

## Carlson SurveyGNSS 2016 v 2.1.0 Release Notes

Currently users should manually check for product updates as they become available at <http://www.carlsonsw.com/support/software-downloads/?product=SurveyGNSS>, including service patches and language support.

### Highlights

- SurveyGNSS now supports project templates. Users no longer have to select their coordinate system everytime SurveyGNSS is started, but can simply load a template file. The project template includes the coordinate system and any other SurveyGNSS project data.
- SurveyGNSS now supports projection factors. This allows for 'grid to ground' computations. The GNSS-derived positions in SurveyGNSS are scaled to localized "ground" coordinates so that any inverse between them results in an approximate 'Ground Distance'. These scaled distances can then be combined with Total Station observations.
- SurveyGNSS now supports projection localization. A four parameter (scale, rotation, shift) 2D similarity transformation to projected coordinates can be defined using corresponding positions. This results in localized horizontal E,N coordinates.
- SurveyGNSS now supports online geoid models. When online, users may select a geoid model directly from the geoids library published by Carlson. Geoid support has also been extended to the (textual) ".asc" format offered by the [US National Geodetic Survey](#).
- SurveyGNSS now supports antenna height input in Meters for projects with a coordinate system in Feet. This makes it easier to enter a typical 2 Meter antenna height while the rest of the data is in Feet.

See below a full list of bug fixes and enhancements.

### Bug Fixes

- Corrected issue with program failure upon exit when **Compute...GNSS Resection(s)** window with selected rows or **Search...Published Observations** panes were active at time of program dismissal.
- Corrected issue with RINEX 3 event marker scans to correctly ascertain **Observation** type.
- Corrected issue with RINEX 3 header edits/rewrites containing **GLONASS COD/PHS/BIS** record.
- Corrected issue with failure to delete temporary files in observation folders with computation of **Vectors** using certain **Observation** combinations.
- Corrected issue with naming convention for serialized user specific program defaults (Preferences, etc.). There is now only one file for retaining these values per user located at **%USERPROFILE%/AppData/Roaming/Carlson Software/Carlson SurveyGNSS <version>**.
- [FB 152039]. Corrected issue with extracting stop+go **Position** descriptions/"feature codes"/remarks from RINEX observation files to SurveyGNSS **Position Remarks**. Unfortunately there is no uniform standard RINEX convention for encoding such values. Based on commonly encountered conventions in the industry, the SurveyGNSS .RW5 based RINEX conversion now applies and honors the convention whereby the RINEX **MARKER NUMBER** header record following a RINEX antenna stationary event record is set to the current .RW5 description/"feature code"/remark. Such conversions also insert additional **MARKER NAME** and **MARKER NUMBER** header records in the subsequent RINEX antenna moving event indicating the current .RW5 description/"feature code"/remark together with the current **ANTENNA: DELTA H/E/N** record. For all stop+go RINEX files, SurveyGNSS first attempts to assign the SurveyGNSS **Position Remark** as the **MARKER NAME** header record in the subsequent RINEX antenna moving event record. If no such record exists, it attempts to assign the SurveyGNSS **Position Remark** to the **MARKER NUMBER** header record following a RINEX antenna stationary event. If no such record exists, the SurveyGNSS **Position Remark** is unassigned. In addition

non blank static RINEX file **MARKER NUMBER** header records are assigned the the SurveyGNSS **Position Remark**.

- Corrected issue with editing of antenna heights in **Observations** tab and subsequent recalculation of affected **Vectors**. Sub processes were not being sequenced correctly potentially causing SurveyGNSS to hang.
- Corrected issue with merged reference RINEX observation archives not opening correctly.

## Enhancements

- Updated topcon\_sample.bat sample script to use Topcon RINEX conversion utility TPS2RIN 1.0.23.990 released August 25, 2015 from Topcon. This version changes command line syntax/usage and supports RINEX 3.02, which is set to the default. Note this utility is currently only available to licensed Topcon customers and must be installed/configured separately.
- [FB 151408] Modified defaults for most SurveyGNSS file solicitation dialogs to default to current project path with name equal to current project name. Exception is the **Preferences...General** dialog solicitation of geoid and antenna definition files where the default folder is the currently selected search path in the search path drop down list, and solicitation of horizontal distortion grids where the default folder is the last entry in the defined search paths.
- [FB 151407] Enhanced command **File...New** to implement SurveyGNSS project templates (.sgt files). Such files are also SurveyGNSS projects usually set to a certain spatial reference, but which also may contain any other SurveyGNSS project data. However care should be taken not to include **Observational** data etc. therein as doing so would likely containing invalid relative path references once the template is used for a future project. Command **File...New...Project** will now solicit a new project path and (.sgp) file name as before, together with an optional SurveyGNSS template project on which to base it. Canceling the latter mimics previous behavior (empty project with WGS84 spatial reference). Command **File...New...Template** will also solicit a new project template path and (.sgt) file name, together with an optional SurveyGNSS template project on which to base it. Command **File...Open** has also been extended to accept SurveyGNSS project template (.sgt) files.
- [FB 153502] SurveyGNSS now serializes any user redocking of the data tabs (**Map, Observations, Vectors, Positions**) upon **File...Exit** and attempts to restore them upon next invocation of the product. The default is now set to initially dock the **Map** data tab to the left.
- Added commands **Edit...Spatial Reference...Projection Localization...Set** and **Clear**. This command allows users to view and apply a four parameter (scale, rotation, shift) two dimensional transformation to projected spatial references, yielding localized horizontal geodetic coordinates when **View...Coordinate Display...Projected** is enabled. Selecting **Set** will display a dialog showing the four transformation parameters to be applied. They may be entered manually or loaded from an active **Compute...Projection Factors** pane or **Compute... Projection Localization** pane (see below). The transformation is applied to the projected **Positions** tab and the status bar is updated with the localized scale factor noted as **[Localized]**. In the event a spatial reference is localized, selecting **Clear** will disable the localized transformation, effectively restoring actual projected (grid) **Positions** together with the projection scale factor on the status bar.
- Added menu command **Compute...Projection Factors**. This command displays a gridded pane of projection factors for all selected **Position(s)**, together with a summary mean at the bottom. This pane is synchronized with the **Positions** tab and will automatically update as different **Positions** are selected. For each selected **Position**, the pane displays the point scale factors along the meridian and parallel, an elevation factor, grid factor (product of mean point scale and elevation factors, sometimes referred to as a "combined" or "ground" factor), meridian convergence, areal scale factor, angular distortion, meridian/parallel intersection angle, and the Tissot indicatrix (also referred to as Tissot's ellipse or ellipse of distortion based on the work of French military engineer and geodesy instructor Nicolas Auguste Tissot). If this pane is active when command **Edit...Spatial Reference...Projection Localization...Set** is selected, its dialog will include a button to automatically capture the *inverse* of the current mean grid factor, which will effectively scale all **Positions** to localized "ground" coordinates such that any inverse between them results in an approximate 'Ground Distance' or (in 3 dimensions) terrestrial 'spatial distance'.

- Added menu command **Compute...Projection Localization** to compute four parameter (scale, rotation, shift) two dimensional transformations. This command displays a gridded pane of check box selectable rows showing position **Status** and **Name**, source (**From**), target (**To**) and residual horizontal coordinates for all selected **Position(s)**. This pane is synchronized with the **Positions** tab and will automatically update as different **Positions** are selected. The source (**From**) coordinates are taken from the current values in the **Positions** tab (the **View...Coordinate Display** for which should be **Projected**). Users may either manually enter target (**To**) coordinates or select pane context menu option **Open...** to read values from a (textual) character delimited file. Such files may use white space, comma, semicolon, or pipe ('|') as delimiters but the first three entries of each record must be a position name (may be enclosed in single (') or double quotes (")), and target coordinate values. Any additional fields in a given record are ignored. Coordinate values are assigned in the target (**To**) coordinate columns based on case insensitive match of the position name to the **Name** field. To reverse the order of target (**To**) coordinates, simply drag the desired column via its header. Selecting two or more rows with both source (**From**) and target (**To**) coordinates will compute a least squares estimate of the localization parameters. The pane status bar displays the number of rows selected, the estimated mean coordinate and positional RMS errors, and computed scale, rotation, and shift. The individual transformed position residuals are also updated. If this pane is active when command **Edit...Spatial Reference...Projection Localization...Set** is selected, its dialog will include a button to automatically capture the current transformation parameters from this pane.
- [FB 151410] Allowed user override of antenna height units when editing them in the **Observations** tab. In general a numeric value is entered in this column is assumed to be in the spatial reference units indicated in the column header. If a suffix of "m" or "M" is appended to the entered value, it is converted from SI meters to the spatial reference units indicated in the column header. Any other unit suffix is ignored and assumed to be in the spatial reference units indicated in the column header; if the spatial reference units are "ft", users may append "ft" or "" to values entered in this column, but it is unnecessary.
- Added unit labels to **Edit...Position(s)** dialog. Geocentric coordinates and ellipsoidal heights are always displayed in meters. Projected coordinates are in the units of the selected spatial reference.
- [FB 150041]. Added commands **File...RINEX...Decompress, Merge** and **Split RINEX Observation(s)/Observation Archive(s)**. **Decompress** will dearchive a selection of RINEX file archives in various popular compression schemes with extensions (\*.Z, \*.gz, \*.zip, \*.d (Hatanaka)) and will **Open** any resultant RINEX **Observation(s)**. Likewise **Merge** will concatenate a selection of RINEX observation(s)/observation archive(s) into a single file and will **Open** any resultant RINEX **Observation**. Care should be taken when selecting the RINEX observation(s)/observation archive(s) as they are concatenated in the order in which they are selected. **Split** performs the opposite operation according to the **Edit...Preferences...General...RINEX File Split Duration** and **Alignment** options in effect. No resultant RINEX **Observation(s)** are **Opened** for the **Split** command.
- [FB 151382] Enhanced geoidal model support. Internally SurveyGNSS utilizes the well known [binary US NOAA/NOS Datum Transformation Grid \(.gtx\) format](#). To date **Edit...Preferences..General...Gravity Model** has also supported the (textual) Carlson ".grd" and ".gsf" formats. Support has now been extended to the (textual) ".asc" format offered by the [US National Geodetic Survey](#). Furthermore an online geoidal model search option has been added to **Edit...Preferences..General...Gravity Model**. When SurveyGNSS is operating in online mode, a cloud button is shown adjacent to the local file folders browse button. Clicking it will open the user's default browser to a Carlson web page displaying a world map depicting **red** outlines of the extents of geoids published by Carlson (most of these are currently in the ".grd" format). Please note that this display requires a contemporary browser supporting HTML 5; please update or switch to the most current browser version if issues are encountered. Users can navigate to any area of interest using the same mouse or touch controls available in the SurveyGNSS **Map** (mouse wheel or pinch unpinch to zoom in/out, <Shift-left mouse drag> to window area). Extents containing the mouse position *which are fully displayed in the current view* are highlighted with a **blue** outline as it is moved (this helps eliminate larger grid extents which extend beyond the current view). Left clicking when a selection of **blue** outlined candidates are shown will then display a gridded dialog box depicting the name, density, and file size of the identified geoids. Hovering the mouse over any geoid file link highlights it and changes its map extent to **green**. Note many of the published geoid extents are coincident or overlap depending on updates to them, so

users must rely on the file names to discern the desired geoid(s) to download. Clicking on any geoid file link will initiate its download, after which the user may dismiss the browser and use the usual local file browse button to open/convert it for use by SurveyGNSS. Depending on the configuration of the user's default browser for download folders, users may wish to first relocate the downloaded geoid(s) to a uniform generally accessible folder before doing so. In this way (multiple) users can avoid repeatedly downloading geoidal models and also save the current spatial reference and geoidal model as a template project (**.sgt** file) as described above.