

# Proper motions of Luyten Catalogue stars with declinations between $-5^\circ$ and $-30^\circ$ and right ascensions between 13h 30m and 24h\*

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**Abstract.** Proper motions, coordinates and finding charts are given for 166 Luyten Catalogue (LTT, Luyten 1957) stars re-discovered as a result of a search for high proper motion stars carried out in nineteen  $5^\circ \times 5^\circ$  areas, located between  $-5^\circ$  and  $-30^\circ$  in declination and between 13h 30m and 24h in right ascension. An estimated precision level between 8 and 19 mas/year was achieved for the proper motions. A comparison with the LTT data is presented.

**Key words:** astrometry — stars: kinematics

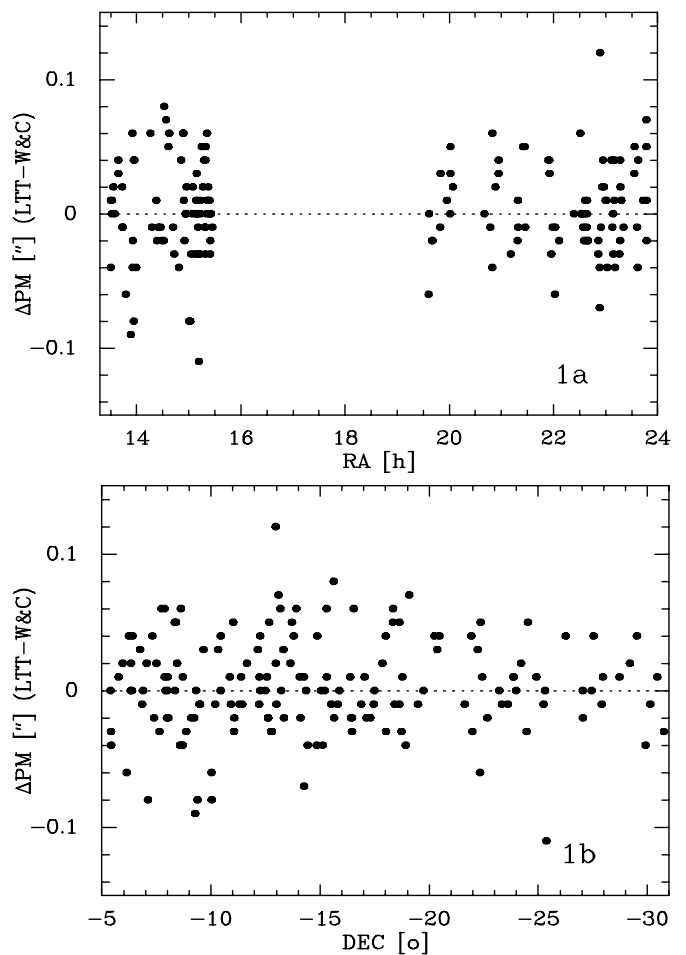
## 1. Introduction

This work is an appendix to the sixth part (Wroblewski & Costa 1999, hereafter W&C) of a program to identify high proper motion stars in the southern hemisphere being carried out with the flat-field 70/100/210 cm Maksutov Astrograph (field:  $5^\circ \times 5^\circ$ , scale:  $99.4''/\text{mm}$ ) at the Estación Astronómica de Cerro el Roble operated by the University of Chile. Here we present newly calculated proper motions, coordinates relative to the Hipparcos Catalogue (ESA 1997) and finding charts, for 166 LTT stars re-discovered as a result of the search for high proper motion stars carried out by W&C in nineteen  $5^\circ \times 5^\circ$  areas, located between  $-5^\circ$  and  $-30^\circ$  in declination and between 13h 30m and 24h in right ascension.

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\* Table 1 is only available in electronic form at the CDS, via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5), or via <http://cdsweb.u-strasbg.fr/Abstract.html>

Figure 3 will appear only in the on-line edition of the journal at <http://www.edpsciences.org>



**Fig. 1. a-b)** Differences in the sense LTT-W&C between our proper motions and those of Luyten, plotted as a function of the coordinates

The coordinates of the 19 area centers and the time base in years between the first and second epoch observations are given in Table 1 of W&C. Figure 1 of W&C shows the distribution of the searched areas in the sky.

We would like to point out that the present data for re-discovered LTT stars have been given in the form of an appendix to W&C solely for consistency with previous publications from this program (see e.g. Wroblewski & Torres 1998). In what follows of our survey, both the newly discovered fast moving stars and the re-discovered LTT stars in additional areas being explored (Wroblewski & Costa 2000, in preparation) will be published in a single paper.

## 2. Observations, reductions and errors

The observational and reduction procedure is described in detail in W&C.

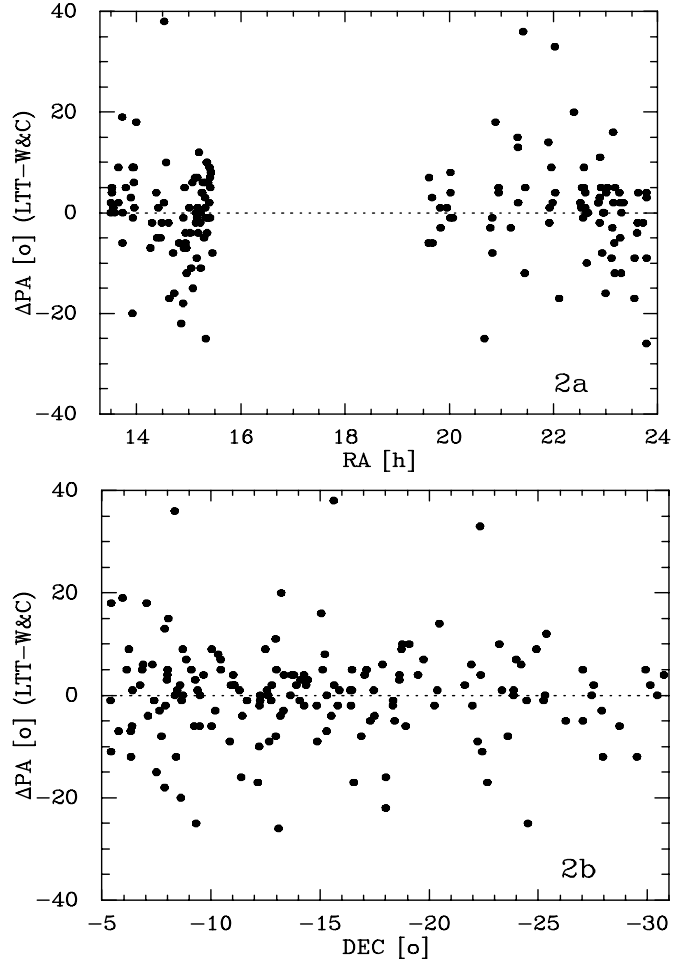
The total internal errors of the proper motions presented in Table 1 were obtained as explained in Sect. 4 of W&C. Precision levels between 8 and 19 mas/year were achieved for the proper motions. Although individual position errors were not determined, we estimate that these errors are in the range  $0.15''$  to  $0.25''$  (see W&C and references therein).

## 3. Results

The results are given in Table 1, only available in electronic form at the Centre de Données Astronomiques de Strasbourg (CDS). The content of the columns is:

- Column 1:* LTT number.
- Column 2:* Location number. The first two digits give our area number, and the remaining digits our star number.
- Column 3:* LTT photographic magnitude.
- Columns 4 and 5:* RA and Dec for J2000.0.
- Column 6:* Total annual proper motion for J2000.0.
- Column 7:* Total annual proper motion error.
- Column 8:* Position angle for J2000.0.
- Column 9:* Difference (Dpm) between our proper motion and that given by Luyten, in the sense LTT-W&C.
- Column 10:* Difference (Dpa) between our position angle and that given by Luyten, in the sense LTT-W&C.
- Column 11:* Remarks(Re).

Both the total annual proper motions and the position angles given in Table 1 are the average of two independent determinations, based on different first/second epoch plate pairs. Eight stars that are common to two overlapping areas have been identified with an (\*) in the Remarks column. The results given for them are therefore average values based on four first/second epoch pairs. The standard deviation of these latter averages provide the means



**Fig. 2. a-b)** Differences in the sense LTT-W&C between our position angles and those of Luyten, plotted as a function of the coordinates

to independently ascertain the errors of the positions and proper motions. The computed Sigmas varied between:  $0.13''$  and  $0.26''$  (positions), and between 0.010 and 0.030 arcsec/year (proper motions). Keeping in mind that these Sigmas are based on only four independent measures, it is interesting to note that they are consistent with the error estimates given in Table 1 for the proper motions, and also with the presumed errors of the positions quoted in Sect. 2.

As shown by Figs. 1 and 2, which are plots of the residuals Dpm and Dpa as a function of the coordinates, there is no clear evidence of systematic differences between our values of the proper motions and position angles and those given by Luyten. Highly discordant cases (see next section) were not included in the plots.

Finding charts for stars fainter than magnitude (LTT)  $\sim 10$  (136 objects) are presented in Fig. 3. They will appear only in the on-line edition of the journal. The charts were reproduced from digitized images extracted from the Digitized Sky Survey (DSS), produced by the Space Telescope Science Institute (STScI). Charts are

4.5 arcmin on a side. North is at the top, East to the left.

#### 4. Notes on individual objects

**LTT 5386** and **LTT 8787**: These stars show very small motions, not measurable with our plate material. For them Luyten gives proper motions of 0.28 and 0.21 arcsec/year, respectively.

**LTT 5804, 6025, 6163, 7852** and **8436**: We did not detect any motion for these stars. For them the LTT gives proper motions of 0.20, 0.23, 0.20, 0.23 and 0.34 arcsec/year, respectively. Of these, only the value for LTT 5804 is declared uncertain by Luyten.

**LTT 8757**: This object appears slightly elongated in our plates. It could be a binary system.

**LTT 8790**: Not visible in our plates. Luyten assigns a photographic magnitude of 13.7 to this star.

**LTT 9049**: This star has a very faint companion with which it could form a binary system.

**LTT 9133, 9134**: Bright close pair, not resolved in our plates. It could be a binary system.

**LTT 9230**: Close pair which seems to form a triple system with **LTT9229**.

**LTT 9453**: For this star we obtain a position angle which differs in more than  $200^\circ$  with that given by Luyten. Dpa for this object was left blank in Table 1.

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