M15

| Var. No. 34 | Plate No. | Var. Est.          | Plate No.             | Var. Est. |
|-------------|-----------|--------------------|-----------------------|-----------|
|             | 1W W 2593 | 15.15 <sup>2</sup> | 1W W 2616             | 15.45     |
|             | 2606      | 15.12              | 3428                  | 15.05     |
|             | 2610      | 15.45              | 2592                  | 15.15     |
|             | 2612      | 15.4               | 2585                  | 15.12     |
|             | 2582      | 15.12              |                       |           |
|             | 2595      | 15.17              | Continued on page 68. |           |
|             | 2587      | 14.65              |                       |           |
|             | 2602      | 14.8               |                       |           |
|             | 3429      | 15.12              |                       |           |
|             | 2618      | 15.4               |                       |           |
|             | 2596      | 15.0               |                       |           |
|             | 2614      | 15.0               |                       |           |
|             | 3439      | 15.18              |                       |           |
|             | 2626      | 15.22              |                       |           |

1917phae.pro  
copied  
This pro

January 7, 1918

to be Prof. B's No. 21.

| Ths p.     | Plate No. | Var. | Est.  |
|------------|-----------|------|-------|
| IEW's Var. | NW 2582   |      | 15.45 |

2597 15.7

|        |      |      |
|--------|------|------|
| No. 64 | 2590 | 15.4 |
|--------|------|------|

|                |      |       |
|----------------|------|-------|
| Using Sequence | 2606 | 16.15 |
|----------------|------|-------|

No. 182

|      |       |
|------|-------|
| 2600 | 15.85 |
|------|-------|

2598

2592

Defect on the

Apparently very bright.

2621 16.10

|      |       |
|------|-------|
| 3444 | 15.12 |
|------|-------|

3432 164



*copied*

January 8, 1918.

| M 15  |                 |                   | Very dark day |      |       |
|---|-----------------|-------------------|---------------|------|-------|
| Plate No.   | Var.            | Est.              | Plate No.     | Var. | Est.  |
| p. 58<br>Continued<br><del>No. 64</del><br>No. 21 | MW 3396         | 15.95             | MW 2624       |      | 15.95 |
|   | 3441            |                   |               |      |       |
|   | <del>3401</del> | 16.35             | 2623          |      | 15.7  |
|   |                 |                   |               |      |       |
|   | 3401            | 16.3              | 3395          |      | 16.0  |
|   | or 2401         |                   |               |      |       |
|   | 2620            | 16.0              | 2613          |      | 16.10 |
|   |                 |                   |               |      |       |
|   | 3446            | 15.7              | 2632          |      | "     |
|   |                 |                   |               |      |       |
|   | 2608            | 16.0              | 2626          |      | 15.45 |
|   |                 |                   |               |      |       |
|   | 2629            | 15.9 <sup>4</sup> | 2604          |      | 16.3  |
|   |                 |                   |               |      |       |
|   | 3434            | 16.2              | 2580          |      | 15.4  |
|   |                 |                   |               |      |       |
|   | 2618            | 16.12             | 2593          |      | 15.8  |
|   |                 |                   |               |      |       |
|   | 2587            | 15.4              | 3437          |      | 16.4  |
|   |                 |                   |               |      |       |
|   | 2614            | 16.0              | 2607          |      | 16.35 |
|   |                 |                   |               |      |       |
|   | 2610            | 16.4              | 2596          |      | 15.95 |
|   |                 |                   |               |      |       |
|   | 3439            | 16.5              | 2585          |      | 15.42 |
|   |                 |                   |               |      |       |
|   | 3447            | 15.25             | 3394          |      | 15.45 |

copied

January 9, 1918.

no. <sup>21</sup>  
64  
Continued

M 15

Plate No. Var. Est.  
MW 2616 - 16.12

2612 16.15

2619 16.7 ?

2588 15.7

2584 15.6

3429 16.6

2628 15.4 ?

2631 15.45

2595 16.0

3428 perhaps 16.0

2602 16.25  
Laggy

H 1746 "

1719 "

1720 "

Plate No. Var. Est. Plate No. Var. Est.  
H 1745 " X 7985 "

1732 " 12162 "

1733 " 8664 "

1725 " 8014 "

1737 " 10893 "

1716 " 7767 "

1724 " 8780 "

1728 " 10897 "

1726 " 8920 16.2

1715 "

1722 "

X 8869 15.9

7986 "

8912 about  
16.3



*copied*

January 9, 1918.

M15

Plate No. Var. Est.

J.E.W.  
→ ..

X 8920 15.6

10897 "

No. 65

7767 "

Close to a  
faint star  
but can be  
distinctly  
separated  
on I plates,  
but not on  
H.

10893 "

8014 15.6

8664 "

12162 "

7985 15.6

8912 15.75

7986 "

8869 15.65

8780 15.25

copied

January 10, 1918.

Late afternoon.

M15

Continued. Plate No. Var. Est.  
Var. No. 65 MW 2602 15.65

J. E. W. 8

3428 15.65

2595 16.3

2631 "

Using  
Sequence 3

2628 15.7

3429 15.7

2584 16.2

2588 16.25

2619 16.2

2612 15.47

2616 15.65



exhib

January 11, 1918.

M 15

| Var. No. 65. | Plate No. | Var. Est.     | Plate No.        | Var. Est. | Plate No.    | Var. Est. |
|--------------|-----------|---------------|------------------|-----------|--------------|-----------|
|              | MW 2596   | 15.95         | MW 2582          | 16.2      | MW 2614      | 15.65     |
|              | 2607      | 15.45         | 2606             | 15.4      | 2629         | "         |
|              | 3437      | 16.0          | 2580             | 16.4?     | 2587         | 15.95     |
|              |           |               | May be defective |           |              |           |
|              | 2593      | 15.95         | 2604             | 15.75     | 2618         | 15.62     |
|              | 3394      | "             | 2626             | 15.7      | 3434         | 15.7?     |
|              |           |               |                  |           | Scratch on   |           |
|              | 2585      | 15.95         | 2632             | "         | Variable.    |           |
|              | 2592      | 15.85         | 2613             | 15.65     | 2608         | 15.5?     |
|              | 2621      | 15.65         | 3395             | "         | 3446         | 15.85     |
|              |           |               | Var. ft.         |           |              |           |
|              | 2600      | 15.9          | Too blurred an   |           | 2620         | 15.68     |
|              |           |               | image to est.    |           |              |           |
|              | 2598      | "             | 2623             | 15.8      | 3401 or      | "         |
|              |           |               |                  |           | 2401         |           |
|              | 3444      | 15.95         | 2624             | 16.08     | Var. bright. |           |
|              | 3432      | 15.7          | 3447             | 16.05     | 3441         | 16.4      |
|              |           |               |                  |           |              |           |
|              | 2597      | about<br>15.9 | 3439             | 16.05     | 3396         | 16.35     |
|              | 2590      | 15.85         | 2610             | 15.72     | H 1722       | "         |

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January 11, 1918.

M 15

Plate No. Var. Est.

Var. No. 65

H 1715

continued

1726

1728

1724

1716

Var. Bright

1737

1725

1732

1733

1745

1720

1719

1746



copied

January 11, 1918.

M15

|                   | Plate No. | Var. Est. | Plate No. | Var. Est. | Plate No. | Var. Est. |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Vari. No. 66      | MW 3396   | 16.10     | MW 3447   | 15.52     | MW 3444   | 15.75     |
| Sequences         | 3441      | 16.20     | 2624      | 15.48     | 2598      | 15.6      |
| 2 and 3           | 3401      | 15.95     | 2623      | 15.50     | 2600      | 15.82     |
|                   | or 2401   |           |           |           |           |           |
|                   | 2620      | 15.7      | 3395      | "         | 2621      | 15.75     |
|                   | 3446      | 15.75     | 2613      | 15.95     | 2592      | 15.58     |
|                   | 2608      | 15.58     | 2632      | "         | 3394      | 15.95     |
|                   | 3434      | 15.95     | 2626      | 15.58     | 2593      | 15.55     |
|                   | 2618      | 15.92     | 2604      | 15.9      | 3437      | 15.77     |
|                   | 2587      | 15.55?    | 2580      | 16.2      | 2596      | 15.48     |
|                   | 2629      | 15.45     | 2606      | 16.10     | 2607      | 15.85     |
|                   | 2614      | 16.0      | 2582      | 16.10     | 2612      | 15.95     |
|                   | 2610      | 15.95     | 2590      | 15.48     | 2619      | 16.02     |
|                   | 3439      | 15.75     | 2597      | 15.45     | 2616      | 15.95     |
| Peculiar image.   |           |           |           |           |           |           |
| 1 large and large |           |           | 3432      | 15.6      | 2588      | 15.48     |
| but not very      |           |           |           |           |           |           |
| bright            |           |           |           |           |           |           |

Continued, page 67.

January 11, 1918.

M15

(Suspected Var.

..K ..

Watch

N.B. 2592, 2593



copied

January 11, 1918.

|              |           |           |   |
|--------------|-----------|-----------|---|
| Continued    | M15       |           |   |
| from p. 65.  | Plate No. | Var. Est. | P |
| Var. No. 66. | MW 2584.  | 15.95     |   |
|              | 3429      | 15.55     |   |
|              | 2628      | 15.50     |   |
|              | 2631      | 15.45     |   |
|              | 2595      | 15.6      |   |
|              | 3428      | 15.5      |   |
|              | 2602      | 15.85     |   |

Continued on page 70

Copied

January 12, 1918.

M15

|                           | Plate No.                                       | Var. Est.     | Plate No.              | Var. Est.     | Plate No. | Var. Est. |
|---------------------------|---|---------------|------------------------|---------------|-----------|-----------|
| Var. No. 34               | MW 2580   | 15.17         | MW 2631                | 15.25         | 3447      | "         |
| Continued<br>from page 57 | 2590  | 14.8          | 2628                   | "             | 3395      | "         |
|                           | 2588  | about<br>15.0 | Can not<br>separate    |               | 2623      | 15.2      |
|                           | 2597  | 15.0          | 3437                   | about<br>15.2 | 2624      | "         |
|                           | 2598  | "             | 3394                   | "             | 2632      | "         |
|                           | lazy. Too closely<br>combined with<br>adj. star |               | 3444                   | 15.18         |           |           |
|                           | 2660  | 15.05         | 3432                   | 15.25         |           |           |
|                           | 2604  | 14.8          | 3434                   | 15.25         |           |           |
|                           | 2607  | 15.0          | 3441                   | "             |           |           |
|                           | 2608  | 15.15         | Cannot separate        |               |           |           |
|                           | 2613  | 15.2          | 3446                   | 15.15         |           |           |
|                           | 2620  | perhaps 15.18 | 3401                   | "             |           |           |
|                           | Bleurred  |               | or 2401                |               |           |           |
|                           | 2621  | 15.4          | 3396                   | 15.3          |           |           |
|                           | 2619  | 15.35         | or a little<br>fainter |               |           |           |
|                           |   |               | 2610                   | 15.3          |           |           |
|                           |   |               | 2629                   | "             |           |           |

If plates  
must be  
combined  
light.  
shall  
they be  
meas.?



January 12, 1918.

M15

2621 &amp; 2612 shows good separation

Var. No. 34.  $\text{Gr.}^* 25.85$   
 May it be  $* 3432$   
 the upper  $* 3429$   
 companion  
 that varies?  
~~\* x~~  
 see 2613

ft. 2602

 $* 2595$  $* 2606$  $xx 2616$  $xx 3434$  $xx 2610$ 

Many plates showing blurred, double  
 image. show the upper star bright.

70

cpied

January 12, 1918.

Continued

1115

from page 67

Plate No. Var. Est.

Var. No. 66.

MW 3428 15.25

2585 15.7

Continued on page 74



copied

January 12, 1918.

M15

|             | Plate No.       | Var. Est.  | Plate No.    | Var. Est. |
|-------------|-----------------|------------|--------------|-----------|
| Var. No. 63 | 2595            | 16.4       | MW 2629      | ..        |
| S.E.W.      |                 |            | Var. Bright. |           |
|             | 2606            | 16.4       | 2614         | 16.5      |
| Using       |                 |            | or fainter   |           |
| Sequence    | 2590            | 15.85      | 3396         | 16.0      |
| No. 2.      |                 |            |              |           |
|             | 2610            | 16.4       |              |           |
|             | 2580            | 15.6       |              |           |
|             | 2582            | 15.45      |              |           |
|             | 2632            | "          |              |           |
|             | 2626            | 15.65      |              |           |
|             | 2624            | 16.05      |              |           |
|             | 2623            | 15.6       |              |           |
|             | <del>3439</del> |            |              |           |
|             | <del>3395</del> | 16.6 or 7? |              |           |
|             | 3447            | "          |              |           |
|             | Var. faint.     |            |              |           |
|             | 2587            | 15.7       |              |           |
|             | 3395            | "          |              |           |

72  
copiedJanuary 14, 1918.

M15

| No. 63  | Plate No.       | Var. Est.       | Plate No.                | Var. Est.     |
|---------|-----------------|-----------------|--------------------------|---------------|
|         | MW 2585         | 15.5            | MW 3432                  | 16.7          |
|         | 2604            | 16.4            | 2596                     | 16.3          |
|         | 3437            | 16.35           | 2612                     | 16.4          |
|         | 2616            | perhaps<br>16.7 | 2584                     | 15.4          |
|         | 2602            | 16.3            | 3429                     | 16.4          |
|         | 2598            | "               | 2628                     | about<br>15.5 |
|         | 2600            | 16.35           | 2631                     | "             |
| many pl | <del>2588</del> | <del>15.9</del> | Var. probably<br>bright. |               |
|         | 2613            | 16.75           | 3444                     | 16.2?         |
|         | 2588            | 16.25           | 2607                     | 16.5          |
|         | 2600            | 16.4            | 2608                     | 16.4          |
|         | 2593            | 16.05           | 2621                     | 15.75         |
|         | 2597            | "               | 2619                     | 16.75?        |
|         | 2620            | 16.3            | 2592                     | 15.82         |



epid.

January 16, 1918.

M15

Plate No. Var. Est.

No. 63

Cannot be measured on ~~X~~ Plates  
 " " " " H "

MW 3441 16.5 or fainter?

3401 "

or 2401

2618 16.6

3428 15.9

3446 16.4

Jan. 17. continued

3394 "

3434 16.4

copied

January 16, 1918.

M 15

Plate No. Var. Est.

Var. No. 66

H 1733

I 8869 about 16.1

H 1716

8780 "

Close to another  
star.

Var. bright.

12162 "

Difficult to  
separate.

1746

8664 "

1719

Var. probably bright.

8014 "

1720

10893 perhaps  
15.7

1745

10897 15.75

1732

7986 15.48

1725

perhaps 15.4

difficult to separate 7985 "

1737

8912 15.7

1722

8920 "

1724

7767 "

1728

1726

1715



copied

January 18, 1918.

M 15

|  | Plate No.      | Var.   | Est. | Plate No.              | Var.          | Est. |
|--|----------------|--------|------|------------------------|---------------|------|
| Var. No. 33                                    | MW 2593        | 15.7   |      | 2607                   | 15.35         |      |
| Very far<br>into center                        | 2580           | 16.05  |      | 2612                   | 15.35         |      |
| Difficult<br>no plates<br>that are<br>hazy     | 2626           | 16.00  |      | 2582                   | 15.78         |      |
|  | 3395           | 16.9 ? |      | 2632                   | "             |      |
| Sequence<br>2 and 3.                           | 2596           | 15.95  |      | 2621                   | 15.6          |      |
|  | 3447           | 15.55  |      | 3395                   |               |      |
| Hazy<br>plates<br>especially<br>unsatisfactory | 2587           | 15.55  |      | Probably faint<br>2597 | 16.4          |      |
|  | 2585           | 15.45  |      | <sup>4</sup> 3232      | about<br>16.0 |      |
|  | 2600           | 15.42  |      | 2623                   | 15.88         |      |
|  | 2624           | 16.45  |      |                        |               |      |
|  | 2628           | 15.7   |      |                        |               |      |
|  | 3487           | 15.65  |      |                        |               |      |
|  | Defect on Var. |        |      |                        |               |      |
|  | 2592           | 15.6   |      |                        |               |      |
|  | 2608           | 15.5   |      |                        |               |      |

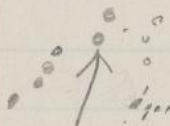
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January 19, 1918

Light, poor, snowing.

| Var. No.    | Plate No.      | Var. Est. | Plate No.   | Var. Est.  | Plate No.    | Var. Est.            |
|-------------|----------------|-----------|-------------|------------|--------------|----------------------|
| Var. No. 33 | MW 2616        | 15.85     | MW 2619     | 16.4       | MW 2607      | 15.32                |
|             | 2610           | 15.6      | 2613        | 15.65      | X & H plates | cannot be estimated. |
|             | 3429           | 16.15     | 2620        | 15.8       |              |                      |
|             | 3401           | "         | 2614        | 15.7       | V 8869       | about 15.5           |
|             | or 2401        |           |             |            |              |                      |
|             | 2595           | "         | 3439        | 16.0       | 8912         | 15.6                 |
|             | Peculiar image |           |             |            |              |                      |
|             | 3441           | 15.35     | 2584        | "          | MW 2590      | 15.7                 |
|             |                |           | hazy.       |            |              |                      |
|             | 2588           | 15.6      | 2596        | 15.85      | 3441         | 15.35                |
|             |                |           |             |            |              |                      |
|             | 2618           | 15.75     | 2602        | 15.35      |              |                      |
|             |                |           |             |            |              |                      |
|             | 3428           | 16.05     | 2606        | 15.3       |              |                      |
|             |                |           |             |            |              |                      |
|             | 3446           | 15.55     | 2629        | "          |              |                      |
|             |                |           | Var. faint? |            |              |                      |
|             | 2604           | 15.15     | 3398        | 16.0       |              |                      |
|             |                |           |             |            |              |                      |
|             | 3394           | 16.3?     | 2631        | "          |              |                      |
|             |                |           |             |            |              |                      |
|             | 3434           | 16.2      | 3444        | about 15.5 |              |                      |
|             |                |           |             |            |              |                      |
|             | 2584           | 15.65     | 2598        | "          |              |                      |





Gr. 2613  
\* 2616  
2595

ft. 2620  
\* 2586  
\* 2619

copied

January 19, 1918.

M15

Plate No. Var. Est.

Var. No. 46 MW 2607 16.08

2598 16.0

2619 16.0

2595 16.35



epid

January 21, 1918

79

w

M15

| Var. No. | Plate No.      | Var. Est.    | Plate No. | Var. Est. | Plate No. | Var. Est. |
|----------|----------------|--------------|-----------|-----------|-----------|-----------|
| 46       | MW 2616        | 15.55        | MW 3441   | 15.65     | MW 2612   | 16.2      |
| Cont.    |                |              |           |           |           |           |
|          | 2588           | 16.2         | 2582      | 15.85     | 2628      | 15.7?     |
|          | 2620           | 15.6         | 2592      | 16.15     | 2608      | 16.4      |
|          | 2613           | 16.4         | 3437      | 15.55     | 2585      | 15.95     |
|          | 3444           | 15.85        | 2624      | 16.05     | 2600      | 16.35     |
|          | 2631           | "            | 2584      | 15.85     | 3439      | 15.7      |
|          | Blurred images |              |           |           |           |           |
|          | 3396           | 16.4         | 2621      | 15.6      | 2614      | 16.05     |
|          | 2629           | "            | 2623      | 15.7      | 2580      | 15.7      |
|          | 2606           | 16.3         | 3432      | 16.0      | 2626      | 15.78     |
|          | 2602           | 16.4         | Dupl.     |           | 2596      | 16.2      |
|          |                |              | 2623      | 15.65     |           |           |
|          | 2590           | 16.2         | 2597      | 16.3?     | 2587      | 15.85     |
|          | 2610           | 16.4         | 3395      | "         | 2593      | 16.3      |
|          | 3429           | 16.7?        | 3447      | 16.05     | 3434      | 15.7      |
|          | 3401           | apparently   | 2632      | "         | 3394      | 16.7?     |
|          | or 2401        | very bright. |           |           |           |           |

copied

January 21, 1918.

M15

Plate No. Var. Est.

Var. No. 46  
(Cont.)

I 8912

Var. apparently very faint.

I 8869

15.7?

MW 2604

16.2

3446

15.8

3428

16.08

2618

15.5

or a little brighter.

Remaining X plates and H plates can  
not be estimated.



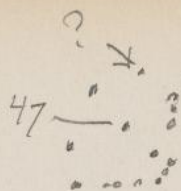
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January 21, 1918.

M15

| Var. No.      | Plate No.           | Var. Est.     | Plate No. | Var. Est. | Plate No. | Var. Est.              |
|---------------|---------------------|---------------|-----------|-----------|-----------|------------------------|
| Var. No. 47.  | MW 2618             | 15.2          | MW 2616   | 15.45     | 2580      | 15.8                   |
| 47 is far     | 3428                | about<br>15.4 | 2588      | 15.85     | 2614      | 15.95                  |
| in center     | 3446                | 15.85         | 2620      | 15.6      | 3439      | 15.65                  |
| and measures  | 2604                | "             | 2613      | 16.6?     | 2600      | <del>15.95</del> 16.05 |
| are difficult | Effective in region |               | 2607      | 16.3      | 2612      | 16.0                   |
| because       | 3441                | 16.05         | 2598      | "         | 2628      | "                      |
| affected      | Sequences           | "             | 2619      | 15.55     | 2608      | 16.05                  |
| by back-      | band 3.             |               | 2595      | 15.95     | 2585      | 15.65                  |
| ground.       | 3429                | 15.5          | 3394      | "         | 2632      | "                      |
|               | 2610                | 15.7          | Var. fr.  |           | 3447      | 16.2                   |
|               | 2590                | 15.7          | 3434      | 15.7      | 2593      | 15.85                  |
|               | 2602                | 16.15         | 3395      | "         | 2587      | 15.65                  |
|               | 2606                | 16.0          | Blurred.  |           | 2597      | about 16.0             |
|               | 3396                | 15.85         | 2596      | 15.95     | 3432      | 15.7                   |
|               | 2631                | "             | 2626      | 15.65     | 2623      | 15.8                   |
|               | 3444                | 15.9          |           |           |           |                        |

See Double  
2612



Jan. 21, 1918.

M15

Suspected Var. ?

~~\*\*~~ 2610

2606

\* 2612

~~\*\*~~ 2608

ft. 2618

3429

~~\*\*~~ 3446

\* 2629

\* 3396

\* 3434

\* 3439

\* 3432

\* 2623

~~\*~~ 2621

~~\*\*~~ 3444

~~\*\*~~ 3437

~~\*\*~~ 2582

Slight change. Not to be  
measured at present.



Copied

January 21, 1918.

M15

| Var. No. 47<br>(cont.) | Plate No. | Var. Est. |
|------------------------|-----------|-----------|
|                        | MW 2621   | 15.45     |

|      |         |
|------|---------|
| 2584 | 15.45 ? |
|------|---------|

|      |               |
|------|---------------|
| 2624 | about<br>16.0 |
|------|---------------|

|      |               |
|------|---------------|
| 3437 | about<br>15.8 |
|------|---------------|

|      |       |
|------|-------|
| 2592 | 15.85 |
|------|-------|

|      |      |
|------|------|
| 2582 | 15.7 |
|------|------|

~~X 5th plates not estimated.~~

|      |      |
|------|------|
| 2629 | 15.7 |
|------|------|

See p. 89.

*exhib*January 22, 1918.

M15

| Var. No. | Plate No. | Var. Est.       | Plate No.      | Var. Est.     | Plate No.                                     | Var. Est. |
|----------|-----------|-----------------|----------------|---------------|---|-----------|
| 56       | MW 2619   | 16.6            | MW 3434        | 16.2          | MW 3437                                       | 15.75     |
|          | 2604      | 15.75           | 2596           | 15.6          | <del>2595</del>                               |           |
|          | 3429      | 16.15           | 2628           | 15.4?         | 2620  | 16.0      |
|          | 2618      | 15.8            | 3439           | 15.9          | 2588  | 15.8      |
|          | 3428      | 16.3            | Defect on Var. |               | 2598  | 15.2?     |
|          | 2587      | 15.7?           | 2580           | 16.0          | Bad images<br>var. but apparently<br>very br. |           |
|          | 2632      | "               | 2626           | 15.95         | 2600  | 16.0      |
|          | 2600      | 15.3            | 2593           | 16.25         | 3444  | 15.6      |
|          | 2585      | 15.7            | 2623           | 16.2          | 3446  | 15.75     |
|          | 3401      | <del>15.4</del> | 2621           | 15.9          | 2582  | 16.2      |
|          | or 2401   | probably faint  |                |               |   |           |
|          | 3441      | 15.4            | 2584           | 16.10         | 3432  | 16.1      |
|          | 2602      | 15.55           | 2623           | 16.25         | 2608  | 16.1      |
|          | 2590      | 15.7            | 2624           | about<br>16.3 | 3447  | 15.7      |
|          | 3394      | 15.95           | 2612           | 15.8          | 3395  | "         |

continued, page 87



2602

85

January 22, 1918.

M15

Suspected Var.



x confirmed S.I.P.  
y " "

Jan. 22, 1918.

br.

xx 2585  
2626

ft.

xx 2602  
3434  
xx 2618  
2614  
2584

medium brightness

2593  
2580  
3439  
2604  
3429

xx 2612  
2595

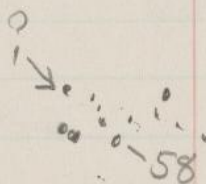
show 2585 = 3 stars,  
then 2602 = 2 "

See y in 2612 br.  
2610 br.

January 22, 1918.

M15

No. 64 =

confirmed  
p1p -

January 26, 1918.

br.

2584

~~2607~~~~2613~~~~3428~~

fr.

~~2623~~

2595

2588

2620

~~2600~~~~3439~~

2593

~~2621~~~~2587~~

br 2610

2582

2588

2597

fr 2620



*copied*

January 22, 1918.

M15.

Var. No. 56  
Continued  
from  
page 84.

Plate No. Var. Est.  
MW 2597 15.2

2595 15.65

2613 16.2

2607 15.7

2616 16.2

2606 15.7

2629 15.45

2631 about  
15.4

3396 16.35

2592 16.0

~~H & X plates not estimated.~~

H plates can not <sup>be</sup> estimated

copied

January 23, 1918.

M15

Plate No. Var. Est.

Var. No. 56

X 8920

Var. very bright but <sup>partly</sup> combined with adj. star.

8869

Var. quite bright but <sup>partly</sup> combined with adj. star.

8912 about 16.0

8780

12162

8664

8014

10893

7767

10897

7985

7986



copied

January 23, 1918

M15

Plate No. Var. Est.

Var. No. 47 ~~8780~~ perhaps 15.2 H 1720 15.4?

8912 16.4 1745 "

8869 about 15.9 1719 "

8920 16.2 1732 "

12162 " 1725 "

8664 " 1737 "

8014 " 1722 "

10893 " 1724 "

7767 " 1726 "

10897 " 1715 "

Var. very faint

7985 " 1728 "

7986 " 1733 "

Var. faint

1716 "

Var. ft. ?

1746 "

264?  
spid

January 23, 1918.

Very bright light, sun on snow.

M15

|                          | Plate No. | Var. Est.     | Plate No.        | Var. Est. | Plate No. | Var. Est.          |
|--------------------------|-----------|---------------|------------------|-----------|-----------|--------------------|
| Var. No. 55              | MW 2596   | 15.95         | MW 2631          | "         | MW 2629   | 16.2<br>or fainter |
| Sequences<br>293<br>used | 2619      | 16.6          | 2604             | 16.05     | 2606      |                    |
|                          | 3396      | 16.05         | 2600             | 16.0      | 3395      | "                  |
|                          | 2606      | 16.4          | 2632             | "         | 3446      | 15.6               |
|                          | 2626      | about<br>15.9 | 3401             | "         | 2608      | 16.4               |
|                          | 3432      | 16.55         | 2401             | "         | 2598      | 15.7?              |
|                          | 2616      | 16.2          | 2592             | 15.7      | 3444      | 15.7               |
|                          | 2595      | 16.0          | 2587             | 15.6      | 2598      | 15.7               |
|                          | 2607      | 16.0          | 2614             | 16.0      | 3447      | 15.8               |
|                          | 2613      | 16.6          | 3428             | 16.2      | 2597      | 15.95              |
|                          | 2588      | 15.75         | 2595             | 16.05     | 2582      | 15.6               |
|                          | 2624      | 16.9?         | 2623             | 16.2      | 3439      | 16.7               |
|                          | 2590      | 15.7?         | 2620             | 16.4      | 2582      | 15.75              |
|                          | 3441      | about<br>16.0 | Reveras.<br>2616 | 16.25     |           |                    |
|                          |           |               | Reveras.<br>2588 | 15.75     |           |                    |



January 23, 1918.



2588  
2614

Er.

3439    ~~2614~~  
2613  
~~2587~~

copied

January 24, 1918.

X plates measured on Jan. 25.

Bright, sun on sun.

M15

Var. No. 55.  
Continued

Plate No. Var. Est.

~~MW 2628~~  
~~2606~~ 16.2

 3394 about  
 16.0

2580 15.75

3434 16.4?

2593 16.15

3429 16.65

 3437 16.6 or  
 fainter?  
 2602 16.1

~~2602~~  
 2610 16.25

2612 16.2

2618 16.3

2610 16.05

2584 15.7

2585 15.65

This star cannot be  
 separated on H  
 plates, therefore  
 no measures  
 are given.

X 8912 16.4 16.4

8780 .. 16.5

8869 16.0

8920 16.05

12162 "

8664 "

8014 "

10893 "

7767 "

10897 "

Var. probably bright

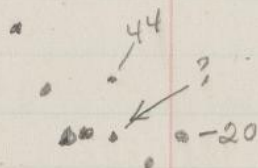
7985 " Var. bright

7986 ..



January 24, 1918

M15



Bright

faint

~~XX~~ 2602 ~~XX~~ 2610

2580

2593 2608

2613

~~XX~~ 2595~~XX~~ 2587

2623

~~XX~~ 2618.~~XX~~ 3437Good plates, medium<sup>(?)</sup> brightness

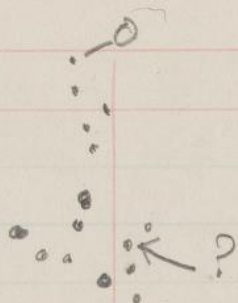
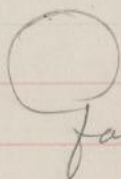
2600

2614

3429

January 24, 1918.

M15

Bright  
3446

Faint

2582

2596



*copied*

January 23<sup>4</sup>, 1918.

M 15

Plate No. Var. Est.

Var. No. 57 MW 3428 15.4

Using 2607 15.7

Sequence 2614 15.55

This star, 2620 15.85  
 on very good  
 MW plates,  
 shows a  
 faint com-  
 panion or  
 hazy, ring-  
 like addition  
 to the bar.  
 As this is  
 separable  
 on only a  
 few plates  
 (see print,  
 which shows  
 it) the  
 combined  
 light is  
 estimated  
 on a different  
 scale.

January 24, 1918.

M15

Confirmed  
S.L.B.

January 26, 1918.

bright

2588

\* 2587

2620

\* 2621

subd 2598

3437

Defeat on  
Fair.

(white spot)

2616 excellent

state of region

faint

2614

3428

3432

\* 2604

\* 2580

2595

3434



copied.

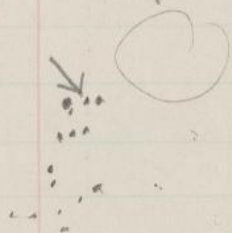
January 25, 1918.

| M15        |           |           |           | Summing   |           |           |  |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| Var. No.   | Plate No. | Var. Est. | Plate No. | Var. Est. | Plate No. | Var. Est. |  |
| Var. No 57 | MW 2619   | 16.0      | MW 2596   | 15.55     | MW 3429   | 15.25     |  |
| Cont.      | 2592      | 15.8      | 2582      | 15.85     | 2613      | 15.6      |  |
|            | 2598      | 15.4      | 2620      | 15.85     | 2624      | 15.7      |  |
|            | 3437      | 15.95     | 3394      | 15.82     | 3439      | 15.75     |  |
|            | 2595      | 15.85     | 2612      | 15.7      | 2626      | 15.7      |  |
|            | 3434      | 15.88     | 2593      | 15.85     | 2631      | 15.55     |  |
|            | 2580      | 15.7      | 2602      | 15.45     | 2632      | "         |  |
|            | 2604      | 15.3      | 2610      | 15.45     | 3395      | "         |  |
|            | 2616      | 16.0      | 2618      | 15.95     | Blurred   |           |  |
|            | 2588      | 15.95     | 2621      | 16.0      | 3401      |           |  |
|            | 3432      | 16.0      | 2585      | 15.7      | or 2401   |           |  |
|            | 2587      | 15.85     | 2584      | 15.82     | Blurred   |           |  |
|            | 3396      | 15.8      | 3444      | 15.8      | 3441      | 15.8      |  |
|            | 3446      | 15.5      | 2597      | 15.4      | 2590      | 15.65     |  |
|            |           |           |           |           | 2600      | 15.25     |  |
|            |           |           |           |           | 2623      | 15.4      |  |
|            |           |           |           |           | 3447      | 15.8      |  |

January 25, 1918.

M15

suspected var. ?



bright

faint

\* 3446

\* 2620

2604

\* 2582

3444

\* 2618

3394

\* 2621



January 25, 1918

M15

Suspected Var. ?

21

bright

faint  
X 2614  
2600

January 25, 1918.

M15

Plate No. Var. Est.

Var. No. 57  
ContinuedMW 2628 <sup>about</sup> 15.2

2629 perhaps 15.3

2606 Duncage  
barye and Phaggy  
2608 15.5

I 7986 perhaps 15.3

X 8780 "

7985 " Var. bright

8912 15.82

10897 "

H 1720 15.3

7767 " Var. bright

1745 15.45

10893 "

1725 15.3

8014 " Var. bright

other H plates  
cannot be  
estimated.

8664 " Var. bright

12162 " Var. bright

8920 15.6

8869 15.3 Very hazy



January 25, 1918.

M15

Plate No. Var. Est.

Var. No. 60 X 7986 ..

Var. is 7985 ..

so close to  
other stars 10897 ..

that measures

are 7767 ..

difficult

when hazy 10893 ..

images are

hazy. 8014 ..

8664 ..

12162 ..

8920 ..

Var. faint

8869 ..

8780 ..

8912 ..

H plates cannot  
be estimated

January 26, 1918.

M15

Plate No. Var. Est.

Plate No. Var. Est.

Plate No. Var. Est.

Var. No. 60  
(Continued)

MW 3432 15.85

MW 2614 15.7

MW 2593 15.6

2592 15.7

2595 15.55

2612 16.0

2619 16.3

3434 15.4

3394 "

Blurred.

3428 15.6

2587 15.4

3395 "

Blurred.

2621 15.85

2588 15.4

2632 "

3447 15.85

2608 15.6

2631 "

separated

faint.

2598 "

2629 "

2626 15.7

2616 16.2

2606 15.78

2607 15.8

2580 15.7

2628 "

2624 "

Var. faint.

Blurred

3437 15.7

2584 15.38

2590 "

Blurred.

2604 15.8

2585 15.25

3441 16.05

2623 15.85

2618 16.1

2596 15.65

3439 15.75

2610 15.78

3396 "

Blurred

2600 15.6

2602 15.85

2582 15.55

Var. 60 has  
a faint star  
on background  
close to it,  
making a  
ragged edge  
on one side.  
This is clearly  
separated  
and the  
Var. only has  
been noted  
on MW plates.



January 26, 1918.

M15

| Plate No. | Var. | Est. |
|-----------|------|------|
| MW3446    | "    |      |

|      |   |  |
|------|---|--|
| 2620 | " |  |
|------|---|--|

|         |  |  |
|---------|--|--|
| Blurred |  |  |
|---------|--|--|

|      |   |  |
|------|---|--|
| 2597 | " |  |
|------|---|--|

|      |      |  |
|------|------|--|
| 3444 | 15.8 |  |
|------|------|--|

|      |      |  |
|------|------|--|
| 2613 | 15.9 |  |
|------|------|--|

|      |      |  |
|------|------|--|
| 3429 | 15.4 |  |
|------|------|--|

|      |   |  |
|------|---|--|
| 3401 | " |  |
|------|---|--|

|        |  |  |
|--------|--|--|
| ~ 2401 |  |  |
|--------|--|--|

January 26, 1918.

M15

Var. No. 28, which is far from the center and for which 3 comparison stars were taken a, b, c, marked on original print. Miss Leavitt's magnitudes are as follows: -

$$a = 15.17 \quad 15.2$$

$$b = 15.92 \quad 15.9$$

$$c = 16.14 \quad 16.1$$

and are used in reduction.

(from sheet of Var. 28 given me by Miss Leavitt)

Stars used are marked on MW 2606.

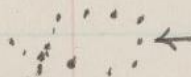
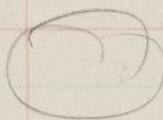
| Plate No. | Var. Est.  | Plate No.               | Var. Est.             | Plate No.            | Var. Est.     |
|-----------|------------|-------------------------|-----------------------|----------------------|---------------|
| MW 2606   | 16.05      | MW <del>2604</del> 3437 | 15.8                  | MW 3437              | 15.3          |
| 2610      | 15.8       | 3428                    | 16.2                  | 3439                 | 15.3          |
| 2585      | 15.6       | 2619                    | <del>15.98</del> 16.0 | 2588                 | 15.4          |
| 2618      | 16.05      | 2592                    | 15.5                  | 2621                 | perhaps 15.95 |
| 2584      | 15.5       | 3432                    | 15.3                  | Defect close to var. |               |
| 2628      | 16.25      | 2598                    | about 15.7            | 3444                 | 15.7          |
| 2629      | 16.08      | 3447                    | 15.7                  | 2580                 | 16.3?         |
| 2608      | 15.8       | 3434                    | 15.25                 | 3432                 | 15.25         |
| 2623      | about 15.9 | 2616                    | 16.5?                 | 3444                 | 15.7          |



| Plate No.           | Var. Est.<br>about |
|---------------------|--------------------|
| Var. No. 28 MM 2597 | 15.6               |
| 2613                | 16.1               |
| 2607                | 15.95              |
| 2608                | 15.75              |
| 2595                | 15.6               |
| 2614                | 15.95              |
| 3446                | 15.8               |
| 2582                | 16.4 or 5          |
| 3396                | 15.6               |
| 2587                | 15.4               |

January 26, 1918.

M15



15.9 -16 2 or 3 ?

Bright

Faint

|      |                |      |
|------|----------------|------|
| 2588 | <del>***</del> | 3439 |
| 3396 | x              | 3437 |

~~\*\*\*~~ 3434~~\*\*\*~~ 2628~~\*\*\*~~ 2585~~\*\*\*~~ 2604~~\*\*~~ 2600~~x~~ 2595



January 28, 1918.

M15

|              | Plate No.             | Var. Est.    | Plate No.          | Var. Est.    | Plate No.   | Var. Est.  |
|--------------|-----------------------|--------------|--------------------|--------------|-------------|------------|
| Var No. 28   | MW 2596               | 15.65        | MW 2620            | 15.95        | H 1719      | 15.8       |
| Continued    |                       |              |                    |              |             |            |
| from p. 105. | 3441                  | 15.4         | <del>7986</del> .. |              | 1720        | 15.9       |
|              |                       |              | Var. faint         |              |             |            |
|              | 2590                  | 15.1         | 7985               | 15.95        | 1745        | 15.8       |
|              | 2624                  | 16.05        | 10897              | about 16.0   | 1732        | 15.7       |
|              | 3401                  | 16.0         | 7767               | about 15.9   | 1725        | 16.0       |
| a 2401       |                       |              |                    |              |             |            |
|              | 3429                  | 16.2 ?       | 10893              | ..           | 1737        | 16.102     |
|              |                       |              |                    |              | fainter.    |            |
|              | 2626                  | 15.95        | 8014               | ..           | 1746        | 16.4 ?     |
|              |                       |              | Var. faint.        |              |             |            |
|              | 2631                  | 16.15        | 8664               |              | 1716        | 15.5       |
|              |                       |              | Var. bright        |              |             |            |
|              | 2632                  | perhaps 16.2 | 12162              | about 15.5   |             |            |
|              | Plate from in region. |              |                    |              | 1733        | 15.7       |
|              | 3395                  | 15.7         | 8920               | 15.95        |             |            |
|              |                       |              |                    |              | 1724        | ..         |
|              | 3394                  | 15.5         | 8869               | 16.2         | Blurred     |            |
|              |                       |              |                    |              | image       |            |
|              | 2612                  | 16.0         | 8780               | 16.0         | 1726        | 16.2       |
|              |                       |              |                    |              | or fainter. |            |
|              | 2593                  | 15.5         | 8912               | 16.0         | 1722        | about 16.1 |
|              |                       |              |                    |              |             |            |
|              | 2602                  | 15.7         | H 1728             | about 16.4 ? | 1715        | 15.8 ?     |

108

January 28, 1918.

No. 64

M15

O.E.W.

64  
58Using  
Seq. 3

| Plate No.               | Var. | Est.       | Plate No. | Var. | Est.  | Plate No. | Var. | Est.  |
|-------------------------|------|------------|-----------|------|-------|-----------|------|-------|
| MW 2604                 |      | 15.9       | MW 2580   |      | 15.7  | MW 2626   |      | 16.55 |
| 3434                    |      | 15.95      | 2597      |      | 16.3  | 3429      |      | 15.85 |
| 2628                    |      | "          | 3444      |      | 16.2  | 3401      |      | "     |
| Var. probably<br>bright |      |            |           |      |       | 2401      |      |       |
| 2588                    |      | 16.0       | 2613      |      | 15.9  | 2624      |      | 16.7? |
|                         |      |            | 3396      |      | 15.95 | 2590      |      | 15.7  |
| 2600                    |      | 16.4       |           |      |       |           |      |       |
|                         |      |            | 2608      |      | 15.7  | 3441      |      | 16.4  |
| 3439                    |      | about 16.6 |           |      |       |           |      |       |
| 2595                    |      | 16.5       | 2614      |      | 15.5  | 2596      |      | 16.0  |
|                         |      |            | 2607      |      | 15.55 | 2623      |      | 16.3  |
| 2585                    |      | 15.7       |           |      |       |           |      |       |
| 3437                    |      | 16.1       | 2620      |      | 16.3  | 2592      |      | 15.9  |
|                         |      |            | 2602      |      | 15.75 | 8912      |      | 15.7  |
| 2606                    |      | 15.45      |           |      |       |           |      |       |
|                         |      |            | 2593      |      | 16.2  | 8980      |      | "     |
| 3432                    |      | 16.55      |           |      |       |           |      |       |
|                         |      |            | 2612      |      | 15.7  | 8869      |      | 16.0  |
| 3394                    |      | "          |           |      |       |           |      |       |
|                         |      |            | 2632      |      | "     | 8920      |      | 15.9  |
| 3395                    |      | 16.4       |           |      |       |           |      |       |
|                         |      |            | 2631      |      | "     | 12162     |      | "     |
| 2621                    |      | 16.2       |           |      |       |           |      |       |



January 28, 1918.

no. 64

M15

| Plate No. | Var. | Est. | Plate No. | Var. | Est.   |
|-----------|------|------|-----------|------|--------|
| X 8664    | "    |      | MW 3428   |      | 15.55  |
| 8014      | "    |      | 2619      |      | 16.6 ? |
| 10893     | "    |      | 2598      | "    |        |
| 7767      | "    |      | 3447      |      | 15.9   |
| 10897     | "    |      | 2582      |      | 15.6   |
| 7985      | "    |      | 2616      |      | 16.0   |
| 7986      | "    |      |           |      |        |

H plates cannot be  
estimated

MW 3446 15.85

2587 15.7

2610 15.65

2618 16.0

2584 15.55

• 2629 "

February 14, 1918.

2, 13.  
a-b 26.14

M15.

Remeasures of Var. No. 49. Using stars marked  
a, b, c, on print.a-b  
c  
a-b 49

Magn. See Min. Estimates a 4 b 6 c

Leland's Bk. 54, p. 207.

a=14.99 MW 3428 a 32 b MW 2632 r 3 a 14.69

b=15.44 15.29 15.24=15.26

c=15.72 3441 r 2 a 14.79 2593 a 23 b 15.16

(use hundredths.)

3434 a 31 b 15.32

2612 a 33 b 15.29 15.14=  
15.22Badly scratched in  
region

3447 a 13 b 15.12

images blurred

2602 a 51 b 15.49 15.34=  
15.42

2585 r 3 a 14.69

2620 a 22 b 15.19 15.24=  
15.22

3395 a 31 b 15.32

2607 a 32 b 15.26

2595 var. a 14.94?

very little brighter

2584 r 4 a 14.59

than a. Not as

2587 r 2 a 14.79

much as x1 grade

2614 a 23 b 15.16 2606 a 23 b 15.16

2608 a 32 b 2624 r 2 a 14.79

15.29 15.24=15.26



February 14, 1918

M15

|                     |                |                     |        |                     |
|---------------------|----------------|---------------------|--------|---------------------|
| Var. No. 49 MW 2592 | a 24 b         | MW 2626             | v 3 a  | MW 3439 a 32 b      |
| 15.19 15.04 = 15.12 |                |                     | 14.69  | 15.26               |
| 2623                | v 3 a 14.69    | 2629                | v 2 a  | 3429 b 14 c         |
|                     |                |                     | 14.79  | 15.43               |
| 2596                | a 32 b 15.26   | 2618                | a 33 b | 8912 v 14.99        |
|                     |                |                     | 15.22  | about equal         |
| 3401                | a 12 b ? 15.16 | 3396                | a 31 b | two                 |
|                     |                |                     | 15.32  | 8869 v 6 a ?        |
| 2590                | v 1 a 14.89    | 2600                | a 32 b | 14.39               |
|                     |                |                     | 15.26  | 8920 a 33 b         |
| 2610                | a 32 b 15.26   | 2588                | v 11 a | 15.22               |
|                     |                |                     | 14.89  | 12162 "             |
| 2616                | a 32 b 15.26   | 2628                | v 2 a  | Too poor            |
|                     |                |                     | 14.79  | 7767 a 33 b ?       |
| 2582                | v 2 a 14.79    | 2604                | a 31 b | 15.22 ?             |
|                     |                |                     | 15.32  | 10897 a 41 b ?      |
| 2598                | a 14 b         | 2631                | a 14 b | 15.36 ?             |
| 15.09 15.04 = 15.06 |                | 15.09 15.04 = 15.06 | 7986   | "                   |
| 2619                | b 2 3 c        | 2597                | a 32 b | Too poor.           |
| 15.64 15.42 = 15.53 |                |                     | 15.26  | 7985 a 42 b         |
| 3394                | a 32 b         | 3444                | v 2 a  | 15.39 15.24 = 15.32 |
|                     | 15.26          |                     | 14.79  | 8014 a 15 b         |
| 2580                | v 4 a          | 3437                | a 14 b | 15.09 14.94 = 15.02 |
|                     | 14.59          |                     | 15.06  | 8664 "              |
| 2621                | a 32 b         | 3446                | a 13 b | Too poor.           |
|                     | 15.26          |                     | 15.12  | 8780 a 42 b         |
| 2613                | a 32 b         | 3432                | a 32 b | 15.32               |
|                     | 15.26          |                     | 15.26  |                     |

February 14, 1918.

M 15

Van. No. 49 X 10893 " " " "  
Too poor.

H 1725 a 246 ?

 $15.19 \ 15.04 = 15.12$ 1722 var. about  
equal to a 14.99

1715 " "

Too poor.

1728 " "

T.p.

1720 v 4 a ? 14.59

1745 var. probably faint.  
defective

1732 b 24c 15.64 15.32 = 15.48

1737 " "

T.p.

1746 " "

T.p.

1716 a 33b 15.22

1733 " "

T.p.

1724 " "

T.p.

1719 " "

1726 a 14b 15.06



February 14, 1918.

normal, see 2607, 2613

br.

fr.

2607

\* 2584

3428

\* 2606

3396

\* 2590

\* 3439

\* 2621

~~2602~~

\* 2614

\* 2604

\* \* 2619

\* \* 2610

April 1, 1918.

M15

Qualities of Plates used.

X, MW, &amp; N.

2<sup>nd</sup> Est.2<sup>nd</sup> Est.See note  
on page

123.

2<sup>nd</sup> Est. made

May 3, 1918.

reject first  
?

|           |     |       |           |                |       |
|-----------|-----|-------|-----------|----------------|-------|
| X 7767 ✓  | 2   | 2-3   | MW 2600 ✓ | 3              | 4     |
| 7985 ✓    | 2-3 | 3     | 2602 ✓    | 3              | 3-4-5 |
| 7986 ✓    | 2   | 3     | 2604 ✓    | 3-4            | 4     |
| 8014 ✓    | 2   | 2-3   | 2606 ✓    | 3-4            | 4     |
| 8664 ✓    | 2   | 3     | 2607 ✓    | 4 <del>3</del> | 3-4   |
| 8780 ✓    | 3   | 3     | 2608 ✓    | 3              | 3-4   |
| 8869 ✓    | 4-5 | 4-5   | 2610 ✓    | 3              | 3-4   |
| 8912 ✓    | 3-4 | 4     | 2612 ✓    | 4              | 4-5   |
| 8920 ✓    | 4   | 4     | 2613 ✓    | 4              | 4     |
| 10893 ✓   | 2   | 3     | 2614 ✓    | 3              | 4     |
| 10897 ✓   | 2   | 3     | 2616 ✓    | 3-4            | 5     |
| 12162 ✓   | 2   | 3     | 2618 ✓    | 3              | 4     |
| MW 2580 ✓ | 3   | 3-4-5 | 2619 ✓    | 4-5            | 4-5   |
| 2582 ✓    | 3   | 3-4   | 2620 ✓    | 3              | 3-4   |
| 2584 ✓    | 3   | 3-4   | 2621 ✓    | 5              | 5     |
| 2585 ✓    | 3   | 3-4   | 2623 ✓    | 4-5            | 4     |
| 2587 ✓    | 2   | 3 ✓   | 2624 ✓    | 4              | 4     |
| 2588 ✓    | 3   | 3-4   | 2626 ✓    | 2-3 4          | 2-4   |
| 2590 ✓    | 2-3 | 3 ✓   | 2628 ✓    | 3              | 3-4   |
| 2592 ✓    | 3-4 | 3-4   | 2629 ✓    | 2-3            | 3-4   |
| 2593 ✓    | 3   | 4-5   | 2631 ✓    | 3              | 3-4   |
| 2595 ✓    | 3   | 4-5   | 2632 ✓    | 1-2            | 3 ✓   |
| 2596 ✓    | 3   | 3-4   | 3394 ✓    | 2-3            | 3-4   |
| 2597 ✓    | 2-3 | 3 ✓   | 3395 ✓    | 3              | 3-4   |
| 2598 ✓    | 2   | 3 ✓   | 3396      | 4-5            | 5     |



|    |      |                  | 2nd ear        |
|----|------|------------------|----------------|
| MW | 3401 | 3 ✓              | 3-4            |
|    | 3428 | 3 ✓              | 3-4            |
|    | 3429 | 4-5 ✓            | 5              |
|    | 3432 | 5 ✓              | 5              |
|    | 3434 | 4-5 ✓            | 4-5            |
|    | 3437 | <del>3</del> 4 ✓ | 4-5            |
|    | 3439 | 4-5 ✓            | 5              |
|    | 3441 | 3 ✓              | 3-4            |
|    | 3444 | 3 ✓              | 3-4            |
|    | 3446 | 3 ✓              | 3-4            |
|    | 3447 | 3 ✓              | <del>2</del> 4 |
| H  | 1715 | 2 ✓              | 3 -            |
|    | 1716 | 4 ✓              | 3 -            |
|    | 1719 | 4 ✓              | 3 -            |
|    | 1720 | 4 ✓              | 3 -            |
|    | 1722 | 4 ✓              | 3 -            |
|    | 1724 | 4 ✓              | 3 -            |
|    | 1725 | 4-5 ✓            | 3              |
|    | 1726 | 4 ✓              | 3 -            |
|    | 1728 | 2-3 ✓            | 2-3 -          |
|    | 1732 | 3-4 ✓            | 3 -            |
|    | 1733 | 4 ✓              | 3 -            |
|    | 1737 | 3 ✓              | 3 -            |
|    | 1745 | 4 ✓              | 3 -            |
|    | 1746 | 4                | 3 -            |

April 17, 1918.

M 15.

Remeasures.

Measures giving difference 0.50 or greater, Miss Leland - I. E. W.  
From sheets of differences.

Var. No. 3 Sequence 3.

MW 2619 15.95

3439 15.65

Var. 9 Seq. 3

MW 3439

Var. 4 Seq. 1.

MW 3429 16.10

H 1716 15.45

Var. 11 Seq. 2

MW 2584

2608

Var. 5

H 1716 Miss L.'s

Var. 13 Seq. 2

MW 2618

H 1745

Measures used.

Var. 6 Seq. 2 or 3.

MW 3439 16.4

Var. 15 Seq. 1

H 1719

Var. 7 Seq. 2 or 3

MW 2619 16.2

3396 16.1

3401 15.9

3439 16.4

Var. 20 Seq. 2.

MW 2613

Var. 8 Seq. -

MW 3441 16.4?

3447 16.0



April 19, 1918.

M15

Remeasures. continued.

No. 9 Sep. 3

MW 3439 15.8

Var. 11. Sep. 2.

MW 2584 15.3

2608 15.75

Var. 13. Sep. 2

MW 2618 15.85

H 1745 15.3 (2 defective)

Var. 15. Sep. 1

H 1719 16.4

Var. 20. Sep. 2.

MW 2613 16.55

Var. 22 Sep. 3.

~~8912~~~~H 1721~~~~1746~~

April 25, 1918.

M15.

Remeasures.

~~Var. 22. Sep. 3~~~~X 8912~~~~H 1720~~~~1746~~

where is 22? not mtd on chart.

Var. 23 H 1715 15.5

Sep. 2. H 1716 15.75

H 1724 15.3

H 1733 15.8.2



April 26, 1918.

Var. 21. Sequence 1 & 2.

X 8869 ✓ 15.85

8912 ✓ 16.20

8920 ✓ 15.9

MW 2593 ✓ 15.6

2595 ✓ 15.95

2596 ✓ 15.85

2619 ✓ 16.6

2621 ✓ 16.10

2624 ✓ 15.90

3395 ✓ 15.90

3401 ✓ ~~15.95~~ <sup>3396</sup> 16.3

3429 ✓ 16.20

3439 ✓ 16.5

3446 ✓ 15.5

Var. 24

X 8912 16.0

Remains as cited 624  
Mar 4, '18 S.R.

Var. 26 Seq 2. & 3.

MW 2613 15.9

Var. 27.

X 7985 16.7 ?

MW 2590 Defects close to image. Var. faint.

2595 about 17.0

2602 16.6

120

May 1, 1918.

M15

Remeasures

Var. No. 5

H 1716

16.05

Var. No. 22

Seg. 3

~~X~~ 8912

16.05

H 1720

16.05

1746

16.0



May 2, 1918.

M 15

Remeasures.

Var. No. 31. Seq. No. 3 ✓  
 H 1745 15.6

Var. No. 32 Seq. No. 3  
 H 1737 Cannot separate

Var. No. 33 283  
 MW 2597 16.0  
 2619 16.4  
 2624 16.35  
 3432 16.1  
 3434 16.05  
 3439 16.2

Var. No. 34  
 MW 2582 15.1  
 2585 15.05

Var. No. 35  
 X 7986 15.9

May 3, 1915.

M15

Remeasures -

Var. No. 36

X 8920 15.85

MW 2604 15.9

2619 16.6

2624 16.6

3437 15.9

3439 15.9

Var. No. 37

MW 2582 15.9

2597 15.7

2619 16.3

2621 15.8

2624 16.0

3396 16.0

3432 16.3

Var. No. 38

MW 3395 16.0

3429 15.9

1+ 1722 16.15

MW 3432 16.4 *reprinted*



May 3, 1915.

M15

Remeasures.

Apparently, the scale of qualifications of plates of M15, see pages 114 and 115, were in error. <sup>estimates</sup> ~~Remeasures~~ made on May 3 are entered against first estimates, pages 114 and 115.

Plates are examined independently of first estimate, but entered with first estimates for convenience.

7  
May 3, 1918.

M15

Remeasures.

Var. No. 39

Σ 7986 15.8 .

MW 3395 16.05 .

H 1728 15.8 .

Var. No. 40 .

Σ 12162 15.85 .

MW 2580 16.05 .

2619 16.2 .

3439 16.2 .

H 1732 15.7 .

Var. No. 42

H 1728 15.05 .

Var. No. 43

MW 2628 15.6 .

3429 15.4 .

H 1716 15.8 .

1728 15.6 .

1746 15.4 ? .

Var. No. 44

MW 2616 15.4 .

3395 15.4 .

Var. No. 45



May 7, 1918.

M 15

Re-measure -

Var. No. 45

MW 2600 15.15

Var. No. 46

MW 2619 15.9

3394 16.3

Var. No. 47

MW 2613 16.3

3432 15.6

Var. No. 51

MW 2624 16.0

Var. No. 53.

MW 2584 15.6

2602 15.85

2618 15.9

2619 15.95

3395 15.95

3439 16.05

3441 15.85

H 1722 15.85

May 7, 1918.

M15

Remeasures.

Var. No. 54.

|         |       |   |
|---------|-------|---|
| V 8912  | 16.2  | . |
| MW 2613 | 16.2  | . |
| 2619    | 16.4  | . |
| 2624    | 16.6  | . |
| 3396    | 16.05 | . |

Var. No. 55.

|         |      |   |
|---------|------|---|
| MW 2613 | 16.4 | . |
| 2624    | 16.7 | . |
| 3437    | 16.4 | . |
| 3439    | 16.6 | . |

Var. No. 56.

|         |      |   |
|---------|------|---|
| MW 2619 | 16.3 | . |
|---------|------|---|

Var. No. 57.

|         |      |   |
|---------|------|---|
| MW 3432 | 16.0 | . |
| 3447    | 15.7 | . |

Var. No. 58.

|         |      |   |
|---------|------|---|
| MW 2587 | 16.0 | . |
|---------|------|---|

Var. No. 61.

|         |       |   |
|---------|-------|---|
| MW 2582 | 16.0  | . |
| 2624    | 15.95 | . |
| 3434    | 16.0  | . |



May 7, 1918.

M15

Remeasures.

Var. No. 62.

MW 2624 16.4

3439 16.1

Var. No. 63

MW 3432 16.6

3439 16.3

Var. No. 64.

MW 2619 16.6

2624 16.7?

3432 16.4

3439 16.6

Var. No. 65

MW 2619 16.0

May 14, 1918.

M 15

Remeasures of plates giving large residuals  
5.0 and greater.

|              |            |                             |
|--------------|------------|-----------------------------|
| Beg. Var. 25 | None       |                             |
| Var. 26      | "          |                             |
| " 27         | No period  |                             |
| " 28         | None       |                             |
| " 29         | None       |                             |
| " 30         | None       |                             |
| * " 31       | No period  |                             |
| " 32         | None       |                             |
| " 33         | None       |                             |
| " 34         | None       |                             |
| " 35         | None       |                             |
| " 36         | None       |                             |
| " 37         | X 8869     | Should estimate about 16.   |
| " 38         | H 1737     | Image faint, hardly separ   |
| " 39         | No period. |                             |
| " 40         | No period. |                             |
| " 41         | None.      |                             |
| " 42         | None.      |                             |
| " 43         | MW 3428    | Should estimate about 15.9. |
|              | H 1725     | Image all right             |
|              | H 1733     | " " "                       |
| " 44         | None       |                             |
| " 45         | "          |                             |
| " 46         | "          |                             |
| " 47         | "          |                             |
| " 48         | "          |                             |



May 14, 1918.

Var. 49-54 No cases.

b. 5. Could phase be moved a little? Image all right.  
ably. Should not be estimated? " " "

Very far from centre.













H.C.

















December 7, 1918.

Continued  
from Bk. 4, page 53.

N.G.C. 3201

For record of Variables confirmed by  
Prof. Bailey, see Bk. 4 p. 52.

On Dec. 3 and 6, Prof. B. and I examined  
the stars he had not confirmed. Those  
to be omitted, <sup>as originally marked</sup> but not confirmed, <sup>as variable</sup>, 10, 25, 33, 40, 42, 48<sup>51</sup>, 55, 56, 58<sup>near 12</sup>, 59, 61, 62,  
63<sup>near 19</sup>, 57 (near 50). These numbers will be given to  
some of the later numbers when final numbering  
is made.

Early nos. rep.  
as not  
variable.See new  
print.\* All variables to be re-marked on new  
print.

of cluster (see below for radius),  
Count of center, to be made: -  
Assume <sup>no.</sup> 14 or X 11885 faintest variable.  
Two stars near 14, marked "Count"  
on print, are to be included in count  
but stars fainter are to be omitted.

Center \* A bright double near 57 is assumed to be  
center of cluster. Marked <sup>(old no. star rep. as root var.)</sup> on original print in  
red ink.  
\* Circle is drawn 96 mm. Radius  
Diam. 192 mm.

5" to mm.  
60 [960]  
16' diam.  
8' Radius



December 7, 1918.

Variables having duplicate Nos. :-

(old numbers)  $\begin{cases} 28 \\ 28 \end{cases}$  both variable. 28b has been renumbered 25.

$\begin{cases} 57 \\ 57 \end{cases}$  near 50. Not confirmed. Omitted.

$\begin{cases} 57 \\ 57 \end{cases}$  near 29 and 30, Confirmed and retained.

$\begin{cases} 63 \\ 63 \end{cases}$  outside. Confirmed and retained.

$\begin{cases} 63 \\ 63 \end{cases}$  near 19 and 26. Not confirmed. Omitted.

Variables outside of circle :-

No. 46

" 63

" 64

" 65

" 66

Duplicate Nos. cont.

$\begin{cases} 58 \\ 58 \end{cases}$  near 12 Not confirmed. Omitted.

$\begin{cases} 58 \\ 58 \end{cases}$  near 24 Retained, confirmed.

December 7, 1918.

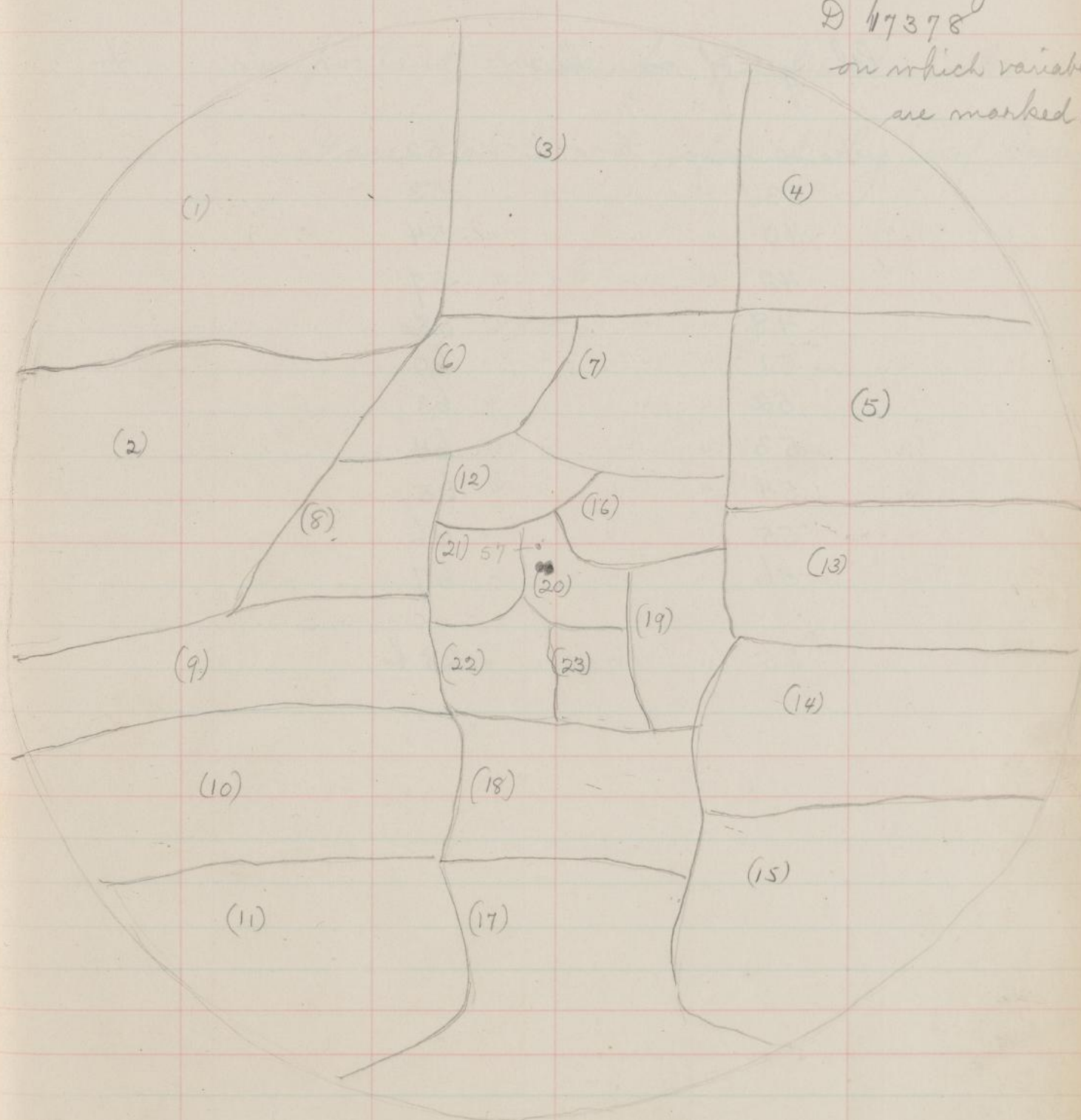
|   |                | No. of Stars | H.G.C. 3201 | Count.   |
|---|----------------|--------------|-------------|--|
| Sections marked on Print, Sketch on p. 143. | First Estimate |              |             |  |
| (1)   | 27             |              |             | Explanation of drawing p. 143.                       |
| (2)   | 25             |              |             | Circle marked as <sup>started</sup> given on p. 140. |
| (3)   | 20             |              |             |  |
| (4)   | 7              |              |             |  |
| (5)   | 24             |              |             | Sections, 1 to 23, marked on print.                  |
| (6)   | 18             |              |             | Count made in each section.                          |
| (7)   | 29             |              |             |  |
| (8)   | 24             |              |             |  |
| (9)   | 25             |              |             | Total = 527.   |
| (10)  | 21             |              |             | Variables in circle = 52                             |
| (11)  | 11             |              |             | $\therefore$ One star in ten is a variable.          |
| (12)  | 32             |              |             |  |
| (13)  | 21             |              |             | Five stars outside of circle are also variable.      |
| (14)  | 22             |              |             |  |
| (15)  | 11             |              |             |  |
| (16)  | 22             |              |             |  |
| (17)  | 12             |              |             |  |
| (18)  | 26             |              |             |  |
| (19)  | 28             |              |             |  |
| (20)  | 44             |              |             |  |
| (21)  | 30             |              |             |  |
| (22)  | 28             |              |             |  |
| (23)  | 20             |              |             |  |
| Total                                       | 527            |              |             |  |



December 7, 1918.

H. G. C. 3201

From print of  
D 17378  
on which variables  
are marked.



N.G.C. 3201.

Change of numbers.

No. 10 given to old No. 52.

33 " " " " 53

40 " " " " 54

42 " " " " 57

48 " " " " 58

51 " " " " 60

52 " " " " 63

53 " " " " 64

54 " " " " 65

55 " " " " 66

56 " " " " 67

^25 " " " " 28b



See also, page 180. 145

\*

N.G.C. 3201

\*

Important notes for final Remarks.

Variable No. 56, found by Prof. Bailey.













December 24, 1918.

Examination of clusters, marked I, H.A. 76, No. 4, not  
already examined by E.W.

N.G.C. 4372

<sup>h m</sup> 12 20 <sup>s</sup> 6-72° 6' 6"

H.A. 76, No. 4. p. 46

A very open cluster.

Plates useless for comparison.

Conclusion. N.G.C. 4372 Plates needed if any  
comparison is to be made.  
Present material not useful.



Plates available:

|         |    |      |
|---------|----|------|
|         | 2  | Exp. |
| X 11925 | 3i | 64m  |
| 11930   | 3i | 47   |
| 11961   | 3i | 105  |

December 25, 1918.

N.G.C. 5286

$13^{\text{h}} 40^{\text{m}} 8^{\text{s}} - 50^{\circ} 52' 2''$

H.A. 76, no. 4 p. 46

Conclusions. Only two plates, and these not very  
comparable.  
No suspected objects.  
More plates needed to make any further examination.



Plates available:

X 4803

Spectrum plate

4837

"

"

5655

"

"

6460

"

"

6562

"

"

6670

"

"

11681

Quality  
32

Exposure  
102 m

Useless for comparison  
elongated images.

12051

4

100

12055

4

118

December 25, 1918.

N

Reg. C. 6541<sup>hms</sup>  
18 0 45 - 43 43.5

H.A. 76, No. 4, p. 47.

Enlarge I 12/24 = D 18330 5 sec. to mm.  
 " " = D 18333 10 sec. to mm.

Conclusion. Two good plates.

One variable found, Large range.  
 " suspected variable.



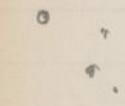
Plates available:

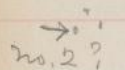
|          | Qual. | Exp.             |                        |
|----------|-------|------------------|------------------------|
| ✓ I 4925 | 3     |                  |                        |
| ✓ 12124  | 4     | 120 <sup>m</sup> | <u>Excellent plate</u> |
| ✓ 12169  | 3     | 111              | Fairly good plate      |

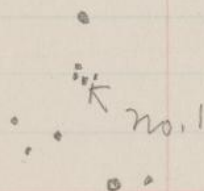
December 25, 1918.

N.Y.C. 6541

Comparing X 12128 and X 12169


 N up, glass up


 no. 2?

 No. 1 see possibly due to  
distortion, but, see X 4925




December 25, 1918.

W.C. 6541.

Comparing X 12124 and 4925

4925 not comparable, poor, fuzzy, images.

But useful in confirming No. 1.  
N.B. range of No. 1.

December 27, 1918.

N.G.C. 6541

Comparing  $\Sigma$  12169 and  $\Sigma$  4925

No further objects.

4925 too poor for comparison.



Continued in Bk. 6, page 14.

December 27, 1918.

N.Y.C. 6584       $18^{\text{h}} 10^{\text{m}} 37^{\text{s}} - 52^{\circ} 14.7'$

H.A. 76, No. 4, p. 47

Conclusion: Only <sup>two</sup> ~~one~~ good plates.  
1 object suspected.

Continued in Pbs 45. This object examined,  
not fixed



December 29, 1918.

Plates available:—

|   |         | Quality        | Exposure        |                       |
|---|---------|----------------|-----------------|-----------------------|
| ✓ | X 11804 | 3              | 37 <sup>m</sup> | Fairly good plate     |
| ✓ | 12134   | 4              | 120             | Best plate            |
|   | 12173   | 3              | 120             | Blurred, images.      |
|   | 12181   | 3 <sup>1</sup> | 120             | Blurred images.       |
|   | 12186   | 3              | 94              | Blurred, few, images. |

December 27, 1918.

X 11804 and 12134. Compared

N

glass up.



Doubtful, images of 11804  
not very easily compared.

X 12173, 12181, 12186, images too poor  
for comparison.

Plates looked over with 12134.

No objects suspected.

Continued in Pb. 45



December 27

December 27, 1915-

M. S. C. 6637       $18^{\text{h}} 24^{\text{m}} 50^{\text{s}} - 32^{\circ} 25.2'$

H. A. 76, No. 4, p. 47.

Conclusion: Only one  $\times$  plate available. Plates needed.



Plates available .

V 4964

December 27, 1918.

N.Y.C. 6681.  $18^h 36^m 41^s - 32^\circ 23'1''$

H.A. 76, No. 4, p. 47.

Conclusion: Only one plate available. Plates needed.



Plates available :

X 4933

December 27, 1918,  
 Const. December 30, 1918.

~~See also~~  
~~see p. 176~~

Ng. C. 6362.

$17^h 21^m 30^s - 66^\circ 58'.1$

Enlarge X 12161 = D18331 Enlargement " " "  
 X 12161 = D18332 "

See also print & letter of Prof. Bailey  
 (rec'd Sept. 1922)

— Variables probably will be confirmed



December 27, 1918.

Neg. C. 6362.

Plates available:

|        | Qual. | Exp.            |                                 |
|--------|-------|-----------------|---------------------------------|
| X 4942 | 3     | 60 <sup>m</sup> | Of little value for comparison. |
| 5177   | 3     | 92              | Hazy                            |
| 11794  | 4     | 60              | Best? plate.                    |
| 12161  | 4     | 120             | Best? plate.                    |
| 12167  | 3     | 121             | Poor, elongated images.         |

Variables examined by S. I. B. May 13-1919.

variables  
vv confirmed

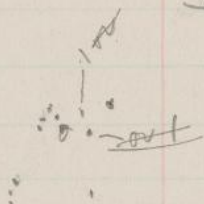
|    |    |             |
|----|----|-------------|
| 1  | vv | D. I. B. 18 |
| 2  | vv |             |
| 3  | vv |             |
| 4  | vv |             |
| 5  | vv |             |
| 6  | ?  |             |
| 7  | vv |             |
| 8  | vv |             |
| 9  | vv |             |
| 10 | ?  |             |
| 11 | vv |             |
| 12 | vv |             |
| 13 | vv |             |
| 14 | vv |             |
| 15 | vv |             |
| 16 | ?  |             |
| 17 | vv |             |

170

December 30, 1918.

NGC. 6362

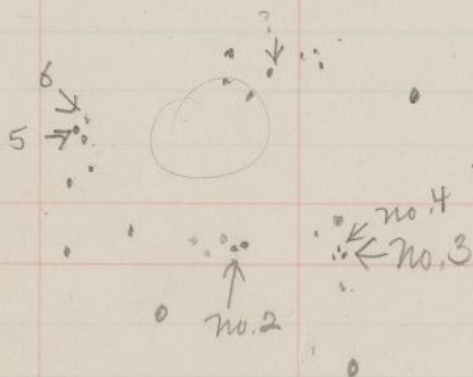
X 5177 and 11794



No. 1, which of 2 stars? Probably N.



X 11794      S 12161



Objects  
found on  
Dec. 31.

no. 7  
no. 8 →

$\leftarrow 20 \times 9$   
 $\leftarrow 108$

in center.

$m_1 + 10 \rightarrow$   $\therefore \leftarrow m_2 + 11$

old nos.  
11, 12, 13, 14  
marked  
on Jan. 1, 1919.

no. 412  
no. 413

$$\therefore \begin{matrix} \nwarrow \\ \bullet \\ \swarrow \end{matrix} = 3 \times 4 \text{ above}$$

13  
to marked  
on Jan. 4, 1919.

1402

1701

near 14, 15, 16, 17  
marked on  
March 24, 1919.

172

December 31, 1918.

NGC 6362

X12167 Too poor for comparison.











176 For exam. of Bluester, etc., see Bk. 4, p. 10.

Aug. December 30, 1918.

Measures of position of Variables and Comparison Sequence.

D17282 from X 11939 Eul. 8.5 Rev.

M.C. 2808

|    | X     | Y    | X    | Y    | X    | Y    |
|----|-------|------|------|------|------|------|
| a  | 13 21 | 766  | 1321 | 764  | 1324 | 764  |
| b  | 657   | 1325 | 657  | 1304 | 658  | 1304 |
| c  | 934   | 1391 | 935  | 1371 | 937  | 1371 |
| d  | 1616  | 1497 | 1618 | 1473 | 1617 | 1475 |
| e  | 1589  | 1871 | 1590 | 1849 | 1590 | 1850 |
| f  | 1441  | 1609 | 1440 | 1585 | 1441 | 1586 |
| g  | 1326  | 1529 | 1328 | 1507 | 1329 | 1506 |
| h  | 1427  | 781  | 1428 | 761  | 1427 | 760  |
| k  | 1610  | 1376 | 1610 | 1353 | 1611 | 1352 |
| l  | 1696  | 1408 | 1696 | 1386 | 1696 | 1387 |
| m  | 1756  | 1342 | 1757 | 1322 | 1756 | 1322 |
| n  | 1811  | 1109 | 1812 | 1096 | 1812 | 1096 |
| o  | 1728  | 1072 | 1730 | 1060 | 1730 | 1060 |
| p  | 1678  | 1081 | 1679 | 1072 | 1678 | 1070 |
| q  | 1656  | 945  | 1658 | 933  | 1658 | 934  |
| r  | 1692  | 949  | 1692 | 936  | 1692 | 936  |
| s  | 1613  | 1047 | 1614 | 1036 | 1613 | 1035 |
| t  | 1632  | 1043 | 1633 | 1031 | 1632 | 1032 |
| u  | 1590  | 962  | 1590 | 952  | 1589 | 952  |
| v  | 1562  | 966  | 1564 | 954  | 1562 | 953  |
| s' | 16.52 | 804  | 1651 | 790  | 1652 | 790  |
| t' | 17.25 | 790  | 1725 | 7.80 | 1726 | 781  |
| w' | 17.46 | 781  | 1745 | 7.69 | 1745 | 770  |

Stars a to k are so large images, it is difficult to bisect image the same the second time. An effort has been made to bisect center of image midway between 1 and 2 of scale.



D17282 not oriented properly. Reject these  
measures, and see Bk. 6, page 56.

Use D18388 with prints from that  
plate.

178

December 30, 1918.

Measurements continued, D 17282  
 Neg C. 2808

| Variables No. | $\times$ Reject $y$ |      | $x$ $y$ |                                | $x$ $y$ |      |
|---------------|---------------------|------|---------|--------------------------------|---------|------|
|               | $x$                 | $y$  | $x$     | $y$                            | $x$     | $y$  |
| 1             | 1460                | 1379 | 1459    | 13 <sup>68</sup> <del>74</del> | 1460    | 1366 |
| 2             | 1345                | 1240 | 1345    | 12 <sup>33</sup> <del>40</del> | 1347    | 1230 |
| 3             | 1544                | 1069 | 1542    | 1059                           | 1542    | 1056 |
| 4             | 1211                | 1168 | 1211    | 1160                           | 1211    | 1158 |
| 5             |                     |      |         |                                |         |      |

Center

1425 1145 1425 1143

Plate was found to not  
 be firmly placed in frame  
 at beginning of second  
 set of measures. First  
 set is rejected and a  
 third complete set made.





180

Continued from  
page 145January 1, 1919. and January 2, 1919.  
Measures of position of Variables and Comparison Stars  
for Sequence.

| 101345   | N.G.C. 3201          |               | Additional meas.<br>for <del>dealing</del> adjusting<br>of plate, when<br>re-taking measures,<br>Jan. 2. |               |               |               |
|--|----------------------|---------------|--|---------------|---------------|---------------|
| Measures of $\Delta 17378$ , from $\Sigma 11885$                               | $\times$ ver.        | $\times$ hor. | $\times$ ver.  | $\times$ hor. | $\times$ ver. | $\times$ hor. |
| To be meas. $a$ On extreme edge, dark, cannot identify when plate is in frame. |                      |               |  |               |               |               |
| $c = b$  | 1652                 | 2030          | 1653   | 2030          |               |               |
| $d = c$  | 625                  | 1887          | 624  | 1887          |               |               |
| $a = d$  | 2523                 | 1149          | 2521   | 1150          | 2522          | 1149          |
| $b = e$  | 2109                 | 951           | 2109   | 951           | 2108          | 951           |
| $c = f$  | 1719                 | 411           | 1719   | 409           | 1720          | 410           |
| $d = g$  | 965                  | 1086          | 966  | 1086          |               |               |
| $e = h$  | 1210                 | 1278          | 1211   | 1278          |               |               |
| $f = k$  | 1867                 | 419           | 1867   | 420           |               |               |
| $g = l$  | 959                  | 1123          | 959  | 1124          |               |               |
| $h = m$  | 1834                 | 654           | 1832   | 654           |               |               |
| $k = n$  | 1062                 | 1291          | 1062   | 1290          | 1062          | 1290          |
| $l = o$  | 979                  | 1264          | 978  | 1266          |               |               |
| $m = p$  | 1176                 | 1070          | 1177   | 1070          |               |               |
| $n = q$  | 1081                 | 1628          | 1082   | 1628          |               |               |
| $o = r$  | 1015                 | 1230          | 1013   | 1231          |               |               |
| $p = s$  | 1080                 | 1250          | 1079   | 1250          |               |               |
| $q = t$  | 1080 <sup>93</sup>   | 1168          | 1093   | 1168          |               |               |
| $r = u$  | 1041 <sup>1041</sup> | 1404          | 1041   | 1405          |               |               |
| $s = w$  | 1838                 | 1060          | 1838   | 1060          |               |               |
| $t = x$  | 1725                 | 866           | 1724   | 866           |               |               |
| $u = y$  | 1812 <sup>1114</sup> | 1350          | 1115   | 1350          |               |               |
| $w = z$  | 1892                 | 926           | 1890   | 926           |               |               |
| $x = \alpha$   | 1124                 | 1340          | 1123   | 1340          |               |               |
| $y = \beta$  | 1056                 | 1229          | 1056   | 1230          |               |               |
| $z = \gamma$   | 1242                 | 1181          | 1242   | 1181          |               |               |



Orientation correction  
applied, see page 198.

| Mean <sup>rev</sup> Resid.                     | Mean <sup>hor.</sup> Resid.                 | Star - cluster.<br>ver. *<br>m.m.    | hor.<br>*<br>m.m.                       | rev. x 5" | hor. x 5" |
|--|---|--------------------------------------|---|-----------|-----------|
| 16525 <sup>05 05</sup> <sub>00,00</sub>        | 2030 <sup>00 00</sup> <sub>00,00</sub>      | +15.60                               | +9.95 <sup>05 05</sup> <sub>00,00</sub> | +78.00    | +484.75   |
| 6245 <sup>05 05</sup> <sub>00,00</sub>         | 188.70 <sup>00 00</sup> <sub>00,00</sub>    | -87.20                               | +76 <sup>05 05</sup> <sub>00,00</sub>   | -436.00   | +383.25   |
| 2522 <sup>10 10</sup> <sub>00,00</sub>         | 114.9 <sup>03 07 03</sup> <sub>00,00</sub>  | +10.2 <sup>55</sup> <sub>00,00</sub> | +02 <sup>88</sup> <sub>00,00</sub>      | +512.75   | +144.0    |
| 2108 <sup>03 03 07</sup> <sub>00,00</sub>      | 95.10 <sup>00 00 00</sup> <sub>00,00</sub>  | +61.3 <sup>22</sup> <sub>00,00</sub> | -16.95                                  | +306.10   | -84.75    |
| 1719 <sup>03 03 07</sup> <sub>00,00</sub>      | 41.00 <sup>10 10 00</sup> <sub>00,00</sub>  | +22.3 <sup>88</sup> <sub>00,00</sub> | -71.05                                  | +111.40   | -355.25   |
| 966 <sup>55 05 05</sup> <sub>00,00</sub>       | 108.60 <sup>00 00 00</sup> <sub>00,00</sub> | -53.1 <sup>10</sup> <sub>00,00</sub> | -03.45                                  | -265.50   | -17.25    |
| 1210 <sup>05 05 05</sup> <sub>00,00</sub>      | 127.80 <sup>00 00 00</sup> <sub>00,00</sub> | -28.60                               | +15.8 <sup>75</sup> <sub>00,00</sub>    | -143.00   | +78.75    |
| 186.70 <sup>00 00 00</sup> <sub>00,00</sub>    | 42.6 <sup>1.95 05 05</sup> <sub>00,00</sub> | +37.1 <sup>05</sup> <sub>00,00</sub> | -70.1 <sup>10</sup> <sub>00,00</sub>    | +185.25   | -350.50   |
| 95.90 <sup>00 00 00</sup> <sub>00,00</sub>     | 112.4 <sup>35 05 05</sup> <sub>00,00</sub>  | -53.75                               | +00.7 <sup>30</sup> <sub>00,00</sub>    | -268.75   | +15.0     |
| 18330 <sup>10 10 00</sup> <sub>00,00</sub>     | 65.40 <sup>00 00 00</sup> <sub>00,00</sub>  | +33.4 <sup>65</sup> <sub>00,00</sub> | -46.65                                  | +168.25   | -233.25   |
| 10.620 <sup>00 00 00 00</sup> <sub>00,00</sub> | 129.03 <sup>07 03 03</sup> <sub>00,00</sub> | -43.45                               | +16.98                                  | -217.25   | +84.90    |
| 9.785 <sup>05 05 00</sup> <sub>00,00</sub>     | 126.50 <sup>10 10 00</sup> <sub>00,00</sub> | -51.80                               | +14.45                                  | -259.00   | +72.25    |
| 117.65 <sup>05 05 00</sup> <sub>00,00</sub>    | 107.00 <sup>00 00 00</sup> <sub>00,00</sub> | -32.00                               | -5.65                                   | -160.00   | -25.25    |
| 108.15 <sup>05 05 00</sup> <sub>00,00</sub>    | 162.80 <sup>00 00 00</sup> <sub>00,00</sub> | -41.50                               | +50.75                                  | -207.50   | +253.75   |
| 101.40 <sup>10 10 00</sup> <sub>00,00</sub>    | 123.05 <sup>05 05 00</sup> <sub>00,00</sub> | -48.25                               | +11.06                                  | -241.25   | +55.00    |
| 107.95 <sup>05 05 00</sup> <sub>00,00</sub>    | 125.00 <sup>00 00 00</sup> <sub>00,00</sub> | -41.70                               | +12.95                                  | -208.50   | +64.75    |
| 109.30 <sup>00 00 00</sup> <sub>00,00</sub>    | 116.80 <sup>00 00 00</sup> <sub>00,00</sub> | -40.35                               | +4.75                                   | -201.75   | +23.75    |
| 104.10 <sup>00 00 00</sup> <sub>00,00</sub>    | 140.45 <sup>05 05 00</sup> <sub>00,00</sub> | -45.55                               | +28.40                                  | -227.75   | +132.00   |
| 183.80 <sup>00 00 00</sup> <sub>00,00</sub>    | 106.00 <sup>00 00 00</sup> <sub>00,00</sub> | +34.15                               | -6.05                                   | +170.75   | -30.25    |
| 172.45 <sup>05 05 00</sup> <sub>00,00</sub>    | 86.60 <sup>00 00 00</sup> <sub>00,00</sub>  | +22.80                               | -25.45                                  | +114.00   | -127.25   |
| 111.45 <sup>05 05 00</sup> <sub>00,00</sub>    | 135.00 <sup>00 00 00</sup> <sub>00,00</sub> | -38.20                               | +22.95                                  | -191.00   | +114.75   |
| 189.10 <sup>10 10 00</sup> <sub>00,00</sub>    | 92.60 <sup>00 00 00</sup> <sub>00,00</sub>  | +39.45                               | -19.45                                  | +197.25   | -97.25    |
| 112.35 <sup>05 05 00</sup> <sub>00,00</sub>    | 134.00 <sup>00 00 00</sup> <sub>00,00</sub> | -37.30                               | +21.95                                  | -186.50   | +109.75   |
| 105.60 <sup>00 00 00</sup> <sub>00,00</sub>    | 122.95 <sup>05 05 00</sup> <sub>00,00</sub> | -44.05                               | +10.90                                  | -220.25   | +54.50    |
| 124.20 <sup>00 00 00</sup> <sub>00,00</sub>    | 118.10 <sup>00 00 00</sup> <sub>00,00</sub> | -25.45                               | +6.05                                   | -127.25   | +30.25    |

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January 1, 1919, and January 2, 1919.

## Measures of Position

N.G.C. 3201

D 17378

|    | $\alpha$ = ver | $\delta$ hor. | $\alpha$ ver | $\delta$ hor |           |
|----|----------------|---------------|--------------|--------------|-----------|
| 1  | 1285           | 1271          | 1285         | 1271         |           |
| 2  | 1277           | 1212          | 1276         | 1212         |           |
| 3  | 1467           | 1488          | 1468         | 1488         |           |
| 4  | 1548           | 1422          | 1549         | 1422         |           |
| 5  | 1462           | 1211          | 1462         | 1211         | 1463 1211 |
| 6  | 1181           | 937           | 1183         | 937          |           |
| 7  | 1099           | 1000          | 1100         | 1000         |           |
| 8  | 1283           | 1017          | 1283         | 1018         |           |
| 9  | 1302           | 1049          | 1302         | 1049         |           |
| 10 | 1902           | 697           | 1900         | 698          |           |
| 11 | 1686           | 882           | 1684         | 882          |           |
| 12 | 1681           | 920           | 1680         | 920          |           |
| 13 | 1629           | 780           | 1628         | 781          |           |
| 14 | 1708           | 775           | 1708         | 776          |           |
| 15 | 1075           | 629           | 1073         | 629          |           |
| 16 | 972            | 809           | 972          | 809          |           |
| 17 | 1451           | 1150          | 1451         | 1151         |           |
| 18 | 1456           | 1172          | 1456         | 1172         |           |
| 19 | 2122           | 1070          | 2122         | 1069         |           |
| 20 | 2062           | 1111          | 2062         | 1110         |           |
| 21 |                |               |              |              |           |
| 22 |                |               |              |              |           |



| Mean ver. Resids. | Mean hor. Resids. | Star-Center<br>m.m. | ver. x 5" hor. x 5" |    |
|-------------------|-------------------|---------------------|---------------------|----|
| 128.50 00 00      | 127.10 00 00      | -21.15 +15.05       | -105.75 +75.25      | 1  |
| 127.65 05 05      | 121.20 00 00      | -22.00 +9.15        | -110.00 +45.75      | 2  |
| 146.75 05 05      | 148.80 00 00      | -2.90 +36.25        | -14.50 +183.75      | 3  |
| 154.85 05 05      | 142.20 00 00      | +5.20 +30.15        | +26.00 +150.75      | 4  |
| 146.23 03 03 07   | 121.10 00 00 00   | -3.42 +9.05         | -17.10 +45.25       | 5  |
| 118.20 10 10      | 93.70 00 00       | -31.45 -18.35       | -157.25 -91.75      | 6  |
| 109.95 05 05      | 100.00 00 00      | -39.70 -12.05       | -198.50 -60.25      | 7  |
| 128.30 00 00      | 101.75 05 05      | -21.35 -10.30       | -106.75 -51.50      | 8  |
| 130.20 00 00      | 104.90 00 00      | -19.45 -7.15        | -97.25 -35.75       | 9  |
| 190.10 10 10      | 69.75 05 05       | +40.45 -42.30       | +202.25 -211.50     | 10 |
| 168.50 10 10      | 88.20 00 00       | +18.85 -23.85       | +94.25 -119.25      | 11 |
| 168.05 05 05      | 92.00 00 00       | +18.40 -20.05       | +92.00 -100.25      | 12 |
| 162.85 05 05      | 78.05 05 05       | +13.20 -34.00       | +66.00 -170.00      | 13 |
| 170.80 00 00      | 77.55 05 05       | +20.15 -34.50       | +100.75 -172.50     | 14 |
| 107.40 10 10      | 62.90 00 00       | -42.25 -49.15       | -211.25 -245.75     | 15 |
| 97.20 00 00       | 80.90 00 00       | -52.45 -31.15       | -262.25 -155.75     | 16 |
| 145.10 00 00      | 115.05 05 05      | -4.55 +3.00         | -22.75 +15.00       | 17 |
| 145.60 00 00      | 117.20 00 00      | -4.05 +5.25         | -20.25 +25.75       | 18 |
| 212.20 00 00      | 106.95 05 05      | +62.55 -5.10        | +312.75 -25.50      | 19 |
| 206.20 00 00      | 111.05 05 05      | +56.55 -1.00        | +282.75 -5.00       | 20 |



January 1, 1919, and January 2, 1919.

## Measures of Position

N.C. 3201

D 17378

Additional, for adjustment

|    | x    | rev | y | hor. | x    | rev | y | hor. | x    | rev | y | hor. |
|----|------|-----|---|------|------|-----|---|------|------|-----|---|------|
| 21 | 1788 |     |   | 1262 | 1788 |     |   | 1262 |      |     |   |      |
| 22 | 1356 |     |   | 942  | 1356 |     |   | 942  |      |     |   |      |
| 23 | 1385 |     |   | 1042 | 1383 |     |   | 1041 |      |     |   |      |
| 24 | 1427 |     |   | 452  | 1426 |     |   | 452  |      |     |   |      |
| 25 | 1862 |     |   | 1250 | 1862 |     |   | 1250 |      |     |   |      |
| 26 | 1287 |     |   | 1591 | 1288 |     |   | 1590 |      |     |   |      |
| 27 | 883  |     |   | 1334 | 883  |     |   | 1332 |      |     |   |      |
| 28 | 1422 |     |   | 1264 | 1422 |     |   | 1263 |      |     |   |      |
| 29 | 1641 |     |   | 586  | 1641 |     |   | 586  |      |     |   |      |
| 30 | 1939 |     |   | 476  | 1940 |     |   | 474  |      |     |   |      |
| 31 | 1806 |     |   | 1437 | 1807 |     |   | 1436 |      |     |   |      |
| 32 | 1944 |     |   | 1440 | 1944 |     |   | 1440 |      |     |   |      |
| 33 | 1432 |     |   | 1226 | 1432 |     |   | 1227 |      |     |   |      |
| 34 | 2142 |     |   | 1611 | 2142 |     |   | 1612 |      |     |   |      |
| 35 | 1730 |     |   | 1063 | 1730 |     |   | 1062 | 1730 |     |   | 1062 |
| 36 | 1443 |     |   | 914  | 1443 |     |   | 913  |      |     |   |      |
| 37 | 1330 |     |   | 1010 | 1331 |     |   | 1010 |      |     |   |      |
| 38 | 1361 |     |   | 1021 | 1361 |     |   | 1019 |      |     |   |      |
| 39 | 1614 |     |   | 1185 | 1614 |     |   | 1185 |      |     |   |      |
| 40 | 1600 |     |   | 911  | 1599 |     |   | 912  |      |     |   |      |



|           |           |           |           | ver.    | hor.    |          |          | Star - Center<br>m.m. | ver. x 5"    hor. x 5" |    |
|-----------|-----------|-----------|-----------|---------|---------|----------|----------|-----------------------|------------------------|----|
| Mean ver. | Residuals | Mean hor. | Residuals | Star    | Center  |          |          |                       |                        |    |
| 178.80    | 00 00     | 126.20    | 00 00     | + 29.15 | + 14.15 | + 145.75 | + 70.75  |                       |                        | 21 |
| 135.60    | 00 00     | 94.20     | 00 00     | - 14.05 | - 17.85 | - 70.25  | - 89.25  |                       |                        | 22 |
| 138.40    | 10 10     | 104.15    | 05 05     | - 11.25 | - 7.90  | - 56.25  | - 39.50  |                       |                        | 23 |
| 142.65    | 05 05     | 45.20     | 00 00     | - 7.00  | - 66.85 | - 35.00  | - 334.25 |                       |                        | 24 |
| 186.20    | 00 00     | 125.00    | 00 00     | + 36.55 | + 12.95 | + 182.75 | + 64.75  |                       |                        | 25 |
| 128.75    | 05 05     | 159.05    | 05 05     | - 20.90 | + 47.00 | - 104.50 | + 235.00 |                       |                        | 26 |
| 88.30     | 00 00     | 133.30    | 10 10     | - 61.35 | + 21.25 | - 306.75 | + 106.25 |                       |                        | 27 |
| 142.20    | 00 00     | 126.35    | 05 05     | - 7.45  | + 14.30 | - 37.25  | + 71.50  |                       |                        | 28 |
| 164.10    | 00 00     | 58.60     | 00 00     | + 14.45 | - 53.45 | + 72.25  | - 267.25 |                       |                        | 29 |
| 193.95    | 05 05     | 47.50     | 10 10     | + 44.30 | - 64.55 | + 221.50 | - 322.75 |                       |                        | 30 |
| 180.65    | 05 05     | 143.65    | 05 05     | + 31.00 | + 31.60 | + 155.00 | + 158.00 |                       |                        | 31 |
| 194.40    | 00 00     | 144.00    | 00 00     | + 44.85 | + 31.95 | + 224.25 | + 159.75 |                       |                        | 32 |
| 143.20    | 00 00     | 122.65    | 05 05     | - 6.45  | + 10.60 | - 32.25  | + 53.00  |                       |                        | 33 |
| 214.20    | 00 00     | 161.15    | 05 05     | + 64.55 | + 49.10 | + 322.75 | + 245.50 |                       |                        | 34 |
| 173.00    | 00 00 00  | 106.23    | 07 03 03  | + 23.35 | - 58.2  | + 116.75 | - 291.0  |                       |                        | 35 |
| 144.30    | 00 00     | 91.35     | 05 05     | - 5.35  | - 20.70 | - 26.75  | - 103.50 |                       |                        | 36 |
| 133.05    | 05 05     | 101.00    | 00 00     | - 16.60 | - 11.05 | - 83.00  | - 55.25  |                       |                        | 37 |
| 136.10    | 00 00     | 102.00    | 10 10     | - 13.55 | - 10.05 | - 67.75  | - 50.25  |                       |                        | 38 |
| 161.40    | 00 00     | 118.50    | 00 00     | + 11.75 | + 6.45  | + 58.75  | + 32.25  |                       |                        | 39 |
| 159.95    | 05 05     | 91.15     | 05 05     | + 10.30 | - 20.90 | + 51.50  | - 104.50 |                       |                        | 40 |



January 1, 1919, and January 2, 1919.

## Measures of Positions.

N.C. 3201

D 17378

Test for rectifying  
plate.

x ver.

y hor.

x ver. y hor.

41 1639

1680

1639 1680

42 1790

474

1790 472

43 1413

381

1413 381

44 1636

1160

1637 1159

45 1472

1379

1472 1378

1472 1378

46 379

500

381 500

47 2008

1256

2008 1257

\* near 12

48 see below

48 1712

952

1711 952

49 1781

1001

1779 1000

50 1544

1087

1546 1087

1546 1086

51 1385

728

1386 728

52 Not on D 17378

to be meas. on X

11889

53 Not on D 17378

" " " "

"

54 Not on D 17378

" " " "

"

55 Not on D 17378

" " " "

"

56 1755

1572

1754 1572

? Nebula 1887

1453

1888 1454

Center of Plate 14.97

1121

1496 1120

\* near 24

48 1485

624

1446 626

\* Found 2 stars marked old no. 58, changed to 46. Exam. by Prof. Bailey.  
 Star near no. 12, not confirmed, rejected. Substitute measure of star  
 near no. 24. Both measures made at same sitting.



| Mean ver. Resids.                          | Mean hor. Resids.                          | Star - Center                      | ver. x5"         | hor. x5"         |      |
|--|--|------------------------------------|------------------|------------------|------|
|  |  | <small>mm. ver.</small><br>hor. mm | <small>"</small> | <small>"</small> |      |
| 163,90 00 00                               | 16800 00 00                                | +14.25 +55.95                      | +71.25           | +279.75          | 41   |
| 17900 00 00                                | 4730 10 10                                 | +29.35 -64.75                      | +146.75          | -323.75          | 42   |
| 14130 00 00                                | 3810 00 00                                 | -8.35 -73.95                       | -41.75           | -369.75          | 43   |
| 16365 05 05                                | 11595 05 05                                | +14.00 +3.90                       | +70.00           | +19.50           | 44   |
| 14720 000000                               | 13783 07 03 03                             | -2.45 +25.78                       | -122.5           | +128.90          | 45   |
| 3800 10 10                                 | 5000 00 00                                 | -111.65 -62.05                     | -558.25          | -310.25          | 46   |
| 20080 00 00                                | 12565 05 05                                | +51.25 +13.60                      | +255.75          | +68.00           | 47   |
| 17800 10 10                                | 10005 05 05                                | +28.35 -12.00                      | +141.75          | -60.00           | 49   |
| 15453 13 07 07                             | 10867 03 03 07                             | +4.88 -3.38                        | +244.0           | -16.90           | 50   |
| 13855 05 05                                | 7280 00 00                                 | -11.10 -39.25                      | -55.50           | -196.25          | 51   |
| 17545 05 05                                | 15720 00 00                                | +25.80 +45.15                      | +129.00          | +225.75          | 56   |
| 188 <sup>75 05 05</sup> <del>5 01 00</del> | 145 <sup>35 05 05</sup> <del>8 01 00</del> | +39.10 +33.30                      | +195.50          | +166.50          | Feb? |
| 149 <sup>05 05</sup> <del>6 01 00</del>    | 112 <sup>05 05 05</sup> <del>8 01 00</del> | -5.10 -49.55                       | -25.50           | -247.75          | 48   |
| 144 <sup>55 05 05</sup> <del>6 01 00</del> | 62.5 <sup>10 10</sup> <del>0 01 01</del>   |                                    |                  |                  |      |



meas. of Center and 5<sup>th</sup>  
 January 2, 1919. meas. of Cat. Stars and  
 CFB, made on Jan. 8.

NGC 3201.

Measures of { Catalogue Stars  
 Comparison Stars  
 Outside Variables

X 11889

(1) Not left, film up. (2)

X plate slightly out in orientation, placed carefully in frame,

|           | x=rev.   | y=hor. | x=rev. | y=hor. |      |
|-----------|----------|--------|--------|--------|------|
| B X       | -45 4528 | 1430   | 1142   | 1431   | 1142 |
| E         | -45 4527 | 1428   | 1144   | 1428   | 1143 |
| C X       | -45 4545 | 1646   | 1188   | 1646   | 1187 |
| D X       | -45 4543 | 1622   | 1308   | 1623   | 1307 |
| near 55 A | -45 4532 | 1485   | 1031   | 1487   | 1030 |

typical  
 N. & S.  
 as far as  
 it could  
 be held  
 by machine.

Center of Plate

|     |      |      |      |      |
|-----|------|------|------|------|
| a X | 1540 | 1200 | 1540 | 1201 |
| b X | 1549 | 1079 | 1549 | 1080 |
| c X | 1522 | 1128 | 1522 | 1128 |
| d X | 1455 | 1170 | 1456 | 1170 |
| e X | 1531 | 1263 | 1531 | 1262 |
| f X | 1553 | 1234 | 1553 | 1234 |
| g X | 1457 | 1152 | 1457 | 1152 |
| h X | 1537 | 1262 | 1536 | 1263 |

(new nos.)

|         |      |      |      |      |
|---------|------|------|------|------|
| Var. 52 | 1560 | 1388 | 1561 | 1388 |
| 53      | 1354 | 1396 | 1353 | 1398 |
| 54      | 1712 | 1370 | 1713 | 1370 |
| 55      | 1442 | 1031 | 1441 | 1031 |

(3)

(4)

|                                   |          |      |      |      |      |   |
|-----------------------------------|----------|------|------|------|------|---|
| Catalogue Star B                  | -45 4528 | 1432 | 1142 | 1431 | 1141 | ✓ |
| repeated to 2                     | -45 4527 | 1425 | 1143 | 1426 | 1144 | ✓ |
| test steadiness of plate. C       | -45 4545 | 1646 | 1186 | 1646 | 1187 | ✓ |
| to sealing wax D                  | -45 4543 | 1625 | 1306 | 1624 | 1306 | ✓ |
| to hold plate for it is steady. A | -45 4532 | 1486 | 1030 | 1488 | 1030 | ✓ |



| (5)  |      | Mean $\kappa$ = ver. Resids.                               | Mean $\gamma$ = hor. Resids.                               | Star - Center                   | (For reduction, see page 194.) |                    |
|------|------|--|--|---------------------------------|--------------------------------|--------------------|
|      |      | $\kappa$ = ver. Resids.                                    | $\gamma$ = hor. Resids.                                    | $\kappa$ = ver. $\gamma$ = hor. | ver. $\times 42''$             | hor. $\times 42''$ |
| 1432 | 1142 | 143.12 <sup>02 03 08 08 08</sup> <sub>01 00 01 00 01</sub> | 114.18 <sup>02 02 02 08 02</sup> <sub>00 00 00 01 00</sub> | -10.88 -0.5.85                  | -461.312                       | -248.040           |
| 1428 | 1143 | 142.70 <sup>10 10 10 10 10</sup> <sub>01 01 02 01 01</sub> | 114.34 <sup>06 04 04 06 04</sup> <sub>01 00 00 01 00</sub> | -11.30 -0.5.89                  | -479.120                       | -241.256           |
| 1646 | 1187 | 164.60 <sup>00 00 00 00 00</sup> <sub>00 00 00 00 00</sub> | 118.70 <sup>10 00 10 00 00</sup> <sub>01 00 01 00 00</sub> | +1.60 -0.1.33                   | +449.440                       | -56.392            |
| 1624 | 1308 | 162.40 <sup>02 01 01 00 00</sup> <sub>01 01 00 00 00</sub> | 130.70 <sup>10 00 10 10 10</sup> <sub>01 00 01 01 01</sub> | +0.8.36 +1.0.67                 | +354.464                       | +452.408           |
| 1487 | 1030 | 148.70 <sup>02 00 01 01 01</sup> <sub>01 00 01 01 01</sub> | 103.00 <sup>08 02 02 02 02</sup> <sub>01 00 00 00 00</sub> | -05.34 -17.01                   | -226.416                       | -721.224           |
| 1540 | 1200 | 154.00 <sup>00 00 00 00</sup> <sub>00 00 00 00</sub>       | 126.00 <sup>03 03 07 03</sup> <sub>00 01 00 00</sub>       |                                 |                                |                    |
|      |      | 154.90 <sup>00 00 00</sup> <sub>00 00 00</sub>             | 108.80 <sup>05 05 05</sup> <sub>01 00 00</sub>             | +00.90 -1.208                   | +38.160                        | -512.192           |
| 1522 | 1129 | 152.20 <sup>00 00 00 00</sup> <sub>00 00 00 00</sub>       | 112.80 <sup>03 03 07</sup> <sub>00 00 01</sub>             | -01.80 -0.8.720                 | -76.320                        | -305.280           |
|      |      | 145.60 <sup>05 05 05</sup> <sub>01 00 00</sub>             | 117.00 <sup>00 00 00</sup> <sub>00 00 00</sub>             | -08.45 -03.03                   | -358.280                       | -128.472           |
|      |      | 153.10 <sup>00 00 00</sup> <sub>00 00 00</sub>             | 126.25 <sup>05 05</sup> <sub>01 00 00</sub>                | -00.90 +0.6.22                  | -38.160                        | +263.728           |
|      |      | 155.30 <sup>00 00 00</sup> <sub>00 00 00</sub>             | 123.40 <sup>00 00 00</sup> <sub>00 00 00</sub>             | +0.1.30 +0.3.37                 | +55.120                        | +142.888           |
|      |      | 145.70 <sup>00 00 00</sup> <sub>00 00 00</sub>             | 115.20 <sup>00 00 00</sup> <sub>00 00 00</sub>             | -08.30 -04.83                   | -351.920                       | -204.792           |
|      |      | 153.65 <sup>05 05</sup> <sub>01 00 00</sub>                | 126.25 <sup>05 05</sup> <sub>00 01 00</sub>                | -00.435 +0.6.22                 | -148.40                        | +263.728           |
|      |      | 156.05 <sup>05 05</sup> <sub>00 01 00</sub>                | 138.80 <sup>00 00 00</sup> <sub>00 00 00</sub>             | +0.205 +18.77                   | +86.920                        | +795.845           |
|      |      | 135.70 <sup>05 05 05</sup> <sub>00 01 00</sub>             | 139.70 <sup>10 10</sup> <sub>01 01 00</sub>                | -18.65 +19.67                   | -790.760                       | +834.008           |
|      |      | 171.25 <sup>05 05</sup> <sub>00 01 00</sub>                | 137.00 <sup>00 00 00</sup> <sub>00 00 00</sub>             | +17.25 +16.97                   | +731.400                       | +719.528           |
|      |      | 144.20 <sup>05 05</sup> <sub>00 01 00</sub>                | 103.10 <sup>00 00 00</sup> <sub>00 00 00</sub>             | -09.85 -16.93                   | -417.640                       | -717.832           |



January 6, 1919.

N.G.C. 3201

See B 35665-

Identification of Cat. Stars  
R.A. (1875) Dec. Magn.

|                                |   |                  |                 |         |           |      |   |
|--------------------------------|---|------------------|-----------------|---------|-----------|------|---|
| chk'd<br>by<br>Miss<br>Mackie. | A | C.P.D. -45° 4532 | 10 <sup>h</sup> | 12.15.3 | -45° 34.9 | 10.2 | = |
|                                | B | " -45° 4528      | 10              | 11 49.3 | -45 42.2  | 10.4 | = |
|                                | C | " -45 4545       | 10              | 13 13.8 | -45 47.1  | 10.6 | = |
|                                | D | " -45 4543       | 10              | 13 0.3  | -45 55.4  | 10.6 | = |
|                                | E | " -45 4527       | 10              | 11 47.8 | -45 42.4  | 10.8 | = |



| C.D.M.     | R.A. (1875) Dec. |              |
|------------|------------------|--------------|
| -45° 59 33 | 10 12 13.9       | -45° 35.0 10 |
| -45 59 27  | 10 11 49.2       | -45 42.3 9.6 |
| -45 59 46  | 10 13 12.4       | -45 47.3 10  |
| -45 59 44  | 10 12 59.0       | -45 55.5 10  |
| -45 59 46  | - x " "          | " " "        |

N.Y.C. 3201.

Instructions by Miss Leavitt. Reduction.

Select stars common to X Pl. &amp; D. Pl.

Use Mean ver. and hor. <sup>same center as D Pl.</sup>Take diff., Star - Center of X Pl. } Diff. in m.m.  
" " " " " D Pl. }Mul. Diff. by scale of each Plate, <sup>to</sup> reduce  
millimeters to seconds of arc.\*  
See H.A. 71, No. 3.  
(Scales of <sup>page 55.</sup>  
various series)

X Plate, X 42".4

D Plate from X Plate, enlargement 8.5 times.

Use 5" to mm.  
MC Plates 1-3548, 90" later, 98".2

Plot: D Plate as standard.

Take Diff. X Pl. - D Plate.

Plot Diff. X = vert., Reading X, D Pl, hor.  
 " X = " , " Y, " , hor.  
 " Y = " , " X, " , hor.  
 " Y = " , " Y, " , "

See sheet as plotted.

\*  
Correction for orientationApply corrections to readings of X Pl.  
Diff. X Corrected - D.

Plot X Plate Diff. X = ver., Corr. X, (X Pl.) hor.

" X = ver., " Y " "  
 " Y = ver., " X, " "  
 " Y = ver., " Y, " "

No evidence of needed correction in Scale.



D Plate. Reduce all cat. stars, sequence stars, and variables, in same way.

Take mean of measures.

Multiply  $\times 50''$ .

For final readings, <sup>in Table</sup> use D plate where it includes stars. For outside stars, give readings on X plate, with Remark.

In final table, correct X & Y for orientation. (Print shows need of correction.)

Use 3 cat. stars, B, C, D.

Diff. Star Cat. Pos. - Center (which has been reduced from coordinates of 5 Cat. stars.)

Reduce diff. R.A. Sec. to seconds of arc.

\*

(Seconds  $\times \cos \delta \times 15$ )

Meas. of X & Y of Cat. stars <sup>minus</sup> Cat. this reduced  
Diff. in seconds.

4 plots, Diff. X (vert) Measured X (horizontal)  
" X " " Y  
" Y " " X  
" Y " " Y

Limits of ~~measures~~ differences divided by limits of  
Measures = rate orientation correction.

Cont. see page 195



N.S.C. 3201.

Measures on X 11889.

rec. = R.A.    hor. = Dec. with reversed sign.  
 Reading from  
 D.R.  $\frac{1}{2}$  D.R. X

Continued from p. 189.

X Plate ~~corrected~~

|   | rec.     | hor.     | centre.     | rec. - centre. | hor. - centre. |
|---|----------|----------|-------------|----------------|----------------|
| B | -461.312 | +248.040 | +4.5 +22.0  | -465.812       | +226.040       |
| E | -479.120 | +241.256 | +4.0 +23.0  | -483.120       | +218.256       |
| C | +449.440 | +56.392  | -6.0 -21.5  | +455.440       | +77.892        |
| D | +354.464 | +452.408 | -32.0 -17.0 | +386.464       | -435.408       |
| A | -226.416 | +721.224 | +28.0 +11.0 | -254.416       | +710.224       |

|   |          |          |            |          |          |
|---|----------|----------|------------|----------|----------|
| a | +38.160  | +512.192 | +17.5 -2.0 | +20.660  | +514.192 |
| b | -76.320  | +305.280 | +7.5 +3.0  | -83.820  | +302.280 |
| c | -358.280 | +128.472 | -2.5 +17.0 | -355.780 | +111.472 |
| d | -38.160  | +263.728 | -22.5 +1.5 | -15.660  | -265.228 |
| e | +55.120  | +142.888 | -16.0 -3.0 | +71.120  | -139.888 |
| f | -351.920 | +204.792 | +2.0 +16.0 | -353.920 | +188.792 |
| g | -14.840  | +263.728 | -22.5 0.   | +7.660   | -263.728 |

|         |          |          |             |          |          |
|---------|----------|----------|-------------|----------|----------|
| Var. 52 | +86.920  | +795.848 | -50.0 -5.0  | +136.920 | -790.848 |
| 53      | -790.760 | +834.008 | -52.5 +37.5 | -738.260 | -871.508 |
| 54      | +731.400 | +719.528 | -46.0 -35.5 | +777.400 | -684.028 |
| 55      | -417.640 | +717.832 | +28.0 +20.0 | -445.640 | +697.832 |



# N.G.C. 3201 Correction for orientation.

|   | Star-Center            |       | (Diff. from Cat.)         |  |
|---|------------------------|-------|---------------------------|--|
|   | Center Red. for (1875) |       | RA. X15 <sup>Cosine</sup> |  |
|   | 10                     | 12    | 32.2                      | -45 47.0   |
|   | 11                     | 12.05 | 149.65                    | 449.4204   |
| B | 10                     | 11    | 49.3                      | -45 42.2 - 0 42.9 + 0 4.8  |
|   |                        |       |                           | <del>- 921.4276</del> + 288.0                                    |
|   |                        |       |                           | <sup>s</sup> <del>(42.9 x 1.4319 x 15)</del> Meas. -16.39 - 62.0 |
|   |                        |       |                           | <sup>s</sup> <del>0.6984</del> - Cat.                            |
|   |                        |       |                           | (B from X Plate)   |
|   |                        |       |                           | X = 465.81 Y = +226.04   |
| C | 10                     | 13    | 13.8                      | -45 47.1 + 0 41.6 - 0. 0.1                                       |
|   |                        |       |                           | 435.1776   |
|   |                        |       |                           | <del>+ 894.8160</del> + 6.0                                      |
|   |                        |       |                           | + 45   |
|   |                        |       |                           | (41.6 x 1.4340 x 15) Meas. + 19.57 + 84.0                        |
|   |                        |       |                           | <sup>cos d</sup> - Cat. 0.6974                                   |
|   |                        |       |                           | from D Pl.   |
|   |                        |       |                           | X = +454.75 Y = +78.00   |
| D | 10                     | 13    | 0.3                       | -45 55.4 + 0 28.1 - 0 8.4  |
|   |                        |       |                           | 293.1954   |
|   |                        |       |                           | <del>+ 605.9484</del> - 504.0                                    |
|   |                        |       |                           | (from D Pl) (28.1 x 1.4376 x 15) + 90.05 + 68.0                  |
|   |                        |       |                           | <sup>cos d</sup> 0.6956 Meas. - Cat.                             |
|   |                        |       |                           | X = +383.25 Y = -436.00  |



A.G.C. 3201.

Position of Center from  
5 Cat. Stars.

$$A \quad \begin{array}{r} 10^h 12^m 15.3^s - 45^\circ 34.9' \\ - 24.23 \quad + 11.8 \end{array} (1875)$$

$$10 12 39.53 - 45 46.7$$

$$B \quad \begin{array}{r} 10 11 49.3 - 45 42.2 \\ - 44.47 \quad + 3.8 \end{array} (1875)$$

$$10 12 33.77 - 45 46.0$$

$$C \quad \begin{array}{r} 10 13 13.8 - 45 47.1 \\ + 43.48 \quad + 1.3 \end{array} (1875)$$

$$10 12 30.32 - 45 48.4$$

$$D \quad \begin{array}{r} 10 13 0.3 - 45 55.4 \\ + 36.73 \quad - 7.3 \end{array} (1875)$$

$$10 12 23.57 - 45 48.1$$

$$E \quad \begin{array}{r} 10 11 47.8 - 45 42.4 \\ - 46.12 \quad + 3.6 \end{array} (1875)$$

$$10 12 33.92 - 45 46.0$$

$$10 12 39.53 - 45 46.7$$

$$10 12 33.77 - 45 46.0$$

$$10 12 30.32 - 45 48.4$$

$$10 12 23.57 - 45 48.1$$

$$10 12 33.92 - 45 46.0$$

$$161.11$$

$$35.2$$

$$\text{Center} \quad \begin{array}{r} 10 12 32.22 - 45 47.0 \\ 1.0 \quad - 7 \end{array} (1875)$$

$$10^h 13^m 5^s - 45^\circ 54' (1900)$$



$$\begin{array}{r}
 15) - 254.416 \\
 - 16.961 \\
 \hline
 1.4288 = \text{sec } d \\
 - 24.2338768 \quad 24.23397
 \end{array}$$

$$\begin{array}{r}
 15) 465.812 \\
 - 31.3054 \\
 \hline
 1.4319 = \text{sec } d \\
 - 44.4662226
 \end{array}$$

$$\begin{array}{r}
 15) + 454.75 \quad (\text{fr. D. Pl}) \\
 + 30.32 \\
 \hline
 1.4340 = \text{sec } d
 \end{array}$$

$$\begin{array}{r}
 + 43.478880 \\
 15) + 383.25 \quad (\text{from D Plate}) \\
 + 25.55 \\
 \hline
 1.4376 = \text{sec } d
 \end{array}$$

$$\begin{array}{r}
 + 36.730680 \\
 15) - 483.120 \\
 - 32.208 \\
 \hline
 1.4320 = \text{sec } d \\
 \checkmark - 46.1218560 \quad \checkmark
 \end{array}$$

$$\begin{array}{r}
 | \quad 1 \text{ Sec. of Time} = 1 \text{ Sec. of Arc. secant } d \\
 60) + 710.224 \\
 + 11.8 \\
 \hline
 15
 \end{array}$$

$$\begin{array}{r}
 60) + 226.040 \\
 + 3.8 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 60) + 78.00 \\
 + 1.3 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 60) - 436.00 \\
 - 17.3 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 60) + 218.256 \\
 + 3.6 \\
 \hline
 \end{array}$$



N.G.C. 3201.

Correction. Formulae:  $X_0 = X + 0.155Y - 24$  $Y_0 = Y - 0.155X - 11$ 

|                           |   |   |          |      |      |     |      |      |      |
|---------------------------|---|---|----------|------|------|-----|------|------|------|
| Meas. $\bar{X}$ $\bar{Y}$ | R | A | -45 4532 | -254 | +710 | -39 | +110 | -168 | +738 |
| " " $\bar{X}$ $\bar{Y}$   | R | B | -45 4528 | -466 | +226 | -72 | +35  | -455 | +287 |
|                           |   | C | -45 4545 | +455 | +78  | +71 | +12  | +443 | -4   |
|                           |   | D | -45 4543 | +383 | -436 | +59 | -68  | +291 | -506 |
| Meas. $\bar{X}$ $\bar{Y}$ | R | E | -45 4527 | -483 | +218 | -75 | +34  | -473 | +282 |
|                           |   | a |          | +14  | +513 | +02 | +80  | +70  | +500 |
|                           |   | b |          | -85  | +306 | -13 | +47  | -62  | +308 |
|                           |   | c |          | -355 | +111 | -55 | +17  | -362 | +155 |
|                           |   | d |          | -17  | -266 | -03 | -41  | -82  | -274 |
|                           |   | e |          | +79  | -143 | +12 | -22  | +33  | -166 |
|                           |   | f |          | -350 | +185 | -54 | +29  | -345 | +228 |
|                           |   | g |          | +2   | -269 | +00 | -42  | -64  | -280 |
|                           |   | h |          | -233 | +168 | -36 | +26  | -231 | +193 |
|                           |   | i |          | +85  | -217 | +13 | -34  | +27  | -241 |
|                           |   | l |          | +72  | -259 | +11 | -40  | +8   | -281 |
|                           |   | m |          | -25  | -160 | -04 | -24  | -73  | -147 |
|                           |   | n |          | +254 | -208 | +39 | -32  | +198 | -187 |
|                           |   | o |          | +55  | -241 | +09 | -37  | -6   | -261 |
|                           |   | p |          | +65  | -208 | +10 | -32  | +9   | -229 |
|                           |   | q |          | +24  | -202 | +04 | -31  | -31  | -217 |
|                           |   | r |          | +142 | -228 | +22 | -35  | +83  | -261 |
|                           |   | s |          | -30  | +171 | -05 | +27  | -27  | +165 |
|                           |   | t |          | -127 | +114 | -20 | +18  | -133 | +123 |
|                           |   | u |          | +115 | -191 | +18 | -30  | +61  | -220 |
|                           |   | w |          | -97  | +197 | -15 | +31  | -90  | +223 |



$$\bar{X}_0 = \bar{X} + 0.155 \bar{Y}$$

$$\bar{Y}_0 = \bar{Y} - 0.155 \bar{X}$$

$$-144 + 749$$

$$-431 + 298$$

$$+467 + 7$$

$$+315 - 495$$

$$-449 + 293$$

$$+94 + 511$$

$$-38 + 319$$

$$-338 + 166$$

$$-58 - 263$$

$$+57 - 155$$

$$-321 + 239$$

$$-40 - 269$$

$$-207 + 204$$

$$+51 - 230$$

$$+32 - 270$$

$$-49 - 156$$

$$+222 - 247$$

$$+18 - 250$$

$$+33 - 218$$

$$-7 - 206$$

$$+107 - 250$$

$$-3 + 176$$

$$-109 + 134$$

$$+85 - 209$$

$$-66 + 212$$

Continued from page 179.

M.G.C. 3201.

~~M.S.C. 2808.~~

~~$$X_0 = X + 0.155Y - 24$$~~

~~$$Y_0 = Y - 0.155X - 11$$~~

|    | <del>X</del> | <del>Y</del> | <del>0.155X</del> | <del>0.155Y</del> |      |      |
|----|--------------|--------------|-------------------|-------------------|------|------|
| x  | +110         | -186         | +17               | -29               | +57  |      |
| y  | +54          | -220         | +8                | -34               | -4   |      |
| z  | +30          | -127         | +5                | -20               | -14  |      |
| 1  | +75          | -106         | +12               | -16               | +35  |      |
| 2  | +46          | -110         | + <sup>07</sup> 4 | -17               | +5   |      |
| 3  | +184         | -14          | +29               | -2                | +158 |      |
| 4  | +151         | +26          | +23               | +4                | +131 |      |
| 5  | +45          | -17          | +7                | -3                | +18  | -35  |
| 6  | -92          | -157         | -14               | -24               | -140 |      |
| 7  | -60          | -198         | -9                | -31               | -115 |      |
| 8  | -52          | -107         | -8                | -17               | -93  |      |
| 9  | -36          | -97          | -6                | -15               | -75  |      |
| 10 | -212         | +202         | -33               | +31               | -205 |      |
| 11 | -119         | +94          | -18               | +15               | -128 |      |
| 12 | -100         | +92          | -16               | +14               | -110 |      |
| 13 | -170         | +66          | -26               | +10               | -184 |      |
| 14 | -172         | +106         | -27               | +16               | -180 |      |
| 15 | -246         | -211         | -38               | -33               | -303 |      |
| 16 | -156         | -262         | -24               | -41               | -221 |      |
| 17 | +15          | -23          | +2                | -4                | -13  | -36  |
| 18 | +26          | -20          | +4                | -3                | -1   | -35  |
| 19 | -26          | +313         | -4                | +49               | -1   | +306 |
| 20 | -5           | +283         | -1                | +44               | +15  |      |



$$24 \quad \bar{X}_0 = \bar{X} + 0.155 \bar{Y}$$

$$11 \quad \bar{Y}_0 = \bar{Y} - 0.155 \bar{X}$$

$$+81 - 203$$

$$+20 - 228$$

$$+10 - 132$$

$$+59 - 118$$

$$+29 - 117$$

$$+182 - 43$$

$$+155 + 3$$

$$+42 - 24$$

$$-116 - 143$$

$$-91 - 189$$

$$-69 - 99$$

$$-51 - 91$$

$$-181 + 235$$

$$-104 + 112$$

$$-86 + 108$$

$$-160 + 92$$

$$-156 + 133$$

$$-279 - 173$$

$$-195 - 238$$

$$+11 - 25$$

$$+23 - 24$$

$$+23 + 317$$

$$+39 + 284$$

M.G.C. 3201.

|    | <u>X</u> | <u>Y</u> | <u>0.155X</u> | <u>0.155Y</u> |
|----|----------|----------|---------------|---------------|
| 21 | + 71     | +146     | + 11          | + 23          |
| 22 | - 89     | - 70     | - 14          | - 11          |
| 23 | - 40     | - 56     | - 6           | - 9           |
| 24 | -334     | -35      | - 52          | - 5           |
| 25 | + 65     | +183     | + 10          | + 28          |
| 26 | +235     | -104     | + 36          | - 16          |
| 27 | +106     | -307     | + 16          | - 48          |
| 28 | + 72     | -37      | + 11          | - 6           |
| 29 | - 267    | +72      | - 41          | + 11          |
| 30 | - 323    | +222     | - 50          | + 34          |
| 31 | +158     | +155     | + 24          | + 24          |
| 32 | +160     | +224     | + 25          | + 35          |
| 33 | + 53     | -32      | + 8           | - 5           |
| 34 | +246     | +323     | + 38          | + 50          |
| 35 | - 29     | +117     | - 4           | + 18          |
| 36 | -104     | -27      | - 16          | - 4           |
| 37 | - 55     | -83      | - 9           | - 13          |
| 38 | - 50     | -68      | - 8           | - 11          |
| 39 | + 32     | +59      | + 5           | + 9           |
| 40 | -104     | +52      | - 16          | + 8           |
| 41 | +280     | +71      | + 43          | + 11          |
| 42 | - 324    | +147     | - 50          | + 23          |
| 43 | - 370    | -42      | - 52          | - 7           |
| 44 | + 20     | +70      | + 3           | + 11          |
| 45 | +129     | - 12     | + 20          | - 2           |



$$\bar{X}_0 = \bar{X} + 0.155 \bar{Y}$$

$$\bar{Y}_0 = \bar{Y} - 0.155 \bar{X}$$

$$+ 94 + 135$$

$$- 100 - 56$$

$$- 49 - 50$$

$$- 339 + 17$$

$$+ 93 + 173$$

$$+ 219 - 140$$

$$+ 58 - 323$$

$$+ 66 - 48$$

$$- 256 + 113$$

$$- 289 + 272$$

$$+ 182 + 131$$

$$+ 185 + 199$$

$$+ 48 - 40$$

$$+ 296 + 285$$

$$- 11 + 121$$

$$- 108 - 11$$

$$- 68 - 74$$

$$- 61 - 60$$

$$+ 41 + 54$$

$$- 96 + 68$$

$$+ 291 + 28$$

$$- 301 + 197$$

$$- 377 + 15$$

$$+ 31 + 67$$

$$+ 127 - 32$$

M.G.C. 3201.

|                                  | X    | Y    | $0.155\bar{X}$ | $0.155\bar{Y}$ |
|----------------------------------|------|------|----------------|----------------|
| 46                               | -310 | -558 | -48            | -86            |
| 47                               | +68  | +256 | +11            | +40            |
| 48                               | -248 | -26  | -38            | -4             |
| 49                               | -60  | +142 | -9             | +22            |
| 50                               | -17  | +24  | -3             | +4             |
| 51                               | -196 | -56  | -30            | -9             |
| (Meas. in $\lambda 11889$ ) R 52 | +137 | -791 | +21            | -123           |
| (" " ) R 53                      | -738 | -872 | -114           | -135           |
| (" " ) R 54                      | +777 | -684 | +120           | -106           |
| (" " ) R 55                      | -446 | +698 | -69            | +108           |
| 56                               | +226 | +129 | +35            | +20            |
| Neb.?                            | +166 | +196 | +26            | +30            |



$$\bar{X}_0 = \bar{X} + 0.155 \bar{Y}$$

$$\bar{Y}_0 = \bar{Y} - 0.155 \bar{X}$$

- 396 - 510

+ 108 + 245

- 252 + 12

- 38 + 151

- 13 + 27

- 205 - 26

+ 14 - 812

- 873 - 758

+ 671 - 804

- 338 + 767

+ 246 + 94

+ 196 + 170

NG.C. 3201.

Position of Center  
from 3 Cat. Stars.  
B, C, D.

|                 |                 |                 |       | (1875) |      | R.A. Resids. | Dec. |
|-----------------|-----------------|-----------------|-------|--------|------|--------------|------|
| from B          | 10 <sup>h</sup> | 12 <sup>m</sup> | 33.77 | -45°   | 46.0 | +4.55        | +1.5 |
| C               | 10              | 12              | 30.32 | -45    | 48.4 | +1.10        | -0.9 |
| D               | 10              | 12              | 23.57 | -45    | 48.1 | -5.65        | -0.6 |
| (1875) Center = | 10              | 12              | 29.22 | -45    | 47.5 | +5.65        | +1.5 |
|                 |                 | 1.0             |       |        | -7   | -5.65        | -1.5 |
| (1900) "        | 10              | 13.5            |       | -45°   | 55.5 |              |      |
|                 |                 |                 |       |        | 54.5 |              |      |



## Correction for Orientation.

Star - Center (10<sup>h</sup> 12<sup>m</sup> 29.22<sup>s</sup> -45° 47.5')

B 10<sup>h</sup> 11<sup>m</sup> 49.3<sup>s</sup> -45° 42.2' - 0<sup>m</sup> 39.9<sup>s</sup> + 0° 5.3'

(corr.)  
39.9 × 0.698 × 15 = -417.533 + 318.0

X = -465.81 Y = +226.04

Meas. - Cat. = -48.28 - 91.96

C 10 13 13.8 -45 47.1

X = +454.75 Y = +78.00 + 0<sup>m</sup> 46.6<sup>s</sup> + 0° 0.4'

(corr.)  
46.6 × 0.697 × 15 = +466.143 + 24.0

Meas. - Cat. = -11.39 + 54.0

D 10 13 0.3 -45 55.4 + 0<sup>m</sup> 31.1<sup>s</sup> - 0° 7.9'

(corr.)  
31.1 × 0.696 × 15 = +324.784 - 474.0

X = +383.25 Y = -436.00

Meas. - Cat. = +58.47 + 38.0

$$\begin{cases} X + 0.155Y \\ Y - 0.155X \end{cases}$$

|   |      |      | 0.155X | 0.155Y | Corr. X | Corr. Y |
|---|------|------|--------|--------|---------|---------|
| B | -466 | +226 | -72    | +35    | -431    | +298    |
| C | +455 | +78  | +71    | +12    | +467    | +7      |
| D | +383 | -436 | +59    | -68    | +315    | -495    |

|   | Corr. X | Corr. Y | Corr. X - Red. Cat. Diff. | Corr. Y - Red. Cat. Diff. |
|---|---------|---------|---------------------------|---------------------------|
| B | -431    | -418    | +298                      | +318                      |
| C | +467    | +466    | +7                        | +24                       |
| D | +315    | +325    | -495                      | -474                      |

$$-\frac{22}{3} = -\frac{58}{3}$$

$$-7 \quad -19$$



MSC 3201

+ Positions from Catalogue

• • Measured positions.

Something wrong with measured positions in X. They are about twice ~~too~~ large, while positions in Y seem to be all right.

Use both coordinates reduced with the same factor for scale?

It appears as if X were reduced for scale  $10'' = 1 \text{ mm}$ , and Y for scale  $5'' = 1 \text{ mm}$  both being measured on plate scale  $5'' = 1 \text{ mm}$

+ 800 400 0 -400 -800

+800

+400

0

-400

-800

Plat 500" = 1 inch (original) } 4 squares  
100" = 1 inch (vertical sheet)

The differences are those between meas. pos. and cat. pos. after both have been reduced to the center.



# Corrections for Orientation.

|   | Cor X       | Cor Y       | Cor X - 22                         | Cor Y - 11 |
|---|-------------|-------------|------------------------------------|------------|
| B | - 431" +8 6 | + 298 +10 1 | - 453 <sup>5</sup> -4 <sup>6</sup> | + 287 -1   |
| C | + 467 +32 8 | + 7 +13 2   | + 445 <sup>3</sup> +8 <sup>8</sup> | - 4 +2     |
| D | + 315 +22 2 | - 495 +09 2 | + 293 <sup>1</sup> -2 <sup>2</sup> | - 506 -2   |
|   | 72          | 32          |                                    |            |
|   | 3 ± 5       | ± 2         |                                    |            |
|   | +24         | +11         |                                    |            |

Diff. Cor X and Red. Cat. Diff. A constant diff. for all readings of X all referred to same position of Center = published position.

A.D. of measures. As these stars were far from center, the systematic errors of variables, nearer to center, will be smaller.

|   | B                   | C                   | D                   |
|---|---------------------|---------------------|---------------------|
| X | - 466<br>233<br>233 | + 455<br>228<br>228 | + 383<br>192<br>192 |
|   | - 72.23             | + 70.58             | + 59.42             |

|  | Y                   |                  |                     |
|--|---------------------|------------------|---------------------|
|  | + 226<br>113<br>113 | + 78<br>39<br>39 | - 436<br>218<br>218 |
|  | + 35.03             | + 12.09          | - 67.58             |

$$X_0 = X + 0.155 Y - 22$$

$$Y_0 = Y - 0.155 X - 11$$



Scatalogue Stars.

Positions, Coordinates applied to Centre.

x &amp; y, from page 199.

$$\begin{array}{rcl} \text{Centre (1900)} & 10^h 13.5^m -45^\circ 54' & \\ & -0.2 & +12 \end{array}$$

$$\text{A (1900)} \quad 10 \quad 13.3 -45 \quad 42$$

$$\begin{array}{r} -144'' \\ \hline 1.43 \\ 15 \overline{) 205.92} \\ \underline{135.73} \end{array} \quad \begin{array}{l} 60 \overline{) 749''} \\ \underline{+12'} \end{array}$$

$$135.73 = 0.2^m$$

$$\begin{array}{rcl} \text{Centre (1900)} & 10^h 13.5^m -45^\circ 54' & \\ & -0.7 & +5 \end{array}$$

$$\text{B (1900)} \quad 10 \quad 12.8 -45 \quad 49$$

$$\begin{array}{r} -431'' \\ \hline 1.43 \\ 15 \overline{) 616.33} \\ \underline{41.09} \end{array} \quad \begin{array}{l} 60 \overline{) 298''} \\ \underline{5'} \end{array}$$

$$41.09 = 0.7^m$$

$$\begin{array}{rcl} \text{Centre (1900)} & 10^h 13.5^m -45^\circ 54' & \\ & +0.7 & +0.1 \end{array}$$

$$\text{C (1900)} \quad 10 \quad 14.2 -45 \quad 54$$

$$\begin{array}{r} +467'' \\ \hline 1.43 \\ 15 \overline{) 667.81} \\ \underline{44.52} \end{array} \quad \begin{array}{l} +7'' \\ \hline 0.1 \end{array}$$

$$44.52 = 0.7^m$$

$$\begin{array}{rcl} \text{Centre (1900)} & 10^h 13.5^m -45^\circ 54' & \\ & +0.5 & -8 \end{array}$$

$$\text{D (1900)} \quad 10 \quad 14.0 -46 \quad 2$$

$$\begin{array}{r} +315'' \\ \hline 1.43 \\ 15 \overline{) 450.45} \\ \underline{30.03} \end{array} \quad \begin{array}{l} 60 \overline{) -495''} \\ \underline{8'} \end{array}$$

$$30.03$$

$$\begin{array}{rcl} \text{Centre (1900)} & 10^h 13.5^m -45^\circ 54' & \\ & -0.7 & +5 \end{array}$$

$$\text{E (1900)} \quad 10 \quad 12.8 -45 \quad 49$$

$$\begin{array}{r} -449'' \\ \hline 1.43 \\ 15 \overline{) 642.07} \\ \underline{42.80} \end{array} \quad \begin{array}{l} 60 \overline{) 293''} \\ \underline{5'} \end{array}$$

$$42.80 = 0.7^m$$



All the catalogue stars proved to be, correctly measured.

Positions, page 190.

A

$$\begin{array}{rcl}
 10^h 12^m 15.3^s -45^\circ 34.9' & (1875) \text{ C.P.D.} & \\
 \underline{1.0 \quad -7} & (\text{precession}) & \\
 10 13.3 \quad -45 42 & (1900) &
 \end{array}$$

B

$$\begin{array}{rcl}
 10 11 49.3 -45 42.2 & (1875) & \\
 \underline{1.0 \quad -7} & & \\
 10 12.8 \quad -45 49 & (1900) &
 \end{array}$$

C

$$\begin{array}{rcl}
 10 13 13.8 -45 47.1 & (1875) & \\
 \underline{1.0 \quad -7} & & \\
 10 14.2 \quad -45 54 & (1900) &
 \end{array}$$

D

$$\begin{array}{rcl}
 10 13 0.3 -45 55.4 & (1875) & \\
 \underline{1.0 \quad -7} & & \\
 10 14.0 \quad -46 02 & (1900) &
 \end{array}$$

E

$$\begin{array}{rcl}
 10 11 47.8 -45 42.4 & (1875) & \\
 \underline{1.0 \quad -7} & & \\
 10 12.8 \quad -45 49 & (1900) &
 \end{array}$$

H.G.C. 3201.

## Position of Nebula (?)

|        |        |                 |                   |          |            |                            |
|--------|--------|-----------------|-------------------|----------|------------|----------------------------|
| Centre | (1900) | 10 <sup>h</sup> | 13.5 <sup>m</sup> | -45° 54' |            | + 196" 60 + 170"           |
|        |        |                 | + 0.3             | + 3      |            | <u>1.43 (secant p)</u> 2.8 |
| Nebula |        | 10              | 13.8              | -45 51   | (1900) 15) | 280.28                     |
|        |        |                 |                   |          |            | <u>18.69 = 0.3</u>         |

|            |        |                 |      |                   |            |        |
|------------|--------|-----------------|------|-------------------|------------|--------|
| Centre     | (1875) | 10 <sup>h</sup> | 12   | 32.2 <sup>s</sup> | -45° 47.0' |        |
| (page 196) |        |                 | +    | 18.7              | + 2.8      |        |
| Nebula     |        | 10              | 12   | 50.9              | -45 44.2   | (1875) |
|            |        |                 | 1.0  |                   | - 7        |        |
|            |        | 10              | 13.8 |                   | -45 51     | (1900) |



8















1917phae.proj.1183W