

## Carlson SurveyGNSS v 2.1.3 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.

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### Highlight

SurveyGNSS now supports Precise Point Positioning (PPP) as a separate module. Raw data from any single or dual frequency phase data receiver can be used for PPP processing. There is no need for a base or reference network; the receiver can log data autonomously.

PPP is a static technique; a station must be occupied for at least 2 hours. The longer the observation time, the better. Depending on the quality of the raw data, the occupied station can be positioned with sub-metre, decimetre, or even centimetre accuracy.

PPP is useful when there is a need to establish one or more known points in an area with no fixed reference station or network.

Note that the PPP result is not defined on the local datum (NAD83, ETRS89, AGD84) but on the International Terrestrial Reference Frame. To obtain a reliable local Latitude, Longitude and Elevation (and eventually E,N,H) a transformation must be applied.

See a full list of bug fixes and more details below.

### Bug Fixes

- Updated Javad RINEX converter JPS2RIN from version 2.0.0.89 to 2.0.0.127. This remedies various RINEX conversion errors in newer Javad receivers and firmware.
- Corrected posting and display of very small values (on the order of  $1^{-11}$ ) to the project and user interface. This typically occurred with some least squares adjustments yielding very small covariance values. Nevertheless they are displayed in the user interface as correlations ( $-1 \leq \rho \leq 1$ ) and in such cases correctly shown as effectively zero.
- Corrected an issue whereby candidate static vectors were shown in the the wrong order under certain status conditions.
- Corrected an issue whereby certain 3<sup>rd</sup> party RINEX converters yielding invalid RINEX content could cause SurveyGNSS RINEX validation to encounter unhandled exceptions and fail. These are now caught and reported to the user in the **Processes** conversion log.
- [Case 208059] Erased stale status bar message after **Compute...Candidate Static Vectors...** query in the event no candidates are found. Program also now displays popup informational dialog indicating users can recompute any existing vectors by selecting them in the **Vectors** tab and selecting **Recompute Vector(s)**.
- [Case 208072] Corrected extension and handling of binary Sokkia GRX Receiver [via teqc] conversion to \*.tps.
- [Case 208355] Corrected truncation of .RW5 geographic coordinates when using **File...Save As...Carlson .RW5**.
- [Case 209103] Corrected **MOde** record to include comma after **UNit** record when using **File...Save As...Carlson .RW5**.

## Enhancements

Support for optional Precise Point Positioning (“PPP”) module (Carlson Part Number 1316.710.003) added. This module adds precise GNSS station positioning capabilities for a single GNSS receiver operating autonomously. It is useful for obtaining submeter to centimeter level absolute positioning accuracies. Highest accuracies require long-term (1-2 hours or more) of continuous dual frequency carrier phase observations. It weights the different observations types (code and carrier phase, various GNSS) according to a variance component estimation. Position results are obtained using a robust estimation algorithm. SurveyGNSS PPP module can also process single frequency observations. Note that as an absolute positioning technique the reference frame of the position solution is determined by the precise satellite orbit data (typically the active International Terrestrial Reference Frame at some epoch of time). To derive coordinates referenced to another time and/or reference frame users may wish to employ available geodetic utilities to transform positional coordinates across time and between spatial reference frames. In the United States an example is the [Horizontal Time-Dependent Positioning program freely available from the US National Geodetic Survey](#) as both an online service and downloadable standalone program.

Precise satellite orbits and clock corrections are also required and may be obtained first using SurveyGNSS command **Search...Published Space Segment** for as many selected **Observations** as desired (note precise orbits, clock corrections, and ionospheric solutions are published for specific days; users need only select target PPP **Observations** which fall on different days as a basis for command **Search...Published Space Segment**).

Ensure that at a minimum **Edit...Preferences...Vectors...Use Precise Ephemeris** is enabled and simply select all target PPP **Observations** and command **Compute...Autonomous Precise Point Position(s)**. The command will display a tabbed **Reportcontrol** comprised of a gridded summary of all PPP solutions followed by a processing transcript of each calculation if **Edit...Preferences...Vectors...Transcript Content Level** is set to either **Brief** or **Detailed**. The **Position** record for each **Observation** is also updated with the respective PPP solution including coordinates, confidence and correlation estimates, and status (set to Adjusted [green]).