

## POSITIONS AND PROPER MOTIONS IN THE AREA OF THE OPEN CLUSTER NGC 129

M. Jeanette Stock

Facultad Experimental de Ciencias  
Universidad del Zulia, Maracaibo, Venezuela

and

Jurgen Stock

Centro de Investigaciones de Astronomía, Mérida, Venezuela

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### RESUMEN

Se han determinado posiciones y magnitudes para 537 estrellas en el área del cúmulo abierto NGC 129. Combinando estas posiciones con datos de otras tres fuentes, se hallaron movimientos propios para 86 estrellas.

### ABSTRACT

Positions and magnitudes were derived for 537 stars in the area of the open cluster NGC 129. Combining these positions with data from the three other sources, proper motions could be derived for 86 stars.

*Key words:* **ASTROMETRY — OPEN CLUSTERS AND ASSOCIATIONS — INDIVIDUAL (NGC 129)**

### 1. INTRODUCTION

Accurate proper motions for galactic clusters may serve a number of purposes. First of all they permit the derivation of probabilities of cluster membership. In this process allowance has to be made for the accuracy of the proper motion data. With data of very high accuracy internal motions in the tangential direction can be detected. Among other things such information can lead to a distance estimate (see for example Cudworth 1979). For very few clusters proper motions of the required accuracy are known. For this reason a cluster position program was started at CIDA, using the 65-cm Refractor with a focal length of 10.5 meters and a field of  $0.8 \times 0.8$  degrees on  $16 \times 16$  cm plates. The principal purpose of this program is to contribute to the study of the distribution and kinematics of open clusters within the Galaxy. In this program only such clusters were included for which one or several old epoch data were available in the literature. One of these clusters is NGC 129. In this particular case another recent epoch is also available. Thus the accuracy of its proper motions can be greatly improved. The area is also of inter-

est because it contains the Cepheid variable DL Cas. In this paper we communicate the data obtained for this cluster.

### 2. THE OBSERVATIONS

A series of plates of NGC 129 was taken during September and October of 1981. All exposures are of 15 minutes on Kodak 103aG plates with a Schott OG 512 filter. Most of the plates contain two exposures, with the plate reversed within the plate holder between exposures. Of this series, four plates with a total of eight exposures, were selected for measurement. This activity was carried out with a Zeiss PSK2 Stereo-comparator in its stereo version, thus two plates were measured simultaneously. In all cases, the positions of all images available on both plates were obtained.

### 3. REDUCTION

For the reduction of the measured coordinates the block adjustment method developed by Stock (1981) was employed. Unpublished positions and proper motions, kindly made available by deVegt, were used

TABLE 1  
POSITIONS CATALOG

| No.<br>(1) | $\alpha$ |    |        | $\delta$ |    |       | $V$<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) |
|------------|----------|----|--------|----------|----|-------|------------|--------------------------------|--------------------------------|-------------------------|
|            | h        | m  | s      | °        | '  | ''    |            |                                |                                |                         |
| No.<br>(1) | h        | m  | s      | °        | '  | ''    | $V$<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) |
| 1          | 00       | 23 | 47.446 | 60       | 22 | 00.62 | 12.7       | 1                              | 5                              | 2                       |
| 2          | 00       | 23 | 49.182 | 60       | 07 | 25.93 | 13.1       | 4                              | 2                              | 2                       |
| 3          | 00       | 23 | 51.686 | 60       | 08 | 39.26 | 12.4       | 17                             | 22                             | 2                       |
| 4          | 00       | 23 | 53.351 | 59       | 53 | 21.97 | 13.3       | 30                             | 2                              | 2                       |
| 5          | 00       | 24 | 04.581 | 60       | 08 | 25.42 | 13.4       | 18                             | 1                              | 2                       |
| 6          | 00       | 24 | 06.825 | 59       | 58 | 02.52 | 14.2       | 4                              | 16                             | 2                       |
| 7          | 00       | 24 | 08.120 | 59       | 50 | 04.62 | 13.0       | 4                              | 5                              | 4                       |
| 8          | 00       | 24 | 09.603 | 60       | 09 | 31.10 | 13.2       | 9                              | 1                              | 6                       |
| 9          | 00       | 24 | 14.783 | 60       | 07 | 32.59 | 8.5        | 17                             | 5                              | 8                       |
| 10         | 00       | 24 | 15.581 | 60       | 21 | 12.37 | 12.4       | 10                             | 1                              | 4                       |
| 11         | 00       | 24 | 17.280 | 60       | 24 | 38.95 | 13.2       | 6                              | 8                              | 6                       |
| 12         | 00       | 24 | 17.297 | 59       | 55 | 22.71 | 10.7       | 8                              | 5                              | 8                       |
| 13         | 00       | 24 | 19.304 | 60       | 03 | 16.67 | 13.2       | 7                              | 3                              | 8                       |
| 14         | 00       | 24 | 20.151 | 60       | 05 | 04.65 | 12.4       | 8                              | 5                              | 8                       |
| 15         | 00       | 24 | 20.779 | 59       | 50 | 27.45 | 13.4       | 12                             | 8                              | 4                       |
| 16         | 00       | 24 | 22.207 | 60       | 23 | 24.34 | 13.0       | 10                             | 10                             | 4                       |
| 17         | 00       | 24 | 22.749 | 60       | 25 | 18.79 | 13.5       | 18                             | 14                             | 6                       |
| 18         | 00       | 24 | 22.908 | 59       | 58 | 39.62 | 14.2       | 13                             | 9                              | 4                       |
| 19         | 00       | 24 | 22.964 | 60       | 05 | 02.89 | 12.8       | 5                              | 3                              | 8                       |
| 20         | 00       | 24 | 22.965 | 60       | 15 | 39.33 | 13.4       | 6                              | 20                             | 2                       |
| 21         | 00       | 24 | 22.996 | 60       | 02 | 27.66 | 13.2       | 6                              | 5                              | 4                       |
| 22         | 00       | 24 | 23.029 | 59       | 54 | 00.49 | 12.9       | 6                              | 5                              | 6                       |
| 23         | 00       | 24 | 23.838 | 59       | 55 | 16.16 | 13.6       | 19                             | 47                             | 2                       |
| 24         | 00       | 24 | 23.913 | 60       | 23 | 25.67 | 7.6        | 8                              | 11                             | 5                       |
| 25         | 00       | 24 | 25.813 | 60       | 20 | 28.31 | 11.4       | 6                              | 5                              | 8                       |
| 26         | 00       | 24 | 26.051 | 60       | 24 | 40.11 | 11.7       | 8                              | 8                              | 6                       |
| 27         | 00       | 24 | 26.634 | 60       | 09 | 53.89 | 12.7       | 7                              | 3                              | 8                       |
| 28         | 00       | 24 | 28.448 | 60       | 16 | 16.33 | 13.0       | 6                              | 5                              | 6                       |
| 29         | 00       | 24 | 30.260 | 60       | 18 | 48.02 | 13.4       | 19                             | 2                              | 2                       |
| 30         | 00       | 24 | 31.640 | 60       | 25 | 39.81 | 13.3       | 9                              | 4                              | 5                       |
| 31         | 00       | 24 | 31.690 | 60       | 16 | 29.43 | 13.0       | 8                              | 5                              | 6                       |
| 32         | 00       | 24 | 31.860 | 60       | 08 | 18.94 | 12.9       | 5                              | 6                              | 8                       |
| 33         | 00       | 24 | 32.733 | 60       | 09 | 40.59 | 13.5       | 8                              | 6                              | 6                       |
| 34         | 00       | 24 | 33.241 | 59       | 50 | 49.86 | 13.5       | 17                             | 15                             | 4                       |
| 35         | 00       | 24 | 33.593 | 60       | 16 | 48.44 | 12.9       | 10                             | 6                              | 6                       |
| 36         | 00       | 24 | 34.804 | 60       | 15 | 02.63 | 13.3       | 4                              | 7                              | 8                       |
| 37         | 00       | 24 | 35.450 | 60       | 01 | 37.92 | 12.9       | 7                              | 4                              | 8                       |
| 38         | 00       | 24 | 36.671 | 60       | 15 | 01.79 | 13.5       | 3                              | 10                             | 8                       |
| 39         | 00       | 24 | 37.465 | 60       | 27 | 35.96 | 10.7       | 2                              | 2                              | 4                       |
| 40         | 00       | 24 | 37.613 | 60       | 15 | 50.41 | 10.5       | 6                              | 8                              | 8                       |
| 41         | 00       | 24 | 38.017 | 60       | 02 | 01.21 | 13.3       | 12                             | 6                              | 4                       |

TABLE 1 (CONTINUED)

| No.<br>(1) | $\alpha$ |     |        | $\delta$ |     |       | V<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) |
|------------|----------|-----|--------|----------|-----|-------|----------|--------------------------------|--------------------------------|-------------------------|
|            | h        | m   | s      | °        | '   | ''    |          |                                |                                |                         |
|            | (1)      | (2) | (3)    | (4)      | (5) | (6)   | (7)      | (8)                            | (9)                            | (10)                    |
| 83         | 00       | 25  | 17.020 | 59       | 55  | 33.52 | 13.5     | 18                             | 2                              | 2                       |
| 84         | 00       | 25  | 18.770 | 59       | 54  | 16.23 | 12.9     | 5                              | 4                              | 8                       |
| 85         | 00       | 25  | 20.436 | 60       | 11  | 22.07 | 12.6     | 10                             | 3                              | 8                       |
| 86         | 00       | 25  | 21.025 | 60       | 12  | 54.63 | 13.5     | 8                              | 4                              | 6                       |
| 87         | 00       | 25  | 23.578 | 60       | 02  | 38.34 | 12.7     | 4                              | 4                              | 8                       |
| 88         | 00       | 25  | 23.885 | 59       | 52  | 11.80 | 13.1     | 8                              | 5                              | 6                       |
| 89         | 00       | 25  | 24.488 | 60       | 08  | 15.07 | 13.6     | 17                             | 5                              | 4                       |
| 90         | 00       | 25  | 24.573 | 59       | 46  | 43.69 | 12.7     | 13                             | 9                              | 4                       |
| 91         | 00       | 25  | 24.593 | 60       | 11  | 47.46 | 13.1     | 3                              | 5                              | 8                       |
| 92         | 00       | 25  | 25.411 | 59       | 53  | 07.36 | 10.9     | 5                              | 5                              | 8                       |
| 93         | 00       | 25  | 26.162 | 60       | 05  | 02.48 | 13.6     | 17                             | 7                              | 2                       |
| 94         | 00       | 25  | 28.860 | 59       | 59  | 52.18 | 11.1     | 4                              | 3                              | 8                       |
| 95         | 00       | 25  | 29.332 | 60       | 01  | 37.86 | 13.1     | 11                             | 1                              | 6                       |
| 96         | 00       | 25  | 29.407 | 59       | 33  | 25.09 | 13.6     | 9                              | 10                             | 6                       |
| 97         | 00       | 25  | 29.538 | 60       | 17  | 44.35 | 13.4     | 8                              | 7                              | 4                       |
| 98         | 00       | 25  | 32.354 | 60       | 15  | 12.04 | 13.3     | 4                              | 11                             | 6                       |
| 99         | 00       | 25  | 33.855 | 60       | 09  | 44.39 | 13.5     | 10                             | 5                              | 4                       |
| 100        | 00       | 25  | 35.645 | 60       | 23  | 28.48 | 13.5     | 6                              | 7                              | 6                       |
| 101        | 00       | 25  | 37.637 | 60       | 15  | 44.79 | 13.2     | 6                              | 5                              | 6                       |
| 102        | 00       | 25  | 37.715 | 60       | 24  | 48.24 | 13.5     | 5                              | 10                             | 4                       |
| 103        | 00       | 25  | 38.147 | 60       | 03  | 25.69 | 13.3     | 5                              | 3                              | 6                       |
| 104        | 00       | 25  | 39.553 | 60       | 05  | 48.42 | 13.2     | 13                             | 3                              | 8                       |
| 105        | 00       | 25  | 40.092 | 59       | 57  | 50.96 | 13.5     | 15                             | 9                              | 6                       |
| 106        | 00       | 25  | 41.334 | 60       | 11  | 19.34 | 12.1     | 7                              | 3                              | 8                       |
| 107        | 00       | 25  | 41.992 | 59       | 53  | 57.69 | 13.3     | 7                              | 8                              | 8                       |
| 108        | 00       | 25  | 42.151 | 60       | 03  | 28.30 | 13.2     | 6                              | 4                              | 6                       |
| 109        | 00       | 25  | 42.276 | 59       | 55  | 49.20 | 13.4     | 9                              | 52                             | 6                       |
| 110        | 00       | 25  | 42.439 | 60       | 11  | 13.60 | 13.0     | 6                              | 3                              | 8                       |
| 111        | 00       | 25  | 43.300 | 59       | 58  | 30.69 | 12.4     | 6                              | 9                              | 6                       |
| 112        | 00       | 25  | 43.306 | 60       | 09  | 44.56 | 12.5     | 5                              | 4                              | 8                       |
| 113        | 00       | 25  | 43.783 | 59       | 58  | 56.01 | 13.0     | 7                              | 4                              | 6                       |
| 114        | 00       | 25  | 44.648 | 60       | 01  | 54.75 | 13.3     | 8                              | 7                              | 8                       |
| 115        | 00       | 25  | 50.868 | 60       | 03  | 58.84 | 11.4     | 7                              | 4                              | 8                       |
| 116        | 00       | 25  | 52.212 | 59       | 57  | 50.83 | 13.6     | 9                              | 6                              | 2                       |
| 117        | 00       | 25  | 53.189 | 59       | 55  | 09.03 | 12.9     | 5                              | 5                              | 8                       |
| 118        | 00       | 25  | 53.250 | 60       | 15  | 08.86 | 12.8     | 4                              | 3                              | 6                       |
| 119        | 00       | 25  | 53.659 | 60       | 00  | 58.55 | 13.6     | 17                             | 60                             | 2                       |
| 120        | 00       | 25  | 54.164 | 60       | 08  | 05.95 | 12.7     | 6                              | 5                              | 6                       |
| 121        | 00       | 25  | 54.248 | 59       | 52  | 43.10 | 13.3     | 22                             | 16                             | 4                       |
| 122        | 00       | 25  | 55.529 | 60       | 14  | 41.39 | 13.3     | 2                              | 10                             | 4                       |
| 123        | 00       | 25  | 55.838 | 60       | 19  | 48.04 | 09.3     | 13                             | 5                              | 8                       |
| 124        | 00       | 25  | 56.485 | 60       | 26  | 30.25 | 13.4     | 18                             | 6                              | 4                       |

TABLE 1 (CONTINUED)

| No.<br>(1) | $\alpha$ |    |        | $\delta$ |    |       | V<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) | No. | $\alpha$ |    |        | $\delta$ |    |       | V<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) |
|------------|----------|----|--------|----------|----|-------|----------|--------------------------------|--------------------------------|-------------------------|-----|----------|----|--------|----------|----|-------|----------|--------------------------------|--------------------------------|-------------------------|
|            | h        | m  | s      | °        | '  | ''    |          |                                |                                |                         |     | h        | m  | s      | °        | '  | ''    |          |                                |                                |                         |
| 167        | 00       | 26 | 22.935 | 60       | 20 | 20.82 | 13.3     | 11                             | 6                              | 6                       | 208 | 00       | 26 | 44.114 | 59       | 55 | 54.85 | 12.9     | 5                              | 5                              | 8                       |
| 168        | 00       | 26 | 23.457 | 60       | 05 | 14.31 | 13.2     | 4                              | 4                              | 8                       | 209 | 00       | 26 | 44.572 | 60       | 11 | 43.20 | 13.0     | 7                              | 4                              | 8                       |
| 169        | 00       | 26 | 24.724 | 59       | 55 | 37.55 | 11.8     | 5                              | 6                              | 8                       | 210 | 00       | 26 | 44.957 | 60       | 04 | 18.23 | 12.2     | 4                              | 6                              | 8                       |
| 170        | 00       | 26 | 25.455 | 60       | 26 | 05.61 | 13.3     | 4                              | 8                              | 4                       | 211 | 00       | 26 | 45.139 | 60       | 04 | 00.59 | 11.4     | 6                              | 7                              | 8                       |
| 171        | 00       | 26 | 25.477 | 60       | 23 | 03.29 | 13.0     | 11                             | 2                              | 6                       | 212 | 00       | 26 | 46.035 | 59       | 57 | 06.81 | 12.3     | 6                              | 5                              | 8                       |
| 172        | 00       | 26 | 25.661 | 60       | 12 | 14.43 | 12.5     | 8                              | 5                              | 8                       | 213 | 00       | 26 | 46.887 | 59       | 45 | 54.69 | 13.0     | 9                              | 32                             | 2                       |
| 173        | 00       | 26 | 25.962 | 59       | 48 | 17.48 | 13.3     | 16                             | 15                             | 2                       | 214 | 00       | 26 | 47.431 | 60       | 01 | 43.66 | 12.1     | 6                              | 4                              | 8                       |
| 174        | 00       | 26 | 26.017 | 60       | 12 | 14.66 | 13.4     | 10                             | 5                              | 6                       | 215 | 00       | 26 | 47.538 | 60       | 08 | 12.79 | 12.6     | 7                              | 4                              | 8                       |
| 175        | 00       | 26 | 26.165 | 60       | 19 | 12.93 | 12.7     | 7                              | 6                              | 8                       | 216 | 00       | 26 | 47.580 | 60       | 18 | 58.11 | 13.2     | 11                             | 5                              | 8                       |
| 176        | 00       | 26 | 26.495 | 60       | 23 | 00.86 | 13.4     | 5                              | 7                              | 6                       | 217 | 00       | 26 | 47.602 | 59       | 56 | 28.63 | 13.1     | 6                              | 6                              | 8                       |
| 177        | 00       | 26 | 27.551 | 59       | 55 | 21.32 | 13.1     | 5                              | 6                              | 8                       | 218 | 00       | 26 | 47.913 | 60       | 32 | 47.50 | 13.4     | 5                              | 11                             | 4                       |
| 178        | 00       | 26 | 30.697 | 60       | 15 | 46.57 | 11.0     | 7                              | 6                              | 6                       | 219 | 00       | 26 | 47.939 | 60       | 14 | 18.21 | 12.9     | 5                              | 2                              | 6                       |
| 179        | 00       | 26 | 30.715 | 59       | 54 | 16.01 | 12.4     | 25                             | 20                             | 2                       | 220 | 00       | 26 | 48.382 | 59       | 56 | 53.35 | 12.9     | 5                              | 3                              | 8                       |
| 180        | 00       | 26 | 30.783 | 60       | 08 | 30.71 | 11.7     | 6                              | 6                              | 8                       | 221 | 00       | 26 | 48.396 | 60       | 28 | 21.75 | 13.4     | 13                             | 7                              | 4                       |
| 181        | 00       | 26 | 31.133 | 59       | 45 | 52.77 | 12.7     | 1                              | 3                              | 4                       | 222 | 00       | 26 | 49.769 | 59       | 50 | 52.26 | 12.8     | 5                              | 2                              | 8                       |
| 182        | 00       | 26 | 31.570 | 59       | 59 | 33.06 | 12.9     | 1                              | 2                              | 2                       | 223 | 00       | 26 | 49.790 | 60       | 22 | 18.23 | 13.3     | 4                              | 7                              | 6                       |
| 183        | 00       | 26 | 32.521 | 59       | 46 | 17.50 | 12.0     | 3                              | 4                              | 4                       | 224 | 00       | 26 | 49.879 | 59       | 52 | 06.06 | 11.2     | 5                              | 5                              | 8                       |
| 184        | 00       | 26 | 32.735 | 59       | 57 | 23.43 | 13.1     | 8                              | 4                              | 8                       | 225 | 00       | 26 | 50.090 | 59       | 56 | 54.21 | 13.1     | 7                              | 4                              | 8                       |
| 185        | 00       | 26 | 33.068 | 60       | 15 | 30.29 | 12.4     | 5                              | 5                              | 6                       | 226 | 00       | 26 | 50.863 | 60       | 26 | 38.83 | 13.5     | 5                              | 7                              | 4                       |
| 186        | 00       | 26 | 33.331 | 60       | 24 | 21.98 | 13.4     | 2                              | 30                             | 2                       | 227 | 00       | 26 | 52.181 | 60       | 26 | 03.50 | 13.4     | 21                             | 3                              | 4                       |
| 187        | 00       | 26 | 33.387 | 60       | 00 | 04.06 | 13.6     | 8                              | 9                              | 2                       | 228 | 00       | 26 | 52.922 | 59       | 55 | 34.02 | 13.6     | 13                             | 12                             | 2                       |
| 188        | 00       | 26 | 33.472 | 59       | 56 | 35.73 | 13.4     | 11                             | 3                              | 6                       | 229 | 00       | 26 | 53.643 | 59       | 59 | 30.26 | 12.6     | 6                              | 4                              | 6                       |
| 189        | 00       | 26 | 33.945 | 60       | 09 | 17.10 | 13.1     | 6                              | 5                              | 6                       | 230 | 00       | 26 | 54.265 | 60       | 07 | 00.07 | 13.0     | 19                             | 4                              | 2                       |
| 190        | 00       | 26 | 33.984 | 59       | 52 | 14.38 | 12.4     | 3                              | 6                              | 8                       | 231 | 00       | 26 | 54.670 | 59       | 54 | 52.03 | 13.4     | 17                             | 11                             | 2                       |
| 191        | 00       | 26 | 34.160 | 59       | 54 | 25.80 | 13.5     | 10                             | 11                             | 6                       | 232 | 00       | 26 | 54.900 | 59       | 56 | 58.86 | 13.3     | 12                             | 6                              | 8                       |
| 192        | 00       | 26 | 34.313 | 59       | 56 | 43.55 | 13.6     | 0                              | 31                             | 2                       | 233 | 00       | 26 | 56.086 | 59       | 53 | 40.20 | 13.6     | 13                             | 8                              | 6                       |
| 193        | 00       | 26 | 34.735 | 60       | 23 | 38.08 | 11.2     | 9                              | 7                              | 4                       | 234 | 00       | 26 | 57.026 | 59       | 49 | 16.18 | 13.4     | 2                              | 2                              | 2                       |
| 194        | 00       | 26 | 35.522 | 59       | 57 | 25.78 | 12.7     | 5                              | 6                              | 8                       | 235 | 00       | 26 | 57.026 | 60       | 07 | 54.82 | 13.3     | 6                              | 7                              | 6                       |
| 195        | 00       | 26 | 36.534 | 60       | 02 | 29.10 | 12.0     | 5                              | 4                              | 8                       | 236 | 00       | 26 | 57.454 | 60       | 17 | 45.06 | 13.4     | 8                              | 7                              | 6                       |
| 196        | 00       | 26 | 36.737 | 60       | 29 | 26.92 | 13.6     | 17                             | 7                              | 2                       | 237 | 00       | 26 | 57.653 | 60       | 01 | 02.13 | 13.2     | 2                              | 6                              | 4                       |
| 197        | 00       | 26 | 37.238 | 60       | 09 | 55.24 | 12.9     | 7                              | 4                              | 8                       | 238 | 00       | 26 | 58.264 | 60       | 20 | 35.67 | 13.1     | 5                              | 6                              | 8                       |
| 198        | 00       | 26 | 38.086 | 60       | 03 | 15.20 | 13.0     | 8                              | 4                              | 6                       | 239 | 00       | 26 | 58.378 | 60       | 03 | 02.17 | 12.8     | 6                              | 6                              | 6                       |
| 199        | 00       | 26 | 38.817 | 60       | 23 | 00.82 | 12.7     | 7                              | 4                              | 6                       | 240 | 00       | 26 | 58.521 | 59       | 59 | 45.75 | 12.5     | 5                              | 7                              | 8                       |
| 200        | 00       | 26 | 39.197 | 60       | 20 | 37.02 | 12.3     | 7                              | 5                              | 8                       | 241 | 00       | 26 | 59.521 | 60       | 16 | 49.42 | 12.6     | 5                              | 5                              | 8                       |
| 201        | 00       | 26 | 40.847 | 60       | 04 | 21.20 | 13.2     | 8                              | 2                              | 8                       | 242 | 00       | 26 | 59.596 | 60       | 19 | 12.75 | 11.1     | 7                              | 5                              | 8                       |
| 202        | 00       | 26 | 41.541 | 60       | 00 | 49.68 | 13.1     | 3                              | 5                              | 8                       | 243 | 00       | 27 | 00.231 | 60       | 13 | 09.18 | 9.5      | 10                             | 5                              | 8                       |
| 203        | 00       | 26 | 41.756 | 59       | 45 | 51.94 | 13.0     | 2                              | 14                             | 2                       | 244 | 00       | 27 | 00.504 | 60       | 01 | 47.99 | 13.2     | 6                              | 8                              | 8                       |
| 204        | 00       | 26 | 41.839 | 59       | 58 | 30.18 | 12.9     | 4                              | 2                              | 6                       | 245 | 00       | 27 | 00.785 | 60       | 27 | 38.92 | 12.9     | 7                              | 2                              | 4                       |
| 205        | 00       | 26 | 41.868 | 60       | 07 | 45.91 | 11.8     | 4                              | 2                              | 8                       | 246 | 00       | 27 | 00.910 | 60       | 18 | 38.66 | 10.6     | 10                             | 6                              | 8                       |
| 206        | 00       | 26 | 42.536 | 59       | 48 | 32.24 | 13.3     | 1                              | 10                             | 2                       | 247 | 00       | 27 | 01.581 | 59       | 59 | 13.54 | 13.3     | 35                             | 1                              | 2                       |
| 207        | 00       | 26 | 44.014 | 59       | 47 | 43.86 | 12.9     | 16                             | 8                              | 4                       | 248 | 00       | 27 | 01.711 | 59       | 58 | 09.96 | 12.9     | 9                              | 4                              | 6                       |

TABLE 1 (CONTINUED)

| No.<br>(1) | $\alpha$ |          |          | $\delta$ |          |           | V<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) |
|------------|----------|----------|----------|----------|----------|-----------|----------|--------------------------------|--------------------------------|-------------------------|
|            | h<br>(2) | m<br>(2) | s<br>(2) | °<br>(3) | '<br>(3) | ''<br>(3) |          |                                |                                |                         |
| 249        | 00       | 27       | 01.762   | 59       | 55       | 42.03     | 12.9     | 6                              | 6                              | 8                       |
| 250        | 00       | 27       | 02.002   | 60       | 29       | 50.34     | 13.5     | 9                              | 9                              | 4                       |
| 251        | 00       | 27       | 02.288   | 60       | 09       | 47.99     | 13.0     | 5                              | 4                              | 8                       |
| 252        | 00       | 27       | 02.618   | 60       | 01       | 16.19     | 12.2     | 11                             | 5                              | 8                       |
| 253        | 00       | 27       | 02.773   | 60       | 10       | 02.74     | 12.7     | 4                              | 6                              | 8                       |
| 254        | 00       | 27       | 03.139   | 60       | 01       | 25.04     | 13.0     | 5                              | 4                              | 8                       |
| 255        | 00       | 27       | 03.725   | 59       | 56       | 35.87     | 13.5     | 19                             | 4                              | 2                       |
| 256        | 00       | 27       | 04.339   | 59       | 57       | 00.43     | 13.4     | 7                              | 9                              | 8                       |
| 257        | 00       | 27       | 04.671   | 60       | 05       | 37.05     | 13.2     | 3                              | 24                             | 2                       |
| 258        | 00       | 27       | 04.876   | 59       | 54       | 12.51     | 13.5     | 21                             | 13                             | 6                       |
| 259        | 00       | 27       | 06.038   | 59       | 59       | 25.81     | 13.4     | 11                             | 18                             | 2                       |
| 260        | 00       | 27       | 06.125   | 59       | 55       | 55.33     | 11.9     | 7                              | 3                              | 8                       |
| 261        | 00       | 27       | 06.249   | 59       | 59       | 48.51     | 11.9     | 6                              | 3                              | 8                       |
| 262        | 00       | 27       | 06.318   | 60       | 11       | 10.08     | 13.3     | 9                              | 6                              | 8                       |
| 263        | 00       | 27       | 06.373   | 60       | 16       | 44.46     | 13.2     | 5                              | 6                              | 8                       |
| 264        | 00       | 27       | 06.631   | 59       | 53       | 56.57     | 13.2     | 4                              | 7                              | 8                       |
| 265        | 00       | 27       | 07.161   | 60       | 14       | 59.12     | 12.8     | 7                              | 6                              | 6                       |
| 266        | 00       | 27       | 07.431   | 60       | 18       | 41.42     | 13.1     | 10                             | 6                              | 8                       |
| 267        | 00       | 27       | 08.128   | 59       | 54       | 37.64     | 12.7     | 6                              | 4                              | 8                       |
| 268        | 00       | 27       | 08.171   | 60       | 04       | 35.02     | 11.8     | 6                              | 2                              | 7                       |
| 269        | 00       | 27       | 08.374   | 60       | 22       | 32.76     | 11.1     | 10                             | 4                              | 6                       |
| 270        | 00       | 27       | 08.811   | 60       | 23       | 46.37     | 11.6     | 6                              | 5                              | 6                       |
| 271        | 00       | 27       | 10.375   | 59       | 56       | 09.21     | 8.6      | 8                              | 8                              | 8                       |
| 272        | 00       | 27       | 10.753   | 60       | 07       | 29.15     | 13.5     | 9                              | 18                             | 4                       |
| 273        | 00       | 27       | 11.071   | 60       | 04       | 48.52     | 13.1     | 12                             | 12                             | 4                       |
| 274        | 00       | 27       | 11.083   | 60       | 01       | 11.34     | 11.2     | 8                              | 3                              | 6                       |
| 275        | 00       | 27       | 11.527   | 59       | 52       | 51.50     | 11.5     | 4                              | 6                              | 8                       |
| 276        | 00       | 27       | 13.119   | 59       | 54       | 48.85     | 13.3     | 40                             | 16                             | 2                       |
| 277        | 00       | 27       | 13.575   | 60       | 21       | 15.28     | 13.4     | 5                              | 4                              | 6                       |
| 278        | 00       | 27       | 15.670   | 60       | 26       | 29.80     | 13.6     | 7                              | 3                              | 4                       |
| 279        | 00       | 27       | 15.704   | 60       | 13       | 00.10     | 11.0     | 5                              | 5                              | 8                       |
| 280        | 00       | 27       | 15.724   | 59       | 56       | 51.07     | 13.5     | 24                             | 1                              | 2                       |
| 281        | 00       | 27       | 16.797   | 60       | 19       | 47.28     | 10.7     | 4                              | 2                              | 8                       |
| 282        | 00       | 27       | 17.785   | 59       | 52       | 30.24     | 9.0      | 15                             | 7                              | 8                       |
| 283        | 00       | 27       | 18.319   | 59       | 51       | 33.09     | 13.0     | 9                              | 4                              | 8                       |
| 284        | 00       | 27       | 18.396   | 60       | 25       | 39.47     | 13.4     | 14                             | 3                              | 4                       |
| 285        | 00       | 27       | 18.671   | 59       | 51       | 06.62     | 13.2     | 5                              | 5                              | 8                       |
| 286        | 00       | 27       | 18.718   | 59       | 59       | 40.79     | 13.0     | 10                             | 6                              | 2                       |
| 287        | 00       | 27       | 19.523   | 60       | 24       | 41.44     | 13.5     | 7                              | 16                             | 6                       |
| 288        | 00       | 27       | 19.810   | 59       | 55       | 33.74     | 11.2     | 5                              | 3                              | 7                       |
| 289        | 00       | 27       | 19.868   | 60       | 31       | 58.89     | 13.4     | 30                             | 8                              | 2                       |



TABLE 1 (CONTINUED)

| No.<br>(1) | $\alpha$ |    |        | $\delta$ |    |       | V<br>(4) | rms $\alpha$<br>0.0001s |     |   | No. of<br>images<br>(7) | rms $\delta$<br>0.001" |     |        | No. of<br>images<br>(7) |    |    |   |
|------------|----------|----|--------|----------|----|-------|----------|-------------------------|-----|---|-------------------------|------------------------|-----|--------|-------------------------|----|----|---|
|            | h        | m  | s      | °        | '  | "     |          | (5)                     | (6) | " |                         | (5)                    | (6) | "      |                         |    |    |   |
| 331        | 00       | 27 | 41.051 | 60       | 11 | 07.58 | 12.2     | 4                       | 5   | 8 | 372                     | 00                     | 28  | 01.797 | 13.1                    | 17 | 8  | 4 |
| 332        | 00       | 27 | 41.121 | 59       | 50 | 45.46 | 12.6     | 18                      | 21  | 2 | 373                     | 00                     | 28  | 02.180 | 13.6                    | 7  | 7  | 4 |
| 333        | 00       | 27 | 41.566 | 59       | 49 | 35.64 | 13.4     | 3                       | 4   | 2 | 374                     | 00                     | 28  | 02.415 | 13.7                    | 15 | 3  | 2 |
| 334        | 00       | 27 | 42.315 | 60       | 04 | 24.02 | 13.3     | 4                       | 6   | 4 | 375                     | 00                     | 28  | 02.779 | 13.0                    | 5  | 7  | 8 |
| 335        | 00       | 27 | 42.428 | 59       | 57 | 10.85 | 13.0     | 11                      | 4   | 2 | 376                     | 00                     | 28  | 03.279 | 12.9                    | 1  | 4  | 2 |
| 336        | 00       | 27 | 42.429 | 59       | 54 | 17.79 | 13.5     | 7                       | 6   | 8 | 377                     | 00                     | 28  | 03.473 | 12.5                    | 6  | 5  | 8 |
| 337        | 00       | 27 | 43.112 | 60       | 01 | 27.93 | 13.5     | 16                      | 19  | 4 | 378                     | 00                     | 28  | 03.528 | 12.0                    | 3  | 5  | 8 |
| 338        | 00       | 27 | 43.212 | 60       | 30 | 47.56 | 13.4     | 16                      | 7   | 2 | 379                     | 00                     | 28  | 03.695 | 13.4                    | 10 | 5  | 6 |
| 339        | 00       | 27 | 43.624 | 60       | 03 | 24.30 | 13.2     | 11                      | 5   | 6 | 380                     | 00                     | 28  | 04.379 | 13.8                    | 16 | 7  | 2 |
| 340        | 00       | 27 | 43.807 | 60       | 03 | 47.91 | 13.4     | 14                      | 8   | 6 | 381                     | 00                     | 28  | 04.788 | 13.0                    | 6  | 5  | 8 |
| 341        | 00       | 27 | 43.910 | 60       | 20 | 36.09 | 12.8     | 8                       | 5   | 8 | 382                     | 00                     | 28  | 04.817 | 13.4                    | 11 | 1  | 2 |
| 342        | 00       | 27 | 44.140 | 60       | 15 | 35.84 | 13.6     | 3                       | 1   | 2 | 383                     | 00                     | 28  | 04.930 | 11.6                    | 5  | 6  | 8 |
| 343        | 00       | 27 | 44.852 | 60       | 00 | 53.91 | 9.7      | 8                       | 9   | 6 | 384                     | 00                     | 28  | 05.128 | 13.0                    | 8  | 12 | 6 |
| 344        | 00       | 27 | 45.633 | 59       | 46 | 23.05 | 13.1     | 5                       | 4   | 2 | 385                     | 00                     | 28  | 05.548 | 13.1                    | 13 | 11 | 8 |
| 345        | 00       | 27 | 46.520 | 60       | 02 | 33.02 | 11.6     | 5                       | 3   | 8 | 386                     | 00                     | 28  | 05.677 | 13.4                    | 2  | 18 | 2 |
| 346        | 00       | 27 | 47.086 | 59       | 58 | 31.06 | 13.6     | 9                       | 0   | 2 | 387                     | 00                     | 28  | 05.821 | 13.4                    | 12 | 6  | 2 |
| 347        | 00       | 27 | 47.272 | 60       | 24 | 27.76 | 11.5     | 7                       | 7   | 6 | 388                     | 00                     | 28  | 05.955 | 13.0                    | 10 | 6  | 6 |
| 348        | 00       | 27 | 47.606 | 59       | 56 | 41.90 | 13.6     | 13                      | 7   | 4 | 389                     | 00                     | 28  | 06.678 | 13.4                    | 23 | 10 | 2 |
| 349        | 00       | 27 | 48.269 | 60       | 30 | 54.11 | 13.1     | 12                      | 8   | 4 | 390                     | 00                     | 28  | 07.463 | 13.7                    | 30 | 8  | 2 |
| 350        | 00       | 27 | 49.189 | 59       | 58 | 34.49 | 13.3     | 20                      | 6   | 2 | 391                     | 00                     | 28  | 08.074 | 12.9                    | 8  | 8  | 8 |
| 351        | 00       | 27 | 50.220 | 60       | 01 | 23.01 | 12.6     | 5                       | 7   | 8 | 392                     | 00                     | 28  | 08.596 | 13.2                    | 5  | 6  | 8 |
| 352        | 00       | 27 | 51.184 | 60       | 23 | 14.12 | 13.2     | 6                       | 10  | 6 | 393                     | 00                     | 28  | 08.901 | 12.3                    | 6  | 4  | 8 |
| 353        | 00       | 27 | 51.415 | 59       | 52 | 12.12 | 13.3     | 8                       | 4   | 4 | 394                     | 00                     | 28  | 09.358 | 13.2                    | 14 | 6  | 4 |
| 354        | 00       | 27 | 52.234 | 60       | 19 | 18.87 | 13.2     | 3                       | 13  | 4 | 395                     | 00                     | 28  | 09.681 | 12.9                    | 8  | 6  | 8 |
| 355        | 00       | 27 | 52.708 | 60       | 16 | 28.42 | 13.2     | 7                       | 11  | 6 | 396                     | 00                     | 28  | 10.532 | 13.5                    | 5  | 14 | 2 |
| 356        | 00       | 27 | 53.368 | 60       | 03 | 41.13 | 13.2     | 7                       | 5   | 8 | 397                     | 00                     | 28  | 10.872 | 13.1                    | 15 | 2  | 2 |
| 357        | 00       | 27 | 55.605 | 60       | 17 | 08.26 | 13.2     | 3                       | 10  | 6 | 398                     | 00                     | 28  | 10.958 | 12.8                    | 9  | 3  | 8 |
| 358        | 00       | 27 | 55.845 | 60       | 02 | 04.35 | 13.1     | 10                      | 7   | 6 | 399                     | 00                     | 28  | 13.048 | 12.9                    | 4  | 5  | 8 |
| 359        | 00       | 27 | 56.458 | 60       | 17 | 09.06 | 13.6     | 9                       | 11  | 2 | 400                     | 00                     | 28  | 14.263 | 13.1                    | 5  | 6  | 8 |
| 360        | 00       | 27 | 56.927 | 59       | 45 | 50.30 | 12.5     | 6                       | 6   | 4 | 401                     | 00                     | 28  | 15.484 | 13.8                    | 10 | 11 | 4 |
| 361        | 00       | 27 | 57.449 | 60       | 11 | 11.67 | 13.1     | 7                       | 4   | 8 | 402                     | 00                     | 28  | 15.856 | 13.0                    | 14 | 15 | 2 |
| 362        | 00       | 27 | 57.590 | 60       | 06 | 02.75 | 12.8     | 9                       | 2   | 4 | 403                     | 00                     | 28  | 16.068 | 13.2                    | 9  | 9  | 8 |
| 363        | 00       | 27 | 58.194 | 60       | 31 | 54.76 | 13.2     | 5                       | 4   | 4 | 404                     | 00                     | 28  | 16.282 | 11.9                    | 5  | 5  | 8 |
| 364        | 00       | 27 | 58.216 | 60       | 12 | 32.05 | 13.4     | 9                       | 2   | 2 | 405                     | 00                     | 28  | 16.420 | 13.5                    | 26 | 1  | 2 |
| 365        | 00       | 27 | 58.473 | 60       | 00 | 33.03 | 13.2     | 9                       | 11  | 4 | 406                     | 00                     | 28  | 16.430 | 13.5                    | 26 | 73 | 2 |
| 366        | 00       | 27 | 58.694 | 59       | 58 | 02.08 | 12.7     | 7                       | 3   | 6 | 407                     | 00                     | 28  | 16.739 | 13.5                    | 23 | 13 | 4 |
| 367        | 00       | 27 | 59.983 | 59       | 47 | 47.87 | 13.1     | 6                       | 3   | 2 | 408                     | 00                     | 28  | 17.354 | 13.0                    | 8  | 3  | 8 |
| 368        | 00       | 28 | 00.091 | 60       | 14 | 53.21 | 12.9     | 7                       | 4   | 6 | 409                     | 00                     | 28  | 17.682 | 13.4                    | 23 | 16 | 2 |
| 369        | 00       | 28 | 00.376 | 59       | 50 | 56.28 | 13.2     | 10                      | 6   | 4 | 410                     | 00                     | 28  | 19.454 | 12.2                    | 10 | 9  | 4 |
| 370        | 00       | 28 | 00.979 | 60       | 30 | 57.44 | 12.2     | 12                      | 8   | 4 | 411                     | 00                     | 28  | 20.103 | 12.6                    | 7  | 5  | 8 |
| 371        | 00       | 28 | 01.690 | 59       | 57 | 33.86 | 13.0     | 6                       | 4   | 8 | 412                     | 00                     | 28  | 20.903 | 13.0                    | 6  | 5  | 8 |

TABLE 1 (CONTINUED)

| No.<br>(1) | $\alpha$ |    |        | $\delta$ |    |       | V<br>(4) | rms $\alpha$<br>0.0001s |     | rms $\delta$<br>0.001'' | No. of<br>images |     | V<br>(4) | rms $\alpha$<br>0.0001s |     | rms $\delta$<br>0.001'' | No. of<br>images |  |
|------------|----------|----|--------|----------|----|-------|----------|-------------------------|-----|-------------------------|------------------|-----|----------|-------------------------|-----|-------------------------|------------------|--|
|            | h        | m  | s      | °        | '  | ''    |          | (5)                     | (6) |                         | (7)              | (5) |          | (6)                     | (7) |                         |                  |  |
| 413        | 00       | 28 | 21.187 | 59       | 57 | 22.87 | 13.7     | 32                      | 20  |                         | 2                |     | 12.9     | 7                       | 4   |                         | 8                |  |
| 414        | 00       | 28 | 22.396 | 60       | 17 | 56.44 | 12.5     | 6                       | 4   |                         | 8                |     | 11.4     | 8                       | 9   |                         | 6                |  |
| 415        | 00       | 28 | 25.886 | 59       | 59 | 58.63 | 13.2     | 8                       | 9   |                         | 8                |     | 12.7     | 7                       | 3   |                         | 8                |  |
| 416        | 00       | 28 | 26.058 | 59       | 53 | 25.26 | 13.1     | 24                      | 16  |                         | 2                |     | 12.9     | 7                       | 6   |                         | 8                |  |
| 417        | 00       | 28 | 26.159 | 60       | 21 | 40.78 | 13.2     | 10                      | 7   |                         | 6                |     | 10.0     | 9                       | 8   |                         | 8                |  |
| 418        | 00       | 28 | 26.469 | 60       | 07 | 21.46 | 12.3     | 5                       | 4   |                         | 8                |     | 13.3     | 14                      | 5   |                         | 4                |  |
| 419        | 00       | 28 | 26.550 | 60       | 24 | 14.74 | 13.5     | 6                       | 7   |                         | 2                |     | 13.9     | 11                      | 21  |                         | 4                |  |
| 420        | 00       | 28 | 27.203 | 60       | 14 | 15.11 | 13.3     | 10                      | 3   |                         | 4                |     | 13.6     | 7                       | 14  |                         | 2                |  |
| 421        | 00       | 28 | 27.798 | 59       | 46 | 30.21 | 13.2     | 8                       | 1   |                         | 2                |     | 12.8     | 7                       | 5   |                         | 8                |  |
| 422        | 00       | 28 | 29.558 | 60       | 31 | 31.73 | 12.4     | 3                       | 7   |                         | 4                |     | 13.0     | 8                       | 6   |                         | 8                |  |
| 423        | 00       | 28 | 30.322 | 60       | 07 | 58.74 | 13.2     | 19                      | 4   |                         | 2                |     | 13.2     | 6                       | 4   |                         | 6                |  |
| 424        | 00       | 28 | 30.647 | 60       | 08 | 32.37 | 13.3     | 24                      | 4   |                         | 2                |     | 10.9     | 8                       | 7   |                         | 8                |  |
| 425        | 00       | 28 | 30.731 | 59       | 54 | 21.48 | 12.5     | 6                       | 3   |                         | 8                |     | 12.4     | 3                       | 3   |                         | 8                |  |
| 426        | 00       | 28 | 32.698 | 59       | 57 | 52.80 | 13.3     | 9                       | 5   |                         | 8                |     | 13.2     | 9                       | 5   |                         | 8                |  |
| 427        | 00       | 28 | 33.579 | 60       | 04 | 55.81 | 13.5     | 30                      | 5   |                         | 2                |     | 13.4     | 5                       | 6   |                         | 2                |  |
| 428        | 00       | 28 | 34.027 | 60       | 29 | 58.13 | 10.6     | 16                      | 6   |                         | 4                |     | 10.8     | 6                       | 12  |                         | 8                |  |
| 429        | 00       | 28 | 34.040 | 60       | 24 | 43.77 | 11.7     | 10                      | 12  |                         | 6                |     | 13.6     | 39                      | 8   |                         | 2                |  |
| 430        | 00       | 28 | 34.260 | 59       | 54 | 09.43 | 13.3     | 13                      | 7   |                         | 8                |     | 13.1     | 9                       | 3   |                         | 8                |  |
| 431        | 00       | 28 | 34.381 | 60       | 02 | 25.66 | 13.4     | 25                      | 2   |                         | 2                |     | 12.1     | 5                       | 3   |                         | 8                |  |
| 432        | 00       | 28 | 36.161 | 60       | 04 | 06.87 | 13.3     | 14                      | 6   |                         | 2                |     | 12.8     | 5                       | 6   |                         | 8                |  |
| 433        | 00       | 28 | 36.484 | 59       | 58 | 46.62 | 8.1      | 8                       | 8   |                         | 8                |     | 13.4     | 4                       | 3   |                         | 2                |  |
| 434        | 00       | 28 | 37.348 | 59       | 58 | 35.10 | 13.2     | 8                       | 5   |                         | 8                |     | 13.3     | 24                      | 10  |                         | 2                |  |
| 435        | 00       | 28 | 38.625 | 60       | 04 | 34.28 | 12.5     | 5                       | 5   |                         | 8                |     | 13.5     | 9                       | 15  |                         | 2                |  |
| 436        | 00       | 28 | 38.995 | 59       | 56 | 07.62 | 13.1     | 6                       | 4   |                         | 8                |     | 13.3     | 6                       | 6   |                         | 8                |  |
| 437        | 00       | 28 | 39.118 | 60       | 05 | 38.63 | 13.5     | 25                      | 1   |                         | 2                |     | 12.7     | 11                      | 2   |                         | 4                |  |
| 438        | 00       | 28 | 39.329 | 60       | 32 | 31.73 | 13.3     | 11                      | 0   |                         | 4                |     | 13.4     | 20                      | 9   |                         | 2                |  |
| 439        | 00       | 28 | 42.174 | 59       | 57 | 18.84 | 12.6     | 7                       | 3   |                         | 8                |     | 13.0     | 19                      | 4   |                         | 4                |  |
| 440        | 00       | 28 | 42.506 | 59       | 53 | 47.10 | 9.1      | 16                      | 4   |                         | 8                |     | 13.4     | 11                      | 4   |                         | 6                |  |
| 441        | 00       | 28 | 44.110 | 59       | 47 | 46.40 | 8.5      | 17                      | 8   |                         | 2                |     | 12.1     | 5                       | 3   |                         | 8                |  |
| 442        | 00       | 28 | 44.262 | 60       | 14 | 54.41 | 11.4     | 5                       | 6   |                         | 6                |     | 13.4     | 15                      | 6   |                         | 4                |  |
| 443        | 00       | 28 | 46.032 | 60       | 09 | 19.26 | 13.1     | 9                       | 9   |                         | 8                |     | 13.1     | 11                      | 6   |                         | 4                |  |
| 444        | 00       | 28 | 46.351 | 60       | 32 | 54.58 | 13.0     | 10                      | 6   |                         | 4                |     | 13.4     | 13                      | 18  |                         | 2                |  |
| 445        | 00       | 28 | 46.371 | 60       | 14 | 20.82 | 12.9     | 5                       | 7   |                         | 4                |     | 12.2     | 7                       | 4   |                         | 8                |  |
| 446        | 00       | 28 | 47.217 | 60       | 10 | 36.48 | 12.9     | 10                      | 10  |                         | 8                |     | 13.1     | 9                       | 1   |                         | 2                |  |
| 447        | 00       | 28 | 48.621 | 60       | 10 | 08.82 | 12.8     | 6                       | 2   |                         | 8                |     | 13.3     | 14                      | 10  |                         | 4                |  |
| 448        | 00       | 28 | 49.188 | 60       | 06 | 12.57 | 13.2     | 5                       | 4   |                         | 8                |     | 11.8     | 11                      | 11  |                         | 6                |  |
| 449        | 00       | 28 | 49.269 | 59       | 58 | 46.40 | 7.7      | 20                      | 5   |                         | 8                |     | 13.6     | 16                      | 1   |                         | 2                |  |
| 450        | 00       | 28 | 50.278 | 59       | 48 | 01.80 | 12.3     | 18                      | 6   |                         | 4                |     | 12.7     | 5                       | 4   |                         | 8                |  |
| 451        | 00       | 28 | 51.215 | 59       | 57 | 12.90 | 13.2     | 6                       | 7   |                         | 6                |     | 11.1     | 10                      | 7   |                         | 6                |  |
| 452        | 00       | 28 | 52.232 | 59       | 54 | 28.59 | 13.2     | 4                       | 5   |                         | 8                |     | 13.5     | 20                      | 14  |                         | 2                |  |
| 453        | 00       | 28 | 52.375 | 60       | 06 | 33.29 | 13.1     | 10                      | 4   |                         | 8                |     | 13.0     | 9                       | 4   |                         | 6                |  |

TABLE 1 (CONTINUED)

| No.<br>(1) | $\alpha$ |    |        | $\delta$ |    |       | V<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) | No. (1) | $\alpha$ |    |        | $\delta$ |    |       | V<br>(4) | rms $\alpha$<br>0.0001s<br>(5) | rms $\delta$<br>0.001''<br>(6) | No. of<br>images<br>(7) |
|------------|----------|----|--------|----------|----|-------|----------|--------------------------------|--------------------------------|-------------------------|---------|----------|----|--------|----------|----|-------|----------|--------------------------------|--------------------------------|-------------------------|
|            | h        | m  | s      | °        | '  | ''    |          |                                |                                |                         |         | h        | m  | s      | °        | '  | ''    |          |                                |                                |                         |
| 495        | 00       | 29 | 19.063 | 60       | 23 | 06.06 | 12.7     | 10                             | 7                              | 6                       | 516     | 00       | 29 | 37.197 | 60       | 05 | 14.97 | 13.5     | 13                             | 13                             | 2                       |
| 496        | 00       | 29 | 20.848 | 60       | 32 | 26.19 | 12.8     | 8                              | 8                              | 4                       | 517     | 00       | 29 | 37.547 | 59       | 46 | 28.66 | 13.4     | 9                              | 10                             | 2                       |
| 497        | 00       | 29 | 22.297 | 60       | 16 | 28.05 | 13.5     | 9                              | 21                             | 2                       | 518     | 00       | 29 | 38.507 | 60       | 14 | 58.27 | 13.4     | 10                             | 16                             | 4                       |
| 498        | 00       | 29 | 22.502 | 60       | 24 | 41.46 | 13.6     | 0                              | 10                             | 2                       | 519     | 00       | 29 | 40.914 | 60       | 19 | 57.35 | 13.4     | 9                              | 8                              | 6                       |
| 499        | 00       | 29 | 25.049 | 60       | 07 | 22.93 | 12.4     | 8                              | 4                              | 8                       | 520     | 00       | 29 | 41.637 | 60       | 03 | 47.53 | 13.3     | 12                             | 6                              | 4                       |
| 500        | 00       | 29 | 26.137 | 60       | 28 | 57.23 | 13.6     | 20                             | 13                             | 2                       | 521     | 00       | 29 | 42.923 | 59       | 48 | 34.81 | 13.4     | 25                             | 6                              | 2                       |
| 501        | 00       | 29 | 26.559 | 60       | 00 | 27.13 | 13.4     | 2                              | 0                              | 2                       | 522     | 00       | 29 | 43.189 | 60       | 07 | 52.88 | 13.1     | 8                              | 11                             | 6                       |
| 502        | 00       | 29 | 26.652 | 60       | 15 | 57.62 | 13.1     | 7                              | 11                             | 4                       | 523     | 00       | 29 | 43.504 | 60       | 18 | 42.10 | 12.5     | 6                              | 4                              | 8                       |
| 503        | 00       | 29 | 27.558 | 60       | 09 | 57.74 | 11.6     | 5                              | 3                              | 8                       | 524     | 00       | 29 | 43.954 | 60       | 00 | 42.98 | 13.2     | 7                              | 11                             | 8                       |
| 504        | 00       | 29 | 28.046 | 60       | 28 | 50.52 | 12.8     | 8                              | 3                              | 4                       | 525     | 00       | 29 | 46.720 | 60       | 24 | 47.06 | 11.5     | 11                             | 18                             | 6                       |
| 505        | 00       | 29 | 30.853 | 60       | 01 | 03.79 | 13.3     | 13                             | 4                              | 2                       | 526     | 00       | 29 | 47.377 | 59       | 51 | 21.35 | 13.3     | 2                              | 9                              | 2                       |
| 506        | 00       | 29 | 32.009 | 59       | 49 | 29.85 | 12.9     | 4                              | 3                              | 4                       | 527     | 00       | 29 | 48.487 | 60       | 20 | 08.01 | 11.1     | 7                              | 6                              | 8                       |
| 507        | 00       | 29 | 32.025 | 60       | 09 | 29.29 | 12.9     | 6                              | 3                              | 8                       | 528     | 00       | 29 | 49.458 | 60       | 02 | 03.14 | 13.2     | 7                              | 6                              | 8                       |
| 508        | 00       | 29 | 32.655 | 59       | 48 | 08.03 | 13.0     | 2                              | 11                             | 2                       | 529     | 00       | 29 | 49.993 | 59       | 50 | 40.90 | 13.6     | 6                              | 0                              | 2                       |
| 509        | 00       | 29 | 33.470 | 60       | 24 | 00.02 | 12.5     | 9                              | 12                             | 6                       | 530     | 00       | 29 | 50.566 | 60       | 15 | 52.46 | 13.3     | 5                              | 3                              | 6                       |
| 510        | 00       | 29 | 33.588 | 59       | 52 | 07.53 | 12.3     | 4                              | 6                              | 6                       | 531     | 00       | 29 | 51.472 | 60       | 22 | 25.18 | 13.1     | 20                             | 5                              | 6                       |
| 511        | 00       | 29 | 34.370 | 60       | 10 | 38.64 | 13.5     | 13                             | 3                              | 4                       | 532     | 00       | 29 | 51.983 | 60       | 04 | 13.10 | 13.1     | 9                              | 8                              | 6                       |
| 512        | 00       | 29 | 34.873 | 60       | 05 | 10.34 | 13.5     | 17                             | 28                             | 2                       | 533     | 00       | 29 | 53.702 | 60       | 24 | 33.65 | 13.5     | 11                             | 15                             | 5                       |
| 513        | 00       | 29 | 34.972 | 60       | 06 | 41.15 | 13.5     | 14                             | 5                              | 2                       | 534     | 00       | 29 | 54.079 | 60       | 04 | 03.61 | 13.2     | 19                             | 10                             | 4                       |
| 514        | 00       | 29 | 34.973 | 60       | 02 | 19.16 | 10.5     | 27                             | 2                              | 2                       | 535     | 00       | 29 | 55.368 | 59       | 47 | 20.26 | 13.0     | 4                              | 10                             | 2                       |
| 515        | 00       | 29 | 35.211 | 60       | 05 | 12.09 | 13.6     | 15                             | 21                             | 2                       | 536     | 00       | 30 | 00.998 | 60       | 04 | 03.48 | 12.8     | 31                             | 24                             | 2                       |
|            |          |    |        |          |    |       |          |                                |                                |                         | 537     | 00       | 30 | 02.761 | 60       | 05 | 36.61 | 13.1     | 11                             | 7                              | 4                       |



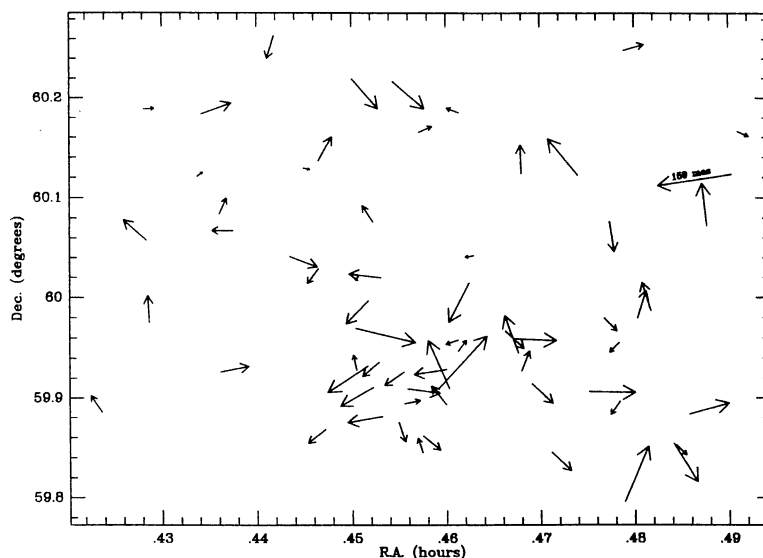


Fig. 1. Position residuals of the data given by De Vegt with respect to our final catalog.

as reference system. The epoch of these positions is 1977.11. Proper motions were derived by deVegt (1983), using the positions derived from the respective coordinates of the Astrographic Catalogue with a mean epoch of 1906.28. The final coordinates derived from our plates are listed in Table 1, together with their respective mean errors. The description is as follows: col. (1) running number; cols. (2) and (3), R.A. and declination equinox 1950.0, epoch 1981.70; col. (4) average visual magnitude; col. (5) mean error in R.A. in units of 0.0001 seconds of time; col. (6) mean error in declination, in units of 0.001 seconds of arcs; col. (7) number of measured images.

#### 4. RECOVERY OF OTHER EPOCHS

The epoch of the positions given by deVegt is too close to our epoch to permit the derivation of proper motions. However, from the positions and proper motions given by deVegt the positions of his first epoch, namely that of the plates of the Astrographic Catalogue, could readily be recovered. In this form we obtained two additional epochs for a total of 65 stars and positions only (1977.11) for an additional 15 stars.

Another source of positions is a paper published by Lenham & Franz in 1961. It gives rectangular coordinates X and Y as well as proper motions for the equinox and epoch 1950.0 for 70 stars. These data were derived from two plate pairs taken with the Yerkes refractor, one with the mean epoch 1916.78, the other with the mean epoch 1958.84. With the above data, rectangular coordinates could then be derived for the two mentioned epochs. These were then reduced with the same method that was applied

to our plates, using again the data by deVegt as reference system. A study of the residuals with arrow diagrams made it clear that there was no need to include second order or magnitude dependent terms in the reductions. An example of such arrow diagrams is shown in Figure 1.

For 14 of the stars measured by us, positions and proper motions are found in the AGK3 catalogue. From it, two additional epochs, namely 1929.81 and 1956.84, could be recovered for these stars.

The entire set of epochs is listed in Table 2.

#### 5. THE PROPER MOTIONS

Proper motions could be calculated for every star with more than one position. An improved position for the epoch 1981.70 could be calculated also, for

TABLE 2

##### COMPLETE SET OF EPOCHS

| Source                    | Epoch   | Weight |
|---------------------------|---------|--------|
| Astrographic Catalogue    | 1906.28 | 1.0    |
| Lenham & Franz, 1st epoch | 1916.78 | 1.0    |
| AGK2                      | 1929.81 | 0.3    |
| AGK3                      | 1956.84 | 0.3    |
| Lenham & Franz, 2nd epoch | 1958.84 | 0.7    |
| deVegt                    | 1977.11 | 1.0    |
| this paper                | 1981.70 | 1.0    |

all stars with more than two positions. In a first approach average residuals were derived for each of the seven sources. From these, weights were derived for each of the sources, and subsequently new positions and proper motions were derived applying these weights. The latter are listed in Table 2.

In Table 3, we present the final positions. The description is as follows: col. (1) number; col. (2) R.A. equinox 1950.0, epoch 1981.70; col. (3) rms error in R.A. in seconds of time; col. (4) declination equinox 1950.0, epoch 1981.70; col. (5) rms error in declina-

tion in seconds of arc; cols. (6)–(7) proper motion in R.A. and respective rms error in units of 0.001 seconds of arc per year; cols. (8)–(9): proper motion in declination and respective rms error in units of 0.001 seconds of arc per year; col. (10) total weight; col. (11) number of epochs that had contributed to the final positions.

Figure 2 shows the point diagram of the proper motions with their respective error bars in mas y<sup>-1</sup> in both coordinates. The diagram is restricted to the range ± 22 mas y<sup>-1</sup> in right ascension and

TABLE 3  
POSITIONS AND PROPER MOTIONS

| No.<br>(1) | $\alpha$ |    |         | rms $\alpha$<br>s | $\delta$ |    |        | rms $\delta$<br>" | $\mu_\alpha$<br>mas y <sup>-1</sup> | rms $\mu_\alpha$<br>mas y <sup>-1</sup> | $\mu_\delta$<br>mas y <sup>-1</sup> | rms $\mu_\delta$<br>mas y <sup>-1</sup> | Total<br>weight<br>(10) | No. of<br>Epochs<br>(11) |
|------------|----------|----|---------|-------------------|----------|----|--------|-------------------|-------------------------------------|-----------------------------------------|-------------------------------------|-----------------------------------------|-------------------------|--------------------------|
|            | h        | m  | s       |                   | °        | '  | "      |                   |                                     |                                         |                                     |                                         |                         |                          |
|            | (2)      |    |         | (3)               | (4)      |    |        | (5)               | (6)                                 | (7)                                     | (8)                                 | (9)                                     |                         |                          |
| 9          | 0        | 24 | 14.7825 | 0.0021            | 60       | 07 | 32.566 | 0.094             | 151.3                               | 0.6                                     | 117.4                               | 3.8                                     | 1.6                     | 3                        |
| 24         | 0        | 24 | 23.9170 | 0.0154            | 60       | 23 | 25.679 | 0.037             | 11.7                                | 4.6                                     | 0.8                                 | 1.5                                     | 1.6                     | 3                        |
| 59         | 0        | 24 | 57.2072 | 0.0048            | 59       | 45 | 08.007 | 0.128             | -7.2                                | 1.5                                     | -8.5                                | 5.1                                     | 1.6                     | 3                        |
| 69         | 0        | 25 | 06.2321 | 0.0076            | 60       | 16 | 54.762 | 0.148             | 7.0                                 | 2.3                                     | 0.4                                 | 5.9                                     | 1.6                     | 3                        |
| 70         | 0        | 25 | 07.0582 | 0.0009            | 60       | 20 | 55.904 | 0.063             | 0.5                                 | 0.3                                     | 1.6                                 | 2.5                                     | 1.6                     | 3                        |
| 92         | 0        | 25 | 25.4042 | 0.0085            | 59       | 53 | 07.262 | 0.081             | -0.1                                | 1.4                                     | 4.0                                 | 1.7                                     | 4.7                     | 5                        |
| 94         | 0        | 25 | 28.8554 | 0.0088            | 59       | 59 | 52.134 | 0.089             | 4.0                                 | 1.6                                     | 2.3                                 | 2.1                                     | 2.7                     | 3                        |
| 106        | 0        | 25 | 41.3262 | 0.0063            | 60       | 11 | 19.363 | 0.022             | -5.9                                | 1.0                                     | 7.8                                 | 0.5                                     | 4.7                     | 5                        |
| 108        | 0        | 25 | 42.1538 | 0.0039            | 60       | 03 | 28.233 | 0.046             | 1.0                                 | 0.8                                     | 3.2                                 | 1.3                                     | 3.7                     | 4                        |
| 111        | 0        | 25 | 43.2999 | 0.0057            | 59       | 58 | 30.654 | 0.037             | -1.0                                | 0.9                                     | 4.5                                 | 0.8                                     | 4.7                     | 5                        |
| 115        | 0        | 25 | 50.8660 | 0.0039            | 60       | 03 | 58.840 | 0.001             | -9.3                                | 0.7                                     | 4.8                                 | 0.0                                     | 2.7                     | 3                        |
| 123        | 0        | 25 | 55.8404 | 0.0096            | 60       | 19 | 48.029 | 0.041             | -13.3                               | 2.8                                     | -163                                | 1.6                                     | 1.6                     | 3                        |
| 128        | 0        | 26 | 01.4494 | 0.0019            | 60       | 07 | 16.303 | 0.023             | -2.5                                | 0.3                                     | 5.3                                 | 0.5                                     | 4.7                     | 5                        |
| 131        | 0        | 26 | 03.0789 | 0.0080            | 60       | 11 | 01.492 | 0.040             | 1.7                                 | 1.7                                     | 5.6                                 | 1.1                                     | 3.7                     | 4                        |
| 141        | 0        | 26 | 09.8616 | 0.0031            | 60       | 05 | 03.528 | 0.008             | -0.1                                | 0.5                                     | 7.3                                 | 0.2                                     | 4.7                     | 5                        |
| 142        | 0        | 26 | 10.2556 | 0.0053            | 59       | 55 | 33.660 | 0.071             | -3.1                                | 0.8                                     | 2.3                                 | 1.5                                     | 4.7                     | 5                        |
| 151        | 0        | 26 | 14.5400 | 0.0019            | 60       | 08 | 49.775 | 0.029             | 4.3                                 | 0.3                                     | 6.2                                 | 0.7                                     | 2.7                     | 3                        |
| 153        | 0        | 26 | 14.9827 | 0.0029            | 60       | 04 | 03.551 | 0.029             | -3.9                                | 0.5                                     | 5.6                                 | 0.6                                     | 4.7                     | 5                        |
| 159        | 0        | 26 | 16.6150 | 0.0039            | 60       | 09 | 55.373 | 0.101             | -9.3                                | 0.7                                     | -2.2                                | 2.5                                     | 2.7                     | 3                        |
| 169        | 0        | 26 | 24.7266 | 0.0050            | 59       | 55 | 37.601 | 0.097             | -2.2                                | 0.9                                     | -7.3                                | 2.4                                     | 2.7                     | 3                        |
| 178        | 0        | 26 | 30.6880 | 0.0049            | 60       | 15 | 46.505 | 0.045             | -2.7                                | 0.8                                     | 8.8                                 | 1.0                                     | 4.7                     | 5                        |
| 180        | 0        | 26 | 30.7844 | 0.0026            | 60       | 08 | 30.717 | 0.013             | -0.8                                | 0.5                                     | 5.7                                 | 0.3                                     | 2.7                     | 3                        |
| 190        | 0        | 26 | 33.9803 | 0.0071            | 59       | 52 | 14.368 | 0.023             | 59.6                                | 1.3                                     | 36.0                                | 0.6                                     | 2.7                     | 3                        |
| 195        | 0        | 26 | 36.5399 | 0.0067            | 60       | 02 | 29.143 | 0.030             | -9.8                                | 1.1                                     | 7.0                                 | 0.6                                     | 4.7                     | 5                        |
| 205        | 0        | 26 | 41.8742 | 0.0052            | 60       | 07 | 45.952 | 0.028             | -5.1                                | 0.8                                     | 5.4                                 | 0.6                                     | 4.7                     | 5                        |
| 210        | 0        | 26 | 44.9590 | 0.0039            | 60       | 04 | 18.252 | 0.042             | 54.5                                | 0.7                                     | -3.1                                | 1.0                                     | 2.7                     | 3                        |
| 211        | 0        | 26 | 45.1405 | 0.0029            | 60       | 04 | 00.595 | 0.010             | 5.8                                 | 0.5                                     | 10.4                                | 0.2                                     | 2.7                     | 3                        |
| 212        | 0        | 26 | 46.0358 | 0.0007            | 59       | 57 | 06.813 | 0.004             | -3.3                                | 0.1                                     | 2.4                                 | 0.1                                     | 4.7                     | 5                        |
| 214        | 0        | 26 | 47.4335 | 0.0058            | 60       | 01 | 43.638 | 0.013             | -2.7                                | 0.9                                     | 3.1                                 | 0.3                                     | 4.7                     | 5                        |
| 215        | 0        | 26 | 47.5464 | 0.0054            | 60       | 08 | 12.860 | 0.054             | -1.5                                | 0.9                                     | 8.3                                 | 1.2                                     | 4.7                     | 5                        |
| 224        | 0        | 26 | 49.8706 | 0.0064            | 59       | 52 | 05.998 | 0.042             | -0.5                                | 1.0                                     | 2.6                                 | 0.9                                     | 4.7                     | 5                        |
| 229        | 0        | 26 | 53.6505 | 0.0144            | 59       | 59 | 30.321 | 0.117             | -1.0                                | 2.6                                     | 10.3                                | 2.8                                     | 2.7                     | 3                        |
| 243        | 0        | 27 | 00.2265 | 0.0056            | 60       | 13 | 09.155 | 0.063             | -1.7                                | 0.9                                     | 6.6                                 | 1.3                                     | 4.7                     | 5                        |
| 248        | 0        | 27 | 01.7073 | 0.0040            | 59       | 58 | 10.079 | 0.127             | -4.4                                | 0.7                                     | 3.5                                 | 2.9                                     | 3.0                     | 3                        |
| 249        | 0        | 27 | 01.7659 | 0.0041            | 59       | 55 | 42.024 | 0.006             | -6.6                                | 0.7                                     | -0.5                                | 0.1                                     | 3.0                     | 3                        |
| 252        | 0        | 27 | 02.6197 | 0.0042            | 60       | 01 | 16.202 | 0.019             | -2.2                                | 0.7                                     | 4.5                                 | 0.4                                     | 4.7                     | 5                        |
| 256        | 0        | 27 | 04.3390 | ...               | 59       | 57 | 00.430 | ...               | -3.3                                | ...                                     | 6.5                                 | ...                                     | 4.7                     | 2                        |

TABLE 3 (CONTINUED)

| No.<br>(1) | $\alpha$ |    |         | rms $\alpha$<br>s<br>(3) | $\delta$ |    |        | rms $\delta$<br>" (5) | $\mu_\alpha$<br>mas y <sup>-1</sup> (6) | rms $\mu_\alpha$<br>mas y <sup>-1</sup> (7) | $\mu_\delta$<br>mas y <sup>-1</sup> (8) | rms $\mu_\delta$<br>mas y <sup>-1</sup> (9) | Total<br>weight (10) | No. of<br>Epochs (11) |
|------------|----------|----|---------|--------------------------|----------|----|--------|-----------------------|-----------------------------------------|---------------------------------------------|-----------------------------------------|---------------------------------------------|----------------------|-----------------------|
|            | h        | m  | s       |                          | °        | '  | "      |                       |                                         |                                             |                                         |                                             |                      |                       |
| 260        | 0        | 27 | 06.1275 | 0.0073                   | 59       | 55 | 55.278 | 0.046                 | -1.7                                    | 1.2                                         | 2.8                                     | 1.0                                         | 4.7                  | 5                     |
| 261        | 0        | 27 | 06.2475 | 0.0041                   | 59       | 59 | 48.511 | 0.038                 | -3.3                                    | 0.7                                         | 0.8                                     | 0.8                                         | 4.7                  | 5                     |
| 264        | 0        | 27 | 06.6310 | ...                      | 59       | 53 | 56.570 | ...                   | 8.2                                     | ...                                         | 2.2                                     | ...                                         | 4.7                  | 2                     |
| 267        | 0        | 27 | 08.1271 | 0.0042                   | 59       | 54 | 37.638 | 0.056                 | -3.6                                    | 0.7                                         | 1.7                                     | 1.2                                         | 4.7                  | 5                     |
| 268        | 0        | 27 | 08.1712 | 0.0056                   | 60       | 04 | 34.992 | 0.015                 | -2.1                                    | 0.9                                         | 4.3                                     | 0.3                                         | 4.7                  | 5                     |
| 271        | 0        | 27 | 10.3759 | 0.0069                   | 59       | 56 | 09.153 | 0.045                 | -5.1                                    | 1.1                                         | 1.6                                     | 1.0                                         | 5.3                  | 7                     |
| 274        | 0        | 27 | 11.0902 | 0.0052                   | 60       | 01 | 11.288 | 0.035                 | -9.4                                    | 0.8                                         | 2.1                                     | 0.7                                         | 4.7                  | 5                     |
| 275        | 0        | 27 | 11.5286 | 0.0024                   | 59       | 52 | 51.439 | 0.038                 | 1.5                                     | 0.4                                         | -1.1                                    | 0.8                                         | 4.7                  | 5                     |
| 279        | 0        | 27 | 15.7046 | 0.0062                   | 60       | 13 | 00.149 | 0.035                 | -2.1                                    | 1.0                                         | 8.1                                     | 0.7                                         | 4.7                  | 5                     |
| 282        | 0        | 27 | 17.7750 | 0.0052                   | 59       | 52 | 30.240 | 0.056                 | -2.3                                    | 0.8                                         | 0.9                                     | 1.2                                         | 5.3                  | 7                     |
| 283        | 0        | 27 | 18.3190 | ...                      | 59       | 51 | 33.090 | ...                   | 0.0                                     | ...                                         | 8.7                                     | ...                                         | 5.3                  | 2                     |
| 285        | 0        | 27 | 18.6710 | ...                      | 59       | 51 | 06.620 | ...                   | -23.0                                   | ...                                         | 32.7                                    | ...                                         | 5.3                  | 2                     |
| 288        | 0        | 27 | 19.8092 | 0.0030                   | 59       | 55 | 33.738 | 0.030                 | -4.3                                    | 0.5                                         | 1.5                                     | 0.6                                         | 4.7                  | 5                     |
| 290        | 0        | 27 | 20.0179 | 0.0010                   | 59       | 53 | 39.001 | 0.033                 | -3.5                                    | 0.2                                         | 3.2                                     | 0.8                                         | 3.0                  | 3                     |
| 293        | 0        | 27 | 21.2238 | 0.0012                   | 59       | 54 | 33.074 | 0.069                 | -3.9                                    | 0.2                                         | 0.7                                     | 1.6                                         | 3.0                  | 3                     |
| 295        | 0        | 27 | 21.4692 | 0.0003                   | 59       | 49 | 56.986 | 0.006                 | -2.5                                    | 0.0                                         | 0.5                                     | 0.1                                         | 3.0                  | 3                     |
| 304        | 0        | 27 | 25.7993 | 0.0037                   | 60       | 09 | 56.179 | 0.040                 | -1.8                                    | 0.6                                         | 10.1                                    | 0.8                                         | 4.7                  | 5                     |
| 307        | 0        | 27 | 26.8107 | 0.0040                   | 59       | 50 | 41.980 | 0.010                 | -0.4                                    | 0.7                                         | 4.4                                     | 0.2                                         | 3.0                  | 3                     |
| 308        | 0        | 27 | 26.9528 | 0.0032                   | 59       | 51 | 41.905 | 0.021                 | -1.9                                    | 0.5                                         | 2.7                                     | 0.4                                         | 4.7                  | 5                     |
| 316        | 0        | 27 | 33.0595 | 0.0121                   | 59       | 54 | 34.508 | 0.059                 | 176.0                                   | 2.0                                         | 92.2                                    | 1.3                                         | 5.3                  | 7                     |
| 321        | 0        | 27 | 34.9760 | ...                      | 59       | 57 | 06.050 | ...                   | -14.7                                   | ...                                         | 19.6                                    | ...                                         | 5.3                  | 2                     |
| 322        | 0        | 27 | 35.9680 | 0.0059                   | 59       | 55 | 43.280 | 0.043                 | -2.3                                    | 1.0                                         | 2.4                                     | 0.9                                         | 4.7                  | 5                     |
| 323        | 0        | 27 | 36.0523 | 0.0037                   | 59       | 53 | 35.542 | 0.022                 | -2.3                                    | 0.6                                         | 2.3                                     | 0.5                                         | 4.7                  | 5                     |
| 325        | 0        | 27 | 37.0988 | 0.0136                   | 59       | 54 | 34.368 | 0.045                 | -2.7                                    | 2.3                                         | 5.0                                     | 1.0                                         | 3.0                  | 3                     |
| 327        | 0        | 27 | 38.9210 | ...                      | 59       | 54 | 57.660 | ...                   | -13.1                                   | ...                                         | -4.4                                    | ...                                         | 3.0                  | 2                     |
| 329        | 0        | 27 | 40.4786 | 0.0023                   | 59       | 57 | 29.268 | 0.015                 | -2.6                                    | 0.4                                         | 2.6                                     | 0.3                                         | 4.7                  | 5                     |
| 330        | 0        | 27 | 40.5478 | 0.0045                   | 59       | 56 | 48.996 | 0.045                 | -3.3                                    | 0.7                                         | 3.1                                     | 1.0                                         | 4.7                  | 5                     |
| 331        | 0        | 27 | 41.0535 | 0.0033                   | 60       | 11 | 07.622 | 0.085                 | -3.7                                    | 0.5                                         | 7.9                                     | 1.8                                         | 4.7                  | 5                     |
| 336        | 0        | 27 | 42.4290 | ...                      | 59       | 54 | 17.790 | ...                   | -21.3                                   | ...                                         | 6.5                                     | ...                                         | 4.7                  | 2                     |
| 343        | 0        | 27 | 44.8353 | 0.0095                   | 60       | 00 | 53.865 | 0.026                 | 26.3                                    | 1.5                                         | 0.1                                     | 0.5                                         | 4.7                  | 5                     |
| 345        | 0        | 27 | 46.5228 | 0.0067                   | 60       | 02 | 32.996 | 0.022                 | -1.0                                    | 1.1                                         | 4.0                                     | 0.5                                         | 4.7                  | 5                     |
| 366        | 0        | 27 | 58.6893 | 0.0050                   | 59       | 58 | 02.117 | 0.040                 | -1.1                                    | 0.9                                         | 3.6                                     | 0.9                                         | 3.0                  | 3                     |
| 371        | 0        | 28 | 01.6895 | 0.0005                   | 59       | 57 | 33.947 | 0.093                 | 0.0                                     | 0.1                                         | 6.5                                     | 2.1                                         | 3.0                  | 3                     |
| 377        | 0        | 28 | 03.4722 | 0.0015                   | 60       | 05 | 55.678 | 0.055                 | -27.0                                   | 0.3                                         | -2.6                                    | 1.3                                         | 2.7                  | 3                     |
| 378        | 0        | 28 | 03.5364 | 0.0068                   | 59       | 56 | 43.422 | 0.034                 | -0.2                                    | 1.1                                         | 2.8                                     | 0.7                                         | 4.7                  | 5                     |
| 381        | 0        | 28 | 04.7933 | 0.0056                   | 59       | 55 | 37.776 | 0.017                 | -0.2                                    | 1.0                                         | 2.9                                     | 0.4                                         | 3.0                  | 3                     |
| 383        | 0        | 28 | 04.9343 | 0.0046                   | 60       | 07 | 27.258 | 0.023                 | -2.7                                    | 0.7                                         | 5.6                                     | 0.5                                         | 4.7                  | 5                     |
| 393        | 0        | 28 | 08.8992 | 0.0040                   | 59       | 54 | 49.719 | 0.047                 | -3.8                                    | 0.6                                         | 2.8                                     | 1.0                                         | 4.7                  | 5                     |
| 398        | 0        | 28 | 10.9580 | ...                      | 59       | 55 | 15.250 | ...                   | 13.1                                    | ...                                         | -6.5                                    | ...                                         | 4.7                  | 2                     |
| 404        | 0        | 28 | 16.2760 | 0.0037                   | 59       | 50 | 43.396 | 0.035                 | 2.9                                     | 0.6                                         | 3.7                                     | 0.7                                         | 4.7                  | 5                     |
| 408        | 0        | 28 | 17.3540 | ...                      | 59       | 57 | 43.560 | ...                   | 1.6                                     | ...                                         | -8.7                                    | ...                                         | 4.7                  | 2                     |
| 418        | 0        | 28 | 26.4725 | 0.0060                   | 60       | 07 | 21.455 | 0.048                 | -0.2                                    | 1.0                                         | 6.8                                     | 1.0                                         | 4.7                  | 5                     |
| 425        | 0        | 28 | 30.7321 | 0.0028                   | 59       | 54 | 21.549 | 0.060                 | -3.6                                    | 0.5                                         | 1.7                                     | 1.3                                         | 4.7                  | 5                     |
| 433        | 0        | 28 | 36.4766 | 0.0062                   | 59       | 58 | 46.551 | 0.074                 | 3.5                                     | 1.0                                         | -4.6                                    | 1.6                                         | 5.3                  | 7                     |
| 434        | 0        | 28 | 37.3480 | ...                      | 59       | 58 | 35.100 | ...                   | 13.1                                    | ...                                         | -56.6                                   | ...                                         | 5.3                  | 2                     |
| 435        | 0        | 28 | 38.6215 | 0.0052                   | 60       | 04 | 34.280 | 0.039                 | -3.4                                    | 0.8                                         | 6.5                                     | 0.8                                         | 4.7                  | 5                     |
| 439        | 0        | 28 | 42.1709 | 0.0097                   | 59       | 57 | 18.785 | 0.100                 | -6.2                                    | 1.6                                         | 1.1                                     | 2.1                                         | 4.7                  | 5                     |
| 440        | 0        | 28 | 42.4957 | 0.0064                   | 59       | 53 | 46.995 | 0.078                 | -5.0                                    | 1.0                                         | 3.3                                     | 1.7                                         | 5.3                  | 7                     |
| 441        | 0        | 28 | 44.1271 | 0.0101                   | 59       | 47 | 46.416 | 0.044                 | 5.9                                     | 1.8                                         | 1.4                                     | 1.0                                         | 3.6                  | 5                     |
| 442        | 0        | 28 | 44.2597 | 0.0041                   | 60       | 14 | 54.439 | 0.049                 | 0.7                                     | 0.7                                         | 4.8                                     | 1.0                                         | 4.7                  | 5                     |
| 449        | 0        | 28 | 49.2703 | 0.0059                   | 59       | 58 | 46.331 | 0.049                 | 0.1                                     | 1.0                                         | 1.8                                     | 1.1                                         | 5.3                  | 7                     |

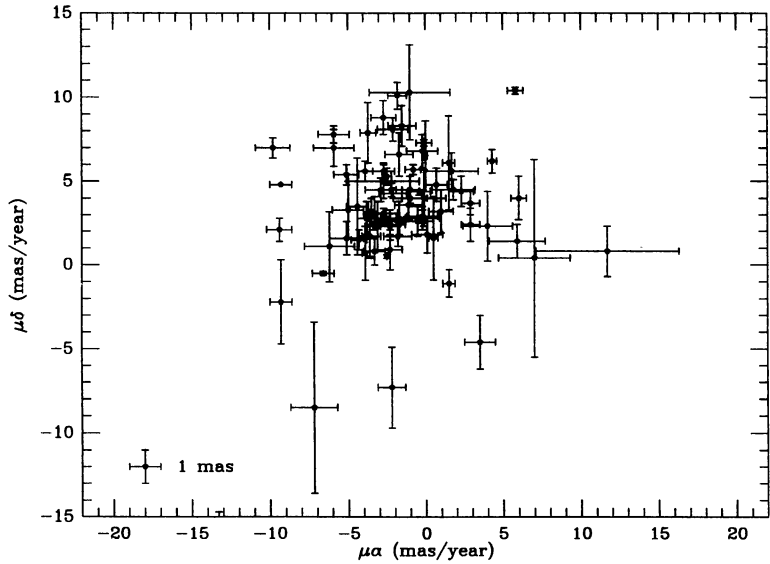


Fig. 2. Point diagram of proper motions for stars considered as probable members in this paper.

$\pm 15 \text{ mas y}^{-1}$  in declination. It becomes evident from the diagram that the scatter around a central value significantly exceeds the mean errors of the data, a fact which makes it difficult to assign membership probabilities to every point in the diagram as long as it is not clear how much of the scatter is due to internal motions. Schmidt (1980) derived membership probabilities for a number of stars in the area on the basis of a photometric study in the

Strömgren narrow-band system. A point diagram of proper motions restricted to the stars which are considered as probable members by Schmidt is shown in Figure 3. It is obviously desirable to extend the photometric study to more stars, and hence to more probable cluster members in order to verify the reality of the asymmetric appearance of the diagram. Recently Turner, Forbes, & Pedredos (1992) made a compilation of various photometric studies and de-

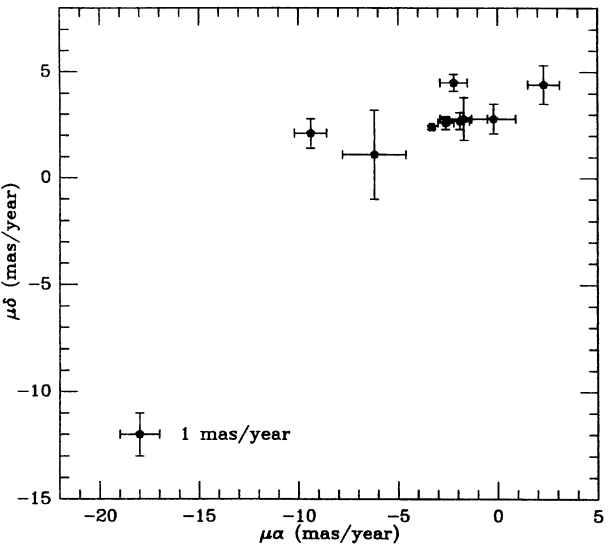


Fig. 3. Point diagram of proper motions for stars considered as probable members by Schmidt.

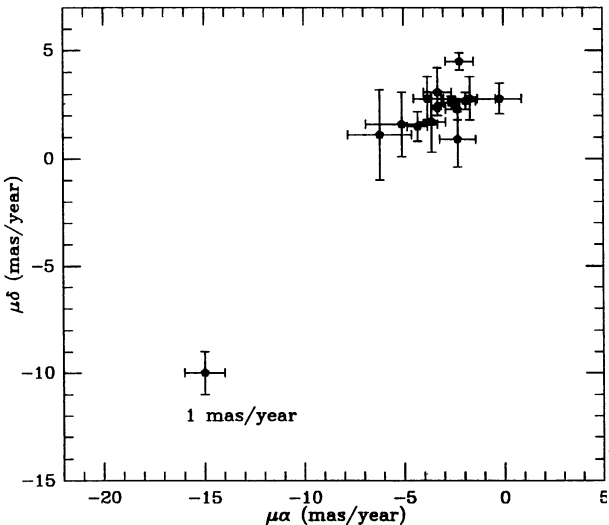


Fig. 4. Point diagram of proper motions for stars considered as probable members by Turner et al.

rived membership probabilities for a larger number of stars. The respective point diagram is shown in Figure 4. Radial velocities were observed by Kraft (1958) for eleven stars in the area. Of these he considered four stars as cluster members. For these we derived an internal dispersion of the radial velocities of  $5.0 \text{ km s}^{-1}$ . Using the average distance modulus of several authors of 11.0 magnitudes, we find that the internal motion of the cluster members in the direction of right ascension corresponds to  $10.9 \text{ km s}^{-1}$  and in declination to  $5.6 \text{ km s}^{-1}$ , based on members determined by Turner et al. (1992).

## 6. THE MAGNITUDES

Image diameters were estimated during the measuring process. These estimates were then transformed into visual magnitudes, using the photometric data given by Arp, Sandage, & Stephens (1959)

for the calibration. The averaged magnitudes are included in Table 1.

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Jeanette Stock: Facultad Experimental de Ciencias, Depto. de Física, Unidad Académica de Astrofísica, Apartado 15439, Maracaibo, Venezuela (jstock@ciens.luz.ve).

Jurgen Stock: Centro de Investigaciones de Astronomía, (CIDA), Apartado Postal 264, Mérida 5101-A, Venezuela.