

## CELESTIAL TOOLS FOR THE USPS/CPS JN/N STUDENT - Not just for JN and N anymore!

CELESTIAL TOOLS is a Windows-based program consisting of three main functions and several auxiliary functions. The main functions use a built-in medium-precision "almanac", which is accurate enough to help students locate their errors, but will not necessarily give the same results as manually extracting data from the Nautical Almanac. There is no need to consult the Nautical Almanac when using CELESTIAL TOOLS.

### Main functions:

"Sight Planner" will calculate the twilight times for a selected date and location, and find the azimuth, altitude, and magnitude of the visible navigational bodies at a selected time, as a list or a star chart. It will also find the times of moonrise and moonset, the phase of the Moon, and the availability of acceptable Sun-Moon fixes.

"Sight Reduction & Fix" will completely reduce a sight to intercept and azimuth by the Law of Cosines method, allowing students to check the quality of their sights while still "at the beach". After a minimum of two sights are reduced and saved, you have the option of establishing a fix using sights selected from the list of ten. It will also produce a Meridian Diagram for the sight.

"Noon Sight" calculates the time of Local Apparent Noon (LAN) for a selected date and longitude, and then calculates latitude from a noon sight. It will also calculate longitude and latitude from the observed zone time of LAN.

### Auxiliary functions:

"SR Methods & Fix" will allow the user to enter data from the upper part of a sight reduction form (derived from data extracted from the Nautical Almanac) and reduce the sight using the Law of Cosines, Nautical Almanac Concise, and several other tabular and inspection methods, giving the same intermediate and final values as would be obtained with a manual reduction. It will also produce a Meridian Diagram for the Sight.

"Sight Averaging" will analyze a run of sights by two methods and calculate the average watch time and sextant altitude.

"Winds & Current" will calculate the Course to Steer and Speed of Advance for a course and speed affected by current and leeway, and the Course Made Good and Speed Made Good given the vessel's heading and speed, the set and drift of the current, and leeway.

"Arcs and Times" will convert angular values to time equivalents and vice versa, and convert between Zone Time and Local Mean Time.

"The Sailings" will calculate, using mid-latitude or Mercator sailing, or the method used in VPP2, course and distance from initial and final positions; final position from initial position, course, and distance; individual points on a rhumb line; set and drift from DR position, fix position, and elapsed time; and drift angle. It will also calculate, using great circle sailing or two methods of composite sailing, initial course and distance or final position, plus maximum latitude, final course, and points on the great circle route, including rhumb line course and distance from point to point and total rhumb line distance.

"Distances" includes a distance to the natural horizon calculator, a geographical range of visibility of an object calculator, and three distance by vertical angle calculators.

"Navig.Math" will do single or double interpolation, sexagesimal-decimal conversions, angle addition and subtraction, time addition/subtraction/conversion, time of day calculation, and zone description calculation.

"60D=ST" will calculate speed, time, or distance when two of the values are known.

"TVMDC" will update the values of the compass variables True (T), Variation (V), Magnetic (M), Deviation (D), and Compass (C) when any one is changed. Can be used with a "small" deviation table. It will also calculate the value of variation for a selected year based on the data provided on a chart.

"Length of Degree" will calculate the length of a degree of latitude and longitude in various linear units for both a spherical Earth and the WGS84 spheroid, for a specified latitude.

"Yellow Pages" will reproduce the values of the Nautical Almanac Increments and Corrections table.

"MoBoard" will perform several calculations typically done on a maneuvering board, e.g. Closest Point of Approach between two moving vessels (or between a moving vessel and a stationary object), course and speed of contact vessel, true wind from apparent wind, apparent wind from true wind.

"2/3 Bearings" will calculate the distance to a fixed object (and related quantities) by taking two bearings on the object from a moving vessel; calculate a fix (or running fix) from cross bearings on charted objects; and calculate the course made good from three bearings on a fixed object and the time or distance between them.

"Tides" will determine the height of the tide at a desired time, using data extracted from a Tide Table, and calculate vertical clearances.

"Currents" will determine the set and drift (velocity) of the tidal current at a desired time, using data extracted from a Tidal Current Table.

CELESTIAL TOOLS is provided as a 717KB zipped archive. Unzip it into its own folder (directory), preferably not under Program Files. (No "installation" is required. The program can be run from removable media, such as a USB memory stick.) If your system meets the requirements below, simply run CelestialTools568.exe to start the program. Then look at the Help file, available from the opening (menu) screen, for more information about operating the program, its additional capabilities, and its limitations.

### System requirements

Operating System: Windows 95 or later

Support files: The Visual Basic 6 runtime files must be on your computer. These files come with Windows Me, Windows 2000 Professional, Windows XP, Windows Vista, Windows 7, Windows 8, and Windows 10, or may have been installed during the installation of another program. If they are not present, your computer will let you know when you try to run the program. The latest version can be downloaded from <http://support.microsoft.com/kb/192461> as a self-extracting executable, currently VBRUN60SP6.EXE, about a 1MB download.

Hard disk space: 3356KB for CelestialTools568.exe. An additional 1.5MB or so if the Visual Basic runtime files are needed.

Screen resolution: 800x600 or greater

Fonts: Tahoma, Arial, Courier New, and Symbol, provided with Windows. (Windows 95 will substitute MS Sans Serif for Tahoma.) Fonts must be set for 96 dpi (called 100%, normal, standard, etc.) except for Windows 10, which will work at any font size..