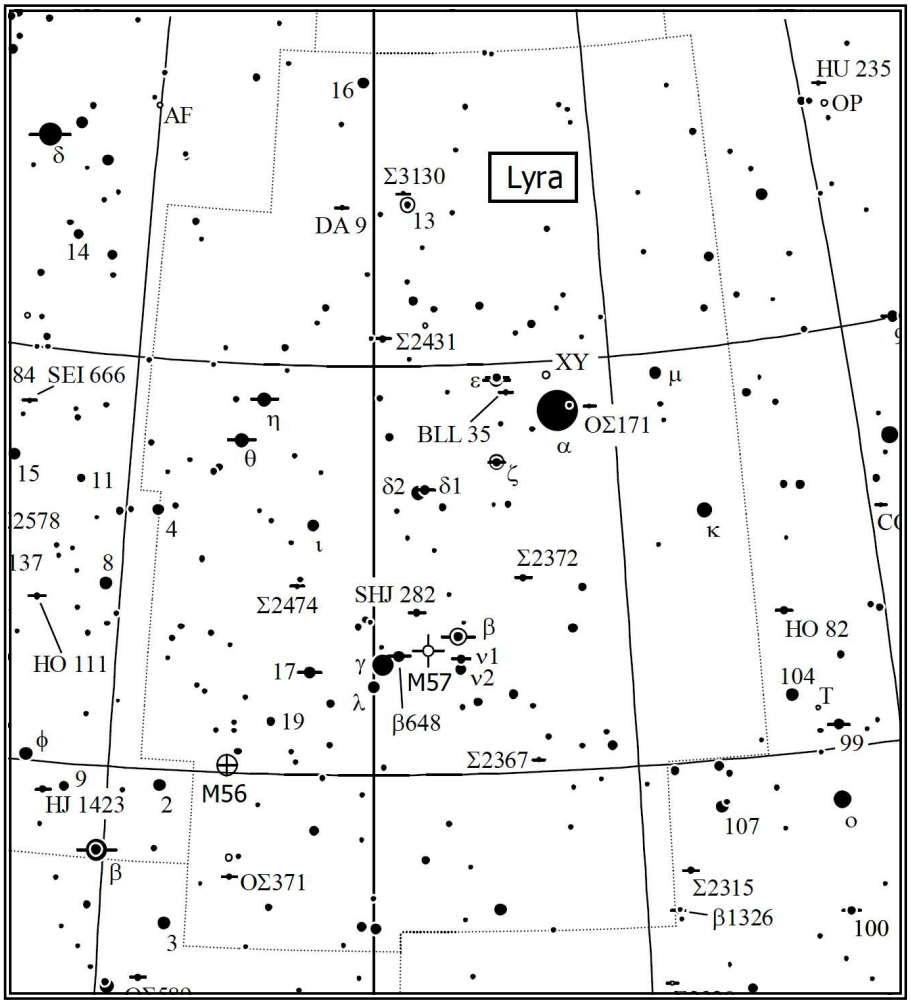
# Atlas of Double Stars

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## 1. INTRODUCTION

The goal of this atlas is to provide the amateur astronomers a series of charts that plot and label double stars within the grasp of moderate-aperture instruments. The United States Naval Observatory's Washington Double Star Catalog is the primary modern resource for doubles, binaries and multiple star systems discovered to date. However, this catalog includes over 100,000 pairs, many of which are beyond the capabilities of the average amateur telescope. The following criteria were selected to represent doubles that would be potentially visible in moderate-aperture telescopes:

- Doubles with a combined magnitude of about 7.0 or brighter
- Angular separations greater than 0.5" and less than 200"
- Secondary components that are magnitude 11 or brighter

Based on these criteria, over 2,000 double stars are plotted and labeled on the charts. A complete list of the plotted doubles along with their specifications can be found in the downloadable Double Star Atlas Data Spreadsheet.

In addition to the double stars, about 300 bright deep sky objects were plotted to broaden the usefulness of the atlas. They include all of the Messier and Caldwell objects and other bright objects that have been described in various other works. A complete list of the double stars and deep sky objects plotted in the atlas can be found in the Double Star Atlas Data Spreadsheet.

## 2. SPECIFICATION OF THE ATLAS

### 2.1 GENERAL

The specification of the atlas is as follows.

- Projection: Modified Transverse Mercator Projection
- Number of Charts: 36
- Scale: 3.9mm/degree
- Chart Size: A4
- Magnitude of Faintest Star: 7.0 (15,918 stars)
- Double (Multiple) Stars labeled: 2053
- Deep Sky Objects: 304

## 2.2 LAYOUT OF CHARTS

| Chart No. | Decl. Range (deg) | RA Range (h) |
|---|---|---|
| 1 | +50 to +90 | 24h to 20h |
| 2 | | 20h to 16h |
| 3 | | 16h to 12h |
| 4 | | 12h to 8h |
| 5 | | 8h to 4h |
| 6 | | 4h to 0h |
| 7 | 0 to +50 | 24h to 22h |
| 8 | | 22h to 20h |
| 9 | | 20h to 18h |
| 10 | | 18h to 16h |
| 11 | | 16h to 14h |
| 12 | | 14h to 12h |
| 13 | | 12h to 10h |
| 14 | | 10h to 8h |
| 15 | | 8h to 6h |
| 16 | | 6h to 4h |
| 17 | | 4h to 2h |
| 18 | | 2h to 0h |
| 19 | -50 to 0 | 24h to 22h |
| 20 | | 22h to 20h |
| 21 | | 20h to 18h |
| 22 | | 18h to 16h |
| 23 | | 16h to 14h |
| 24 | | 14h to 12h |
| 25 | | 12h to 10h |
| 26 | | 10h to 8h |
| 27 | | 8h to 6h |
| 28 | | 6h to 4h |
| 29 | | 4h to 2h |
| 30 | | 2h to 0h |
| 31 | -90 to -50 | 24h to 20h |
| 32 | | 20h to 16h |
| 33 | | 16h to 12h |
| 34 | | 12h to 8h |
| 35 | | 8h to 4h |
| 36 | | 4h to 0h |

**2.3 STAR LABELS**

The following labeling convention was used on the charts and Double Star Atlas Data Spreadsheet:

Double stars with Bayer (lower-case Greek) letters - labeled with Bayer letters (Example: α Geminorum, aka Castor)

Double stars with Flamsteed numbers - labeled with Flamsteed numbers (Example 1 Arietis)

Doubles without Bayer or Flamsteed designations - labeled with the discoverer designation and catalog number (Example: William Herschel (H), John Herschel (HJ), J. Dunlop (Δ), F. G. W. Struve (Σ), O. Struve (OΣ), S. W. Burnham (β) and others)

See the Double Star Data Spreadsheet for more specific information on the labeling symbols used on the charts (Designation Key worksheet).

**2.4 DATA SPREADSHEETS**

The Double Star Atlas Data Spreadsheet includes the Double Star Data worksheet which lists detailed information for each double star labeled on the charts. Note that there are 2,053 doubles labeled on the chart, but the number of entries in the Double Star Data worksheet is over 2,600. Many of the doubles plotted on the chart are multiple stars; the worksheet lists the multiple components for these stars.

The Deep Sky Object Data worksheet lists detailed information for the deep sky objects that are plotted and labeled on the chart.

**3. DATABASE**


[1] B. D. Mason, G. L. Wycoff and W. I. Hartkopf, The Washington Double Star Catalog, Astrometry Department, U.S. Naval Observatory (http://ad.usno.navy.mil/wds/wdstext.html#single)

[2] "SAO Star Catalog J2000 (SAO Staff 1966; USNO, ADC 1990)"

[3] D. Hoffleit, W. H. Warren Jr., "The Bright Star Catalogue, 5th Revised Ed. (Preliminary Version)," Astronomical Data Center, NSSDC/ADC (1991)

[4] D. Hoffleit, M. Saladyga and P. Wlasuk, "A Supplement to the Bright Star Catalogue," Yale University Obs. (1983)

[5] A. C. Davenhall and S. K. Leggett, "A Catalogue of Constellation Boundary Data," (1990) --> There are some errors in the data.

[6] "Saguaro Astronomy Club Database," Version 7.2, (2000)

[7] "Charles Messier's Catalog of Nebulae and Star Clusters"

[8] Patrick Moore and the Editors of Sky & Telescope, "The Caldwell Catalog: 109 Deep-Sky Delights for Backyard Observers," (1995)

[9] "The Combined Table of General Catalogue of Variable Stars Volumes I-III, 4th Ed. (GCVS4) (Kholopov+ 1988) and Namelist of Variable Stars Nos.67-76 (Kholopov+, 1985-2001)," Institute of Astronomy of Russian Academy of Sciences and Sternberg State Astronomical Institute of the Moscow State University.

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This work is a result of collaboration of Toshimi Taki and Pete Wehner.

- Development of specification of the atlas: T. Taki and P. Wehner
- Compilation of the double star list: P. Wehner
- Compilation of the deep sky object list: T. Taki
- Making the star charts: T. Taki
- Making the index charts: T. Taki