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.
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"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 available from the Downloads section of starpath.com.