

# Neglected Double Stars: First Measurement of Double Star SEI 1007 and Updating Measures to SEI 1006AB, SLE 964AC, and SEI 1011

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**Abstract:** The purpose of this study is to obtain updated measurements of the double star SEI 1007, discovered by J. Scheiner in 1896. Moreover, I updated the astrometric measurements of the double stars SEI 1006AB, SLE 964AC and SEI 1011. The data were controlled on Washington Double Star Catalog (General Catalog and “Neglected Doubles” section).

## Introduction

I used the Washington Double Star Catalog to identify an interesting double star and to perform some astrometric measurements: SEI 1007 (WDS 20127+3642SEI1007). This double star was seen for the first time by J. Scheiner in 1896.

Moreover, I checked the archives of “Journal of Double Star Observations” to see if this double star had recently been measured.

In the same field of the CCD camera, near SEI 1007, there are other double stars including two observed by Scheiner in 1896: SEI 1006AB and SEI 1011.

From the Washington Double Star Catalog, I saw that SEI 1006AB is a triple star. The third companion belongs to the system SLE 964AC with the component C (visual magnitude 13) discovered and measured in 1985.

The main interest of this study is to obtain precise astrometric measurements of SEI 1007 and to compare new measurements of Theta and Rho with the measures of 1896.

## Methods

With the collaboration of Lorenzo Preti on September 13, 2010 I obtained images of SEI 1007 and with processing, I have seen other double and multiple systems near SEI 1007.

I made some checks on Washington Double Star Catalog and on The Aladin Sky Atlas (NED, Simbad and DSS2.F.POSSII), and I identified the following systems: SEI 1006AB, SLE 964AC and SEI 1011.

In Figure 1, we see the reference field (The Aladin Sky Atlas) with the double stars identified, in the constellation Cygnus.

While in Figure 2, we see the field in the CCD camera with an exposure of about 10 seconds.

The telescope used was a Newton SkyWatcher 200/1000 on German equatorial mount EQ6 SkyScan and the optical train is composed of CCD camera MAGZERO MZ-5m and Barlow 2x Celestron Ultima.

In Figure 3, the secondary component of the system SLE 964AC has been carefully marked. The visual magnitude of this star is 13 and its position is more obvious with the image processing.

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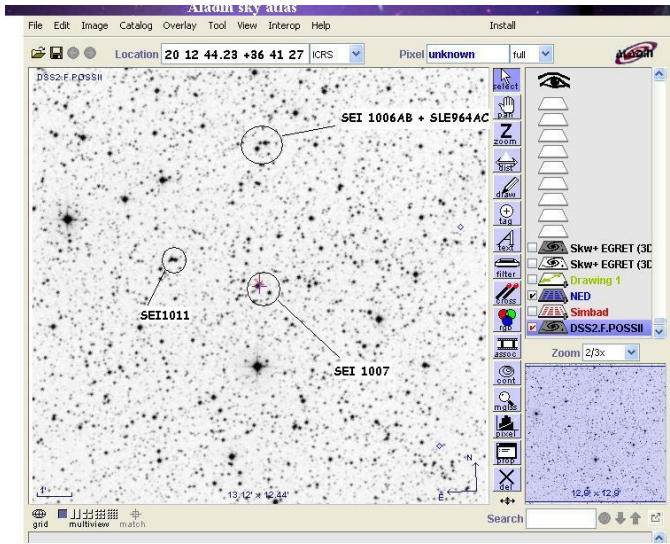


Figure 1: Reference field from the Aladin Sky Atlas.

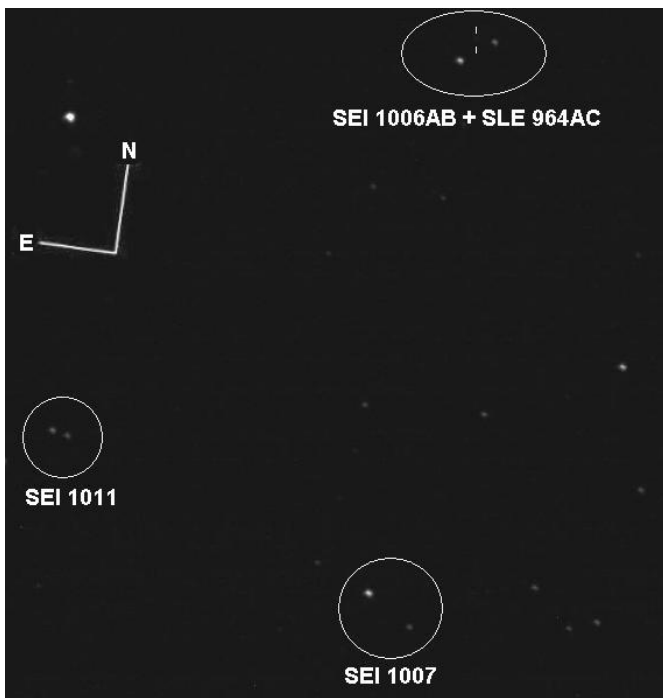


Figure 2: Field of the CCD camera.

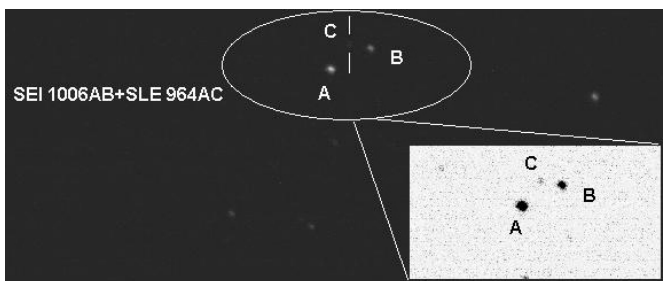


Figure 3: Detail of SEI 1006AB and SLE 964AC.

When I analyzed the data, I saw a difference in visual magnitude of the systems SEI 1006AB and SLE 964AC.

The latest measurements are in the WDS are dated 1999 and the Washington Double Star Catalog provides the following magnitudes:

SEI 1006AB:  $M_v1 = 12$ ;  $M_v2 = 12.8$   
 SLE 964AC:  $M_v1 = 12$ ;  $M_v2 = 14.7$

I compared the data with the The Aladin Sky Atlas (NED, Simbad and DSS2.F.POSSII) which list the magnitudes as:

SEI 1006AB:  $M_v1 = 9.8$ ;  $M_v2 = 10.5$   
 SLE 964AC:  $M_v1 = 9.8$ ;  $M_v2 = 13$ .

All these data are shown in Table 1.

**Measurements and Comparisons**

The astrometric measurements were performed using the software “Reduc” (V3.88e), courtesy of Florent Losse (<http://www.astrosurf.com/hfosaf/>).

For calibration of the stars I used an image of Albireo, obtained during the September 13 observing session. The measure of Theta and Rho, useful for calibration, was taken from the Washington Double Star Catalog.

As shown in Table 2, the measures Theta and Rho of the systems studied have not changed significantly over time. SEI 1007, topic of this study, has a slight change in the values of separation and position angle in 114 years.

**Conclusions**

From the astrometric measurements performed on SEI1007, the difference of Theta and Rho between 1896 and 2010 are  $0.56^\circ$  and  $0.496''$ , respectively. The position angle and separation, based on a mean of 15 measurements, are:

Teta:  $239.56^\circ$ ;  
 Rho:  $23.004''$ ;  
 DeltaM = 1,29.

No significant changes were noted (Theta and Rho) of systems SEI 1006AB , SLE 964AC and SEI1011.

**Acknowledgements**

I sincerely thank Florent Losse for the excellent software “Reduc”.

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**Table 1:** Table with astrometric measurements (WDS). (\*) = Exact values reported in The Aladin Sky Atlas.

Name	Coordinate (WDS)	Theta - Rho	Mv1 - Mv2
<b>SEI 1006AB</b> (WDS 20127+3645SEI1006AB)	20 12 43.53 +36 45 20.1	306 - 17.0	9.8* - 10.5*
<b>SLE 964AC</b> (WDS 20127+3645SEI964AC)	20 12 43.53 +36 45 20.1	331 - 11.5	9.8* - 13*
<b>SEI 1007</b> (WDS 20127+3642SEI1007)	20 12 44.23 +36 41 27.6	239 - 23.5	9.5 - 11.0
<b>SEI 1011</b> (WDS 20129+3642SEI1011)	20 12 56.25 +36 42 17.9	258 - 7.0	10.5 - 11.0

**Table 2:** Periodic astrometric measurements with data updated to September, 2010 (\*).

Name	Theta - Rho (1)	Theta - Rho (2)	Theta - Rho (3)
SEI 1006AB	307 - 17.1 (1896)	306 - 17.0 (1999)	307.12* - 17.124* (2010.701)
<b>SLE 964AC</b>	328 - 11.5 (1985)	331 - 11.5 (1999)	331.44* - 11.571* (2010.701)
<b>SEI 1007</b>	239 - 23,5 (1896)	239.56* - 23.004* (2010.701)	
<b>SEI 1011</b>	260 - 6.4 (1896)	258 - 7.0 (2006)	258.87* - 6.841* (2010.701)

This work was done thanks to The Aladin Sky Atlas, the Washington Double Star Catalog and consulting the archives of Journal of Double Star Observations.

Thanks to Lorenzo Preti for giving me the images and Adriano for advice.

### References

Brian D. Mason, Gary L. Wycoff, and William I. Hartkopf. Washington Double Star Catalog <http://ad.usno.navy.mil/wds/>

The Aladin Sky Atlas. <http://aladin.u-strasbg.fr/aladin.gml>