Nautical Almanac (Selected Stars)

2020
Warning and Terms of Usage:

The following pages have been generated by a computer program. Complex computer programs usually have bugs and may produce wrong data. The data in this Nautical Almanac is believed to be accurate but no warranty is given for its correctness. Use this Nautical Almanac only for training and exercising!
Introduction

This Nautical Almanac contains the Ephemerides of the “First Point of Aries” and sixty selected stars. It is designed for determination of Position (geographical Latitude and Longitude) from astronomical observations (Altitude of Celestial Objects).

The data compiled in this Nautical Almanac is based on calculations done with the software package “NOVAS” from the U.S. Naval Observatory (http://aa.usno.navy.mil/AA/software). The fundamental star data was originally obtained from the “Bright Star Catalogue” (5th revised edition of 1991). However, this data has recently been updated from other star catalogues. The complete star data as used in this Almanac is shown on the next page.

Values for “deltaT”

For the astrodynamical calculations, the following values for “delta T” (the difference between terrestrial time realized by atomic clocks and UT defined by the irregular rotation of the Earth) have been used:

<table>
<thead>
<tr>
<th>Month</th>
<th>Value</th>
</tr>
</thead>
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<tr>
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</tr>
<tr>
<td>Apr</td>
<td>69.4 s</td>
</tr>
<tr>
<td>Jul</td>
<td>69.5 s</td>
</tr>
<tr>
<td>Oct</td>
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<tr>
<td>Dec</td>
<td>69.6 s</td>
</tr>
</tbody>
</table>

Interpolation of the integral-hour GHA values

This Nautical Almanac uses a slightly different approach for the interpolation of the integral-hour values of Greenwich Hour Angle, compared to the techniques used in most commercially available Almanacs.

For more information please refer to the following web site: “http://www.siranah.de/”
The following table shows the fundamental star data as used in this Almanac. The data refers to Equinox J2000 / Epoch J2000.0.

<table>
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<tr>
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<th>RA</th>
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<th>mu_RA</th>
<th>mu_Dec</th>
<th>prllx</th>
<th>rad.vel.</th>
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<td>0.002290</td>
<td>0.008</td>
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<td>-0.049730</td>
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The following table lists the traditional star names as used in this Almanac with the corresponding scientific names (Bayer designation) as used in astronomical star constellation maps.

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<th>Star Name</th>
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<td>Alpha Camelopardae</td>
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<td>Alpha Eridani</td>
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<td>Capella</td>
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<td>Beta Tauri</td>
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<td>Beta Tauri</td>
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</table>
Position of the Stars on the local hemisphere

The following pages show different maps of the brightest stars on the night sky (down to magnitude 4.5) as well as some of the standard constellations. On each of the maps, the stars used in this Almanac are labeled with their traditional names.

The first two maps are stereographic maps of the stars of the northern- and southern hemisphere, respectively. These maps are centered on the celestial poles and may be used for observations at locations in high northern- or southern latitudes.

The following eight maps show the star constellations on the local hemisphere for locations on the Equator. These maps can be used for observations at locations in lower latitudes.

The Horizontal-Coordinate-System map shows the brightest stars (up to magnitude 4.5) of the local hemisphere for a location on the Equator. The stars are plotted with their Altitude (Hc) and Azimuth (Az) coordinates. The Azimuth scale is plotted on the circle of 0°-Altitude (local horizon). The Azimuth is the approximate compass direction in which the star is visible.

Each of these maps is valid for a location on the equator at a specific time of the day.
The map is centered on the celestial north pole and shows the brightest stars (up to magnitude 4.5) of the northern celestial hemisphere. The circle of constant declination is shown at 0° (Celestial Equator). The Sidereal Hour Angle of a specific star can be directly read from the SHA scale plotted on the Celestial Equator, while, the Declination can be determined by transferring the distance from the star to the center of the map onto the separate Declination scale. The Sidereal Hour Angle is zero for the "First-Point-of-Aries" and increases westward.

The map is centered on the celestial south pole and shows the brightest stars (up to magnitude 4.5) of the southern celestial hemisphere. The circle of constant declination is shown at 0° (Celestial Equator). The Sidereal Hour Angle of a specific star can be directly read from the SHA scale plotted on the Celestial Equator, while, the Declination can be determined by transferring the distance from the star to the center of the map onto the separate Declination scale. The Sidereal Hour Angle is zero for the "First-Point-of-Aries" and increases westward.
The Horizontal-Coordinate-System map shows the brightest stars (up to magnitude 4.5) of the local hemisphere for a location on the Equator. The stars are plotted with their Altitude (Hc) and Azimuth (Az) coordinates. The Azimuth scale is plotted on the circle of 0°-Altitude (local horizon). The Azimuth is the approximate compass direction in which the star is visible. Each of these maps is valid for a location on the equator at a specific time of the day.
The Horizontal-Coordinate-System map shows the brightest stars (up to magnitude 4.5) of the local hemisphere for a location on the Equator. The stars are plotted with their Altitude (Hc) and Azimuth (Az) coordinates. The Azimuth scale is plotted on the circle of 0°-Altitude (local horizon). The Azimuth is the approximate compass direction in which the star is visible.

Each of these maps is valid for a location on the equator at a specific time of the day.
The Horizontal-Coordinate-System map shows the brightest stars (up to magnitude 4.5) of the local hemisphere for a location on the Equator. The stars are plotted with their Altitude (Hc) and Azimuth (Az) coordinates. The Azimuth scale is plotted on the circle of 0°-Altitude (local horizon). The Azimuth is the approximate compass direction in which the star is visible.

Each of these maps is valid for a location on the equator at a specific time of the day.
The Horizontal-Coordinate-System map shows the brightest stars (up to magnitude 4.5) of the local hemisphere for a location on the Equator. The stars are plotted with their Altitude (Hc) and Azimuth (Az) coordinates. The Azimuth scale is plotted on the circle of 0°-Altitude (local horizon). The Azimuth is the approximate compass direction in which the star is visible.

Each of these maps is valid for a location on the equator at a specific time of the day.
# Nautical Almanac for selected Stars

The following pages contain the celestial tables of the "First Point of Aries" and a set of selected stars. Each page compiles the almanac data for five successive days of the year. For this time span, the recorded star data consists of Siderial Hour Angle (SHA) and Declination (Dec). The time used in this Almanac is Universal Time (UT).

The GHA of a specific star is obtained from the GHA of the "First Point of Aries" and the star's SHA by the following relationship: $\text{GHA}_{\text{star}} = \text{GHA}_{\text{Aries}} + \text{SHA}_{\text{star}}$

**NOTICE:**

This Nautical Almanac uses a slightly different approach for the interpolation of the integral-hour values of Greenwich Hour Angle and Declination, compared to the techniques used in most commercially available Almanacs. For more information please refer to the following web site: "http://www.siranah.de/"

### Abbreviations used in the Almanac tables:

- **SHA**: Siderial Hour Angle
- **Dec**: Declination
- **ddGHA**: the increment of the GHA value for the next hour of time,
- **GHA**: Greenwich Hour Angle
- **°**: [degrees]
- **'**: [minutes of arc]
- **UT**: Universal Time
- **N**: North
- **S**: South
- **H**: Hour
- **M**: Minute
- **S**: Second

### Nautical Almanac for selected Stars

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<th>Dec</th>
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**Warning:** This page has been generated by a computer program. Complete computer programs usually have bugs and may produce wrong data. The data on this page is believed to be accurate but no warranty is given for its correctness. Use it only for training and exercising!
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**2020 - First Point of Aries / Selected Stars**

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## Polaris (Pole Star) Tables, 2020

For determining Latitude from Sextant Altitude and for Azimuth

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### Notes

- **Latitude** = Apparent Altitude (corrected for refraction and dip) - 1° + a0 + a1 + a2
- To determine Latitude, the table is entered with LHA Aries, which is obtained by addition of the observer's Longitude and the GHA Aries from the daily pages of this Almanac. The value of LHA Aries determines which column of the Polaris Tables to use. Each column refers to a range of 10° in RA. The value of a0 is taken with mental interpolation (taking into account the fractional part of LHA Aries), from the upper table with the units of LHA Aries in degrees as argument. The values of a1 and a2 are taken, without interpolation, from the second and third tables with arguments Latitude and Month respectively. The correction terms a0, a1, and a2 are always positive. The final table gives the Azimuth of Polaris.

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### Polaris (Pole Star) Tables, 2020

For determining Latitude from Sextant Altitude and for Azimuth

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### Notes

- **Lat.** = Apparent Altitude (corrected for refraction and dip)
- **a0** = a0 + a1 + a2

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