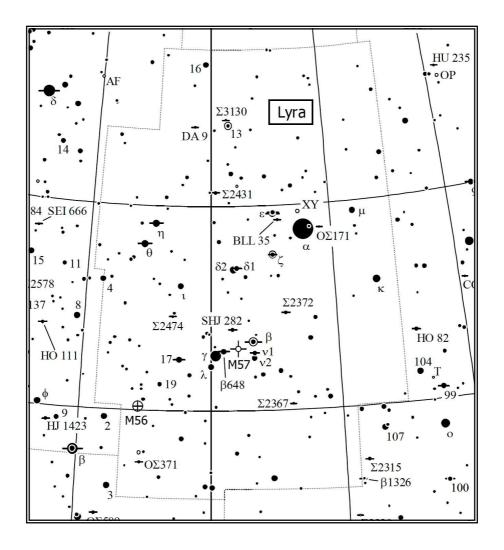
# **Atlas of Double Stars**



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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

2/5

## 2.2 LAYOUT OF CHARTS

Chart No.         (deg)         (h)           1         +50 to +90         24h to 20h           2         20h to 16h         16h to 12h           1         12h to 8h         8h to 4h           4         4h to 0h         24h to 22h           22h to 20h         22h to 22h         22h to 20h           9         20h to 18h         18h to 16h           10         16h to 14h         14h to 12h           13         12h to 10h         10h to 8h           8h to 6h         6h to 4h         4h to 2h           18         2h to 0h         24h to 22h           20         22h to 20h         22h to 20h           21         2h to 0h         24h to 22h           20         22h to 20h         22h to 20h           21         20h to 18h         18h to 16h           22         20h to 18h         18h to 16h           23         12h to 20h         20h to 18h           24         24         14h to 12h           25         12h to 10h         10h to 8h           8h to 6h         6h to 4h         4h to 2h           28         2h to 0h         24h to 20h           29         30         2h to 0	Chart No.	Decl. Range	RA Range
2		(deg)	(h)
3       16h to 12h         4       12h to 8h         8h to 4h       4h to 0h         7       0 to +50       24h to 22h         22h to 20h       20h to 18h         10       18h to 16h         11       12h to 10h         13       12h to 10h         14       14h to 12h         15       6h to 4h         16       6h to 4h         17       2h to 0h         20       22h to 20h         21       20h to 18h         22       22h to 20h         23       18h to 16h         16h to 14h       14h to 12h         12h to 10h       10h to 8h         8h to 6h       6h to 4h         4h to 2h       2h to 10h         26       2h to 0h         27       8h to 6h         6h to 4h       4h to 2h         28       6h to 4h         4h to 2h       2h to 0h         29       2h to 0h         31       -90 to -50       24h to 20h         20h to 16h       16h to 12h         12h to 8h       8h to 4h	1	+50 to +90	24h to 20h
4       12h to 8h         8h to 4h       8h to 4h         4       4h to 0h         7       0 to +50       24h to 22h         20h to 18h       20h to 18h         10       18h to 16h         11       14h to 12h         12       12h to 10h         13       12h to 10h         15       8h to 6h         6h to 4h       4h to 2h         2h to 0h       24h to 22h         20       22h to 20h         21       20h to 18h         22       22h to 20h         23       18h to 16h         16h to 14h       14h to 12h         12h to 10h       10h to 8h         8h to 6h       6h to 4h         4h to 2h       2h to 0h         28       2h to 0h         30       -90 to -50         24h to 20h       20h to 16h         16h to 12h       12h to 8h         31       -90 to -50         24h to 20h       20h to 16h         16h to 12h       12h to 8h         8h to 4h       12h to 8h	2		20h to 16h
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8	6		4h to 0h
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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         20h to 16h       16h to 12h         12h to 8h       8h to 4h	14		10h to 8h
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18       2h to 0h         19       -50 to 0       24h to 22h         20       22h to 20h       20h to 18h         21       20h to 18h       18h to 16h         23       16h to 14h       14h to 12h         25       12h to 10h       10h to 8h         27       8h to 6h       6h to 4h         29       4h to 2h       2h to 0h         30       2h to 0h       2h to 20h         32       20h to 16h       16h to 12h         34       34       12h to 8h         8h to 4h       8h to 4h	16		6h to 4h
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	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:  $\alpha$  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 ( $\Delta$ ), F. G. W. Struve ( $\Sigma$ ), O. Struve ( $\Sigma$ ), S. W. Burnham ( $\beta$ ) 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

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- [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:
Compilation of the deep sky object list:
Making the star charts:
Making the index charts:
T. Taki
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T. Taki