

# Release Notes

## POSPac™ Software

This document contains late-breaking product information, updates, and troubleshooting tips not covered in the Applanix POSPac™ documentation.

- [Introduction](#)
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## Introduction

These Release Notes describe new features and enhancements that are in the Position and Orientation System Post-processing Package (POSPac). For further support information, go to <http://applanix.com/contact.htm#support>.

POSPac is the post-processing software from Applanix Corporation, supporting mobile mapping from airborne, land, and marine platforms. POSPac includes a powerful user-friendly interface to maximize data quality and efficiency.

POSPac is a simple-to-use, integrated suite of software utilities designed to import and process raw data obtained from Applanix POS airborne, land and marine computing equipment. The GNSS-Inertial Toolset incorporates the new Applanix IN-Fusion™ technology and the Applanix SmartBase™ module, which together compute an efficient and accurate GNSS-aided inertial solution based on a network of GNSS reference stations. The patented processing generates a post-processed Virtual Reference Station solution for the GNSS network setup with a built-in database tool, which is then combined with the raw GNSS and inertial data from the POS in a single Kalman Filter. The POSPac MMS and POSPac UAV software also supports standard differential GNSS based processing and tightly integrated Precise Point Positioning (IAPPP) solutions.

The sophisticated design of POSPac's main Graphical User Interface (GUI) displays different types of data including real-time and post-processed data. All data is viewable and selectable in many different ways, including the 2D Plan View, 3D View and Points Spreadsheet.

Version 9.0 Hotfix  
Revision 54  
July 2023



# New Features and Changes

## POSPac 9.0 Hotfix

Release Date: July 2023

### Addressed issues

- Fixed an issue where ephemeris files download can hang on rare occasions during the Data Preview step. This affected both GUI and batch Command Line modes.
- Updated to new precise GLONASS ephemeris service links because CORS has discontinued this product.
- Fixed an issue where the Real Time GAMS Solution plots were not available after import.

# POSPac 9.0

Release Date: May 2023

## GNSS-Inertial Tools

### Additions

- Added support for IN-Fusion+ Single Base (available for all LV and MV products).
- Added support for IN-Fusion+ PP-RTX 2 (available for uncrewed UAV products only).
- Added various LiDAR QC tools enhancements.
- Added support for Initialization without GNSS.
- Added multi-axis support and general UI improvements in DisplayPlot.
- Added IGS long product name support for PPP processing.
- Added support for the MBL navigation solution in NAVDIF.
- Added extraction of Vehicle, Sensor 1 and Sensor 2 frames solutions for AP+ products.
- Added Real Time residual and estimated error diagnostic plots for APX/AP+ products.
- Improved labelling of GNSS signals to be consistent with Real Time display.
- Improved Google KML Trajectory colorization to match the Plan View colorization based on the position RMS.
- Added SWEREF 99 projection in EO and Export.
- Improved Single Base download times with hourly user database base files.
- Added Windows 11 support.
- Updated Trimble Antenna Library to antenna.ini 8.85 and receiver.ini 6.05.
- Added support for AV18 antenna.

### Addressed issues

- Fixed an issue where POSPac unexpectedly crashes when importing rover files from a folder containing a .meta file.
- Fixed an issue where the Primary GNSS nav solution extracted from T04 data can be partially missing after a weekend rollover.

## Software Licensing

- Added Photogrammetry, PPK GNSS Single Base, PPK GNSS SmartBase term licenses.

# POSPac 8.9 Hotfix

Release Date: Feb 2023

## **Addressed issues**

- Fixed an issue in LiDAR QC where processing with the 5 Doubles format LiDAR file causes an error.
- Fixed an issue with Velodyne LiDAR data decoding when a reduced FOV is used.

# POSPac 8.9

Release Date: Dec 2022

## Additions

- Added support for LVX120 (IMU92).
- Added support for RT200 and RT300 extraction.
- Added support for new long IGS product filenames.
- Added support for PhotoID extraction for AP+ AV products.
- Added support for RINEX 3.05 for Compute RTX Coordinates.
- Added support for position fixes and satellite custom events file in batch under <Process><CustomSettings>.
- Added Heave QC plots in DisplayPlots.
- Added Base Station GPS/GLONASS Satellite Lock/Elevation and SNR plots to QC Report.
- Added support for SAR/SFIN mode using remote IMU.
- SmartBase database maintenance to ensure continued reliability.

## Addressed issues

- Fixed an issue where IGS ephemeris file format change caused a SmartBase QC error.
- Fixed an issue where upgrading fails in the Software License Utility with different Windows regional settings (decimal separator).
- Fixed an issue where the following geoid model definitions are incorrect: Canada CGG2010 (NAD83), Canada CGG2013 (NAD83), Canada CGG2013A (NAD83), and Canada Geoid Model HT2\_0.
- Fixed an issue where certain data elements are not carried over from the LQC LiDAR file to the output LAS file.
- Fixed an issue where POSPac will crash if the ImageID field inside a PhotoID file is greater than 48 characters in length.
- Fixed an issue where individual GNSS QC log files from Multi-Single Base processing are deleted.
- Fixed an issue where the NMEA GST output has latitude and longitude error standard deviations reversed.
- Fixed an issue where certain frame definitions are missing in the batch documentation.

# POSPac 8.8

Release Date: Jun 2022

## Additions

- Significantly enhanced base station support for Single Base and SmartBase processing:
  - Added ~1800 base stations to POSPac database (~9000 base stations total worldwide).
  - Added at least 20 services and therefore increased reliability, redundancy and success rate for base station downloads.
  - Improved worldwide coverage.
  - Improved base station coordinates and accuracy.
- Improved overall performance for GNSS-Inertial processing.
- Added support for RINEX 3.05 files.
- Added support for Velodyne VLP-32C files in LiDAR QC Tools.
- Added custom file support for POSPac Cloud processing.
- Added base coordinate survey results to QC Report.
- Added a new batch tag <ElevationMaskAngle> to allow users to configure the elevation mask angle in batch processing.
- Added a new batch tag <LASSolutionType> to allow users to generate a point cloud using *RealTime*, *Corrected*, *Postprocessed*, or *Custom* trajectory.
- Updated Trimble Antenna Library to Antenna.ini 8.76 and receiver.ini 6.00.
- Added Zephyr 3 Rugged, AV28/TW3972, and AV28 w/Ground Plane to the list of supported rover antennas.
- Suppressed the Data Preview window for a speed improvement.

## Addressed issues

- Fixed an issue where POSPac may crash when running PP-RTX.
- Fixed an issue where the <InitialAttitudeSource> tag is ignored in batch processing.
- Fixed an issue where base coordinate survey returns the wrong coordinates.
- Fixed an issue where the intensity value in the LQC format was not properly scaled in LASCcreator.
- Fixed an issue where the Gimbal to IMU Lever Arm values were not displaying correctly in the QC Report.
- Fixed an issue where GAMS does not re-run when the rover antenna was changed.

# POSPac 8.7 SP2

Release Date: Feb 2022

## Additions

- Added support for AP+ LV products.
- Improved overall performance for GNSS-Inertial processing in poor GNSS environments.
- Improved performance for all products using IMU89.
- Improved performance for APX-20 and AP+20 (IMU90).
- Improved GNSS outage performance for all LV products.
- Improved GAMS performance for all LV products.
- Added support for multiple LiDAR blocks in a single batch project.
- Added support for drag and drop of a valid .posbat file into the batch manager window.

## Addressed issues

- Fixed an issue where available RINEX3 base stations are not always downloaded.
- Fixed an issue where POSPac closes unexpectedly when running EO or Export with British National Grid Projection.
- Fixed an issue where POSPac will fail to launch because the VC++2019 redistributables are required but the prerequisite fails to install.
- Fixed an issue where running QC Report in a SmartBase project with user-defined base stations and IDs will cause an exception.
- Fixed an issue where missing leap seconds in ephemeris files can cause an error.

## Software Licensing

- Added a warning message to alert the user of near-expiring term licenses.
- Fixed an issue with LiDAR QC term license failure with LV datasets.

# POSPac 8.7 SP1

Release Date: Nov 2021

## **GNSS-Inertial Tools**

### **Addressed issues**

- Fixed an issue where differential corrections in multi-single base mode were not processed correctly in batch mode.



# POSPac 8.7 Hotfix

Release Date: Oct 2021

## GNSS-Inertial Tools

### Addressed issues

- Fixed an issue where the SmartBase processor fails to run for the default SmartBase configurations.

## Software Licensing

- Fixed an issue where users cannot activate/revoke licenses in certain scenarios with Software License Utility v8.7.
- Fixed an issue where the LiDAR QC term license did not provide trajectory adjustment for LV datasets.
- Fixed an issue where the Software License Utility may cause PP-RTX license issues and prevent PP-RTX from working properly. [Customers are required to click the Upgrade button in the Software License Utility to ensure proper PP-RTX usage.]
- Fixed an issue where PP-RTX subscription licenses did not work properly with POSPac UAV/UAV Lite GNSS-Inertial licenses.

# POSPac 8.7

Release Date: Aug 2021

## GNSS-Inertial Tools

### Additions

- Migrated Applanix licensing services to a cloud hosted service to improve robustness, and to enable additional features.
- Added support for RINEX3 format (base station services and user-imported base station files) for SmartBase.
- Added support for long file naming conventions from base station services.
- Improved overall performance for GNSS-Inertial processing.
- Added support for Term licenses.
- Added a new subscription license dedicated for the UAV VLOS market: PP-RTX for UAV.
- Added support for SmartBase in batch for a purely user-defined network.
- Added support to enter base station LLH coordinates in decimal degrees for batch processing.
- Added support to read base coordinate from the User Database in batch mode.
- Added Custom Smoothed BET UTC export profile.

### Addressed issues

- Fixed an issue where POSPac UAV Command Line QC fails to import DGaaS datasets.
- Fixed an issue with spikes in the SBET for land applications.
- Fixed an issue where ephemeris download hangs due to missing Trimble ephemeris.
- Fixed an issue where ephemeris download hangs when there is no internet connection.
- Fixed an issue where exporting a MultiSingle Base solution throws an error.
- Fixed an issue where the <RealTime> tag for LiDAR QC is not respected.
- Fixed an issue where POSPac CL QC fails to import DGaaS data.
- Fixed an issue where the tabular view in DisplayPlot was not showing the properly decimated points.
- Fixed an issue where ASCII/Custom profile exports incorrect standard deviation values.
- Fixed an issue where the rotation parameters were incorrect between GDA94 and GDA2020.
- Fixed an issue where noise from a secondary antenna input causes processing issues with GAMS on by default.
- Fixed an issue where manual vs. batch processing may result in differences caused by mismatch of antenna IDs.

## Software Licensing

- Added a warning message when the user checks out a license onto the same computer where the license was activated.

# POSPac 8.6 SP1 Hotfix

Release Date: June 2021

## **GNSS-Inertial Tools**

### **Additions**

- Added support for HTTPS protocol for CORS/ALTCORS downloads.

### **Addressed issues**

- Fixed an issue where POSPac UAV Command Line QC fails to import DGaaS datasets.

# POSPac 8.6 SP1

Release Date: May 2021

## GNSS-Inertial Tools

### Additions

- Added support for POS LV400 (IMU89).
- Improved performance of IMU42 and IMU82 for POS LV products.
- Improved performance of IMU44 and IMU57 for POS AV products.
- Improved performance of IMU57 for AP+ products.
- Added support for TrueHeave extraction and display.
- Updated base station service paths for CORS, ALTCORS, EPN, FLEPOS, OLG, and EUREF.
- Updated batch validation logic for mapping frame definition.

### Addressed issues

- Fixed an issue where user-specified single base did not honour custom processing start/end time.
- Fixed an issue where some RINEX files were causing an exception on import.
- Fixed an issue where logged gimbal data in AP+ AV products were not applied by default.

# POSPac MMS 8.6 and POSPac UAV 8.6

Release Date: Jan 2021

## GNSS-Inertial Tools

### Additions

- Added support for automatic GNSS lever arm calibration.
- Added support for LV LiDAR QC Tools for boresight calibration.
- Added support for AP+30 LV (IMU82).
- Added support for .crx extension for compact RINEX 3.02 and later versions.
- Improved performance for AP+60 (IMU57), LV610/620 (IMU57).
- Improved performance for AP+50 LV (IMU31, IMU46, IMU80), LV510/520 (IMU31, IMU46, IMU80).
- Added support for HTTPS protocol for CDDIS downloads.
- Added support for new CORS/ALTCORS/CDDIS/KASI Dailyobs FTP format.
- Added support for France Lambert 93 system.
- Added support for OSTN15\_OSGM15 British grid.
- Added support for RAF18 (France) geoid model.
- Updated the DHDN datum transformation parameters.
- Updated the default frame and epoch for base station import to ITRF (Mission Epoch).
- Added a global setting for the default mapping frame for base station import.
- Updated the Trimble antenna/receiver configuration files database.
- Added support for PPK.xml QC Report template for RINEX rover processing.
- Added support for velocity parameters in the Mapping Frame Parameters dialog.
- Added support for GPS only tag in batch for GNSS and GNSS-Inertial processing.
- Added support for Start and End processing time tags in batch processing.
- Added option to disable Position Filter in batch processing.

### Addressed issues

- Fixed an issue where LiDAR QC Tools fails to run in Command Line processing mode.
- Fixed an issue where shortcut links from the Start menu in Windows were missing.
- Fixed an issue where the MultiSingleBase processor generates a bogus >50km warning.
- Fixed an issue where the RAF09, RAF98, OSGM02(UK), OSGM91(UK) geoid models throw an error when used.
- Fixed an issue where Navdif GUI options are hidden in Chinese Windows.
- Fixed an issue where SmartBase QC throws an error if a disabled station exists in the project.
- Fixed an issue where the time interval and offset settings in LiDAR QC Tools were not working for LAS Creator.
- Fixed an issue where RINEX data cannot be processed when the mixed ephemeris data is missing the leap second information.

## Software Licensing

- Added dual locking code support.
- Fixed an issue where certain licenses do not show in the Software License Utility if the previous license file contained PP-RTX license.
- Fixed an issue where the Software License Utility may crash when remote checking out a feature with long names.

# POSPac MMS 8.5 and POSpac UAV 8.5

Release Date: July 2020

## GNSS-Inertial Tools

### Additions

- Added support for AP+ AV products: AP+18 (IMU79), AP+18 EI (IMU69), AP+30 (IMU82), AP+50 (IMU91), AP+60 (IMU57).
- Added support for POS AV 510/520 (IMU91).
- Improved performance for APX AV products: APX15, APX18, APX15EI, APX8, APX20.
- Improved performance for POS LV products: LV120, LV125.
- Improved performance for POS MV SurfMaster and SurfMaster One products.
- Fixed an issue where the reported SBET RMS was pessimistic for low grade APX products.
- Improved performance and usability for LiDAR QC Tools.
- Added support for processing RINEX rover.
- Added support for RINEX 3.04 files.
- Improved GNSS QC performance and bug fixes for PP-RTX, Single Base, and SmartBase processing modes.
- Added GAMS support for dual-antenna APX datasets that do not contain Real-Time GNSS Compass.
- Added Support for generic multi-column ASCII events file in PhotoID File creator/editor.
- Added support for QZSS L1SAIF decoding.
- Added support to show the Real-Time solution status plots even after post processing.
- Added support to convert Trimble T01/T02/T04 files to Google KMZ format.
- Added support for PFIxes in POS TG products.
- Added support to download mixed broadcast ephemeris files for all GNSS constellations from IGS for RINEX rover.
- Added functionality to save the project as a batch file containing all project settings.
- Updated the Trimble antenna/receiver configuration files database.
- Enabled the Velocity tab in Coordinate Manager for non-fixed base stations.
- Added support for ETRF2000 and ETRF2014.
- Added support for Hong Kong geoid model.
- Added support for NGS Geoid18 for Conterminous US and Puerto Rico.

### Addressed issues

- Fixed an issue where the mapping frame in the <Bsci> tag was not applied in Single Base batch mode.
- Fixed an issue where some Single Base options were missing in Batch Editor.
- Fixed an issue where DisplayPlot may truncate the IMU data.
- Fixed an issue where exported UTC time shows -0.000 periodically.



- Fixed an issue extracting rover data containing RTK differential corrections on the same day would fail due to incomplete Trimble ephemeris,
- Fixed an issue where POSPac was unable to process APX data using the secondary receiver as primary.
- Fixed an issue where DisplayPlot would crash when certain diagnostic groups were logged in Real-Time.
- Fixed an issue where the transformation parameters for GDA2020 were incorrectly used.
- Fixed an issue where Beidou, Galileo, and QZSS Satellite and Elevation plots were missing from the QC Report.
- Fixed an issue where GNSS QC plots from SmartBase processing were missing from the QC Report.

## Software Licensing

- Added a comprehensive log file with licensing history under “C:\Program Files (x86)\Applanix\SoftwareLicenseUtility”. It also contains the MAC address and the associated locking code if the locking code has changed.
- Fixed an issue where the standalone Software License Utility sometimes does not work in a clean machine.
- Added a warning message when commuted licenses are not checked in prior to upgrading the license.
- Fixed an issue where upgrading license to the same version causes the license to deactivate and not reactivate.

# POSPac CL QC 8.4 SP2 Hotfix

Release Date: April 2020

## **GNSS-Inertial Tools**

### **Additions**

- Improved security of POSPac UAV Command Line QC.

# POSPac MMS 8.4 SP2 and POSPac UAV 8.4 SP2

Release Date: Dec 2019

## GNSS-Inertial Tools

### Additions

- Improved performance for IMU59, IMU69, and IMU79 for APX AV and APX LV products.
- Updated SmartBase database coordinates, and also added 658 base stations to the database.
- Updated the Trimble antenna/receiver configuration files database.
- Added support for AV18 antenna.
- Added support for onboard and remote IMU mounted on the same gimbaled platform.
- Improved GNSS QC performance for PP-RTX, Single Base, and SmartBase processing modes.
- Added new plots in QC Report.
- Improved the processing speed in NAVDIF.
- Removed POSGNSS from POSPac installer.

### Addressed issues

- Fixed an issue where data in which Group 10002 is logged crashes POSPac.
- Fixed an issue where exported data from DisplayPlot is missing header information.
- Fixed an issue where processing with differential correction base causes POSPac to crash.
- Fixed an issue where the NZGD2000 to ITRF2000 transformation parameters were incorrect.

# POSPac MMS 8.4 SP1 Hotfix and POSPac UAV 8.4 SP1 Hotfix

**Release Date: Oct 2019**

## **GNSS-Inertial Tools**

This is a full installer release that includes the changes in the RTX Configuration Update Utility.

### **Addressed issues**

- This update incorporates several important changes which will reduce processing time, increase service uptime and improve overall performance for Post-processed Centerpoint RTX (PP-RTX)

# POSPac RTX Configuration Update Utility 8.4.1

Release Date: Oct 2019

## **GNSS-Inertial Tools**

### **Addressed issues**

- This update incorporates several important changes which will reduce processing time, increase service uptime and improve overall performance for Post-processed Centerpoint RTX (PP-RTX)

# POSPac MMS 8.4 SP1 and POSPac UAV 8.4 SP1

Release Date: Sept 2019

## GNSS-Inertial Tools

### Addressed issues

- Fixed an issue where POS data import may abort on first import attempt.
- Fixed an issue where SmartSelect throws an error sometimes if there are <6 stations available for download.
- Fixed two issues where differential correction bases are not correctly decoded.
- Fixed an issue where checking “Remote IMU attached to airframe” causes a timing issue when remote IMU is not present.
- Fixed an issue where <OutputRateInterval> in batch processing is not being used.
- Fixed an issue where setting rover antenna type does not trigger GNSS QC through file properties menu of the raw file.

# POSPac MMS 8.4 Hotfix and POSPac UAV 8.4 Hotfix

Release Date: Aug 2019

## **GNSS-Inertial Tools**

### **Addressed issues**

- Fixed an issue during PCAP data conversion in LiDAR QC Tools.
- Fixed an issue where POSPac hangs after rover import, which is caused by bad GLONASS ephemeris data.
- Fixed an issue where the Reference to Output lever arm values were not correctly extracted.

# POSPac MMS 8.4 and POSPac UAV 8.4

Release Date: June 2019

## GNSS-Inertial Tools

### Additions

- Added support for LiDAR QC Tools.
- Added support for GNSS-denied data.
- Added support for BD992 receivers.
- Added support for QZSS PRN 199.
- Added support for GALILEO processing.
- Added support for external user base stations in SmartBase mode in batch processing.
- Added support for RTK corrections and MultiSingleBase processing in Command Line batch processing.
- Added support for VRS moving base as a RTK correction source (CMR and RTCM).
- Improved performance of IMU71 for UAV applications.
- Improved performance of IMU36 for MV applications.
- Added support for remote IMU installation parameters in batch processing.
- Added absolute GPS time as time format in Export.
- Added support for AusGeoid2020 geoid model.
- Added Total Velocity to custom profiles for Export.
- Added network and host mask in the extract log.
- Updated the Trimble antenna/receiver configuration files database.
- Updated the ConvertToRINEX utility to v3.09.11.

### Addressed issues

- Fixed an issue where some APX-18 datasets could not be imported into POSPac UAV.
- Fixed an issue where the GNSS compass vector was incorrectly calculated.
- Fixed an issue where POSPac was incorrectly decoding GNSS observables for BD982.
- Fixed an issue where CMR/RTCM datasets crashes upon import.
- Fixed an issue where the EO/Export output file was in the project directory instead of the expected default EO/Export folder.
- Fixed an issue where the exported filenames from Display Plots were incorrect.
- Fixed an issue where batch processing was incorrectly using ETRS89 datum.
- Fixed an issue where Event and Photold time shift were not being applied in batch EO processing.
- Fixed an issue where the QC Report was missing SmartBase information for user imported base stations.
- Fixed an issue where QC report was missing the Export/EO summary in certain use cases.
- Fixed an issue where units were inconsistent between parameters in the GUI and the QC Report.



- Fixed an issue where empty ephemeris files were triggering bogus warning messages in Find Base Station.
- Fixed an issue where the CTRF2000 reference epoch was incorrectly set to 1997 instead of 2000.
- Fixed an issue where Command Line batch did not respect the <ScaleHeightOutput> tag.
- Fixed an issue where the Export time was incorrect at the integer second rollover.
- Fixed an issue where the GNSS QC processor progress bar was improperly representing the actual progress.
- Fixed an issue where the time format HH:MM:SS.SSS was missing the leading zeros for single digit hours.

## Software Licensing

- Added version information in the Software License Utility.

# POSPac MMS 8.3 SP3 and POSPac UAV 8.3 SP3

Release Date: Dec 2018

## **GNSS-Inertial Tools**

### **Additions**

- Improved performance of IMU82 for APX AV products.
- Improved performance of IMU82 for AV, LV and MV products.
- Improved performance of IMU86 for AV products.

### **Addressed issues**

- Fixed an issue where PP-RTX processing causes POSPac to crash.

# POSPac MMS 8.3 SP2 and POSPac UAV 8.3 SP2

Release Date: Nov 2018

## **GNSS-Inertial Tools**

### **Additions**

- Added support for IMU82 for APX-20 UAV.
- Added support for IMU86 for AV510M and AP50M.
- Faster heading alignment performance for APX-15 UAV products.

### **Addressed issues**

- Added missing Zephyr Geodetic 3 antenna model.

# POSPac MMS 8.3 SP1 and POSPac UAV 8.3 SP1

Release Date: Aug 2018

## GNSS-Inertial Tools

### Additions

- Improved the vertical performance in DR mode with various IMUs.
- Added support for APX DGaaS products with upgraded firmware.
- Improved the vertical performance for compute RTX for the unknown antenna case.
- Added support for RTXBase mode in batch Command Line and GUI. Details can be found in ...\\POSPac MMS 8.3\\Manuals\\Batch Documentation\\index.html
- Improved Preview Network functionality by differentiating user and SmartBase database stations.

### Addressed issues

- Fixed an issue where POSPac UAV cannot process datasets with heading sensor data.
- Fixed an issue where reopening saved project containing QC Report or Published data causes an exception.
- Fixed an issue where the exported time records for GGA and ZDA messages are incorrectly rounded.
- Fixed an issue where the GLONASS SV numbers are incorrectly exported in NMEA GSV messages.
- Fixed an issue where the start/end time is incorrectly set in View Epoch command.
- Fixed an issue where Display Plot crashes when Swedish letters are used in the project path.
- Fixed an issue where the antenna type for CMR/RTCM bases remains as the default antenna even though it is changed.
- Fixed an issue where selecting GDA2020 from the Frame tab in Coordinate Manager causes an exception.
- Fixed an issue where unit labels are incorrect for user defined 7-parameter datum.

### CalQC

- Fixed a CalQC calibration failure with Helmert transformations.

# POSPac MMS 8.3 and POSPac UAV 8.3

Release Date: May 2018

## GNSS-Inertial Tools

### Additions

- Added support for remote IMU processing for APX15-EI products.
- Added synthesized gimbal data processing with remote IMU data for APX15-EI products. This is in the manual and batch mode.
- Added support for GNSS-only processing in Applanix SmartBase, Single Base and PP-RTX modes in manual and batch mode.
- Improved performance of IMU59 for APX AV products.
- Improved performance of Applanix SmartBase and single base products for AV products
- Added GSI reference stations back to the base station database.
- Added support for IMU71 for LV and MV products.
- Added support for IMU82 for AV, LV and MV products.
- Added support for OMNISTar G2+, G4 and G4+ processing mode in Primary GNSS Nav mode.

### Addressed issues

- Fixed an issue where the reported SBET RMS was pessimistic for IMU44.
- Fixed an issue in differential correction and multi-single base modes where the antenna phase center corrections were not applied.
- Fixed an issue where the Mapping Frame Dialog target epoch for fixed frames (e.g. ETRS89) was set to the mission epoch instead of the frame epoch.
- Fixed an issue where QC Report generation crashed when processing in multi-single base mode.
- Fixed an issue where the POS and Exported NMEA timestamps were off by 1 hour.
- Fixed an issue where the East Velocity in the Real Time Trajectory, Reference Frame plot was incorrect.
- Fixed an issue where the units were incorrect for user defined 7 parameter datum.
- Fixed an issue where the antenna phase center corrections were not applied to the rover and base observables when the rover antenna AT1675-540TS is selected.
- Fixed an issue where QC Report generation failed when a single minimal EO or Export was defined in a batch file.

## CalQC

- Added support for MIDAS Canon EOS 5DSR 100 \ 135 cameras

# POSPac MMS 8.2 and POSPac UAV 8.2

Release Date: Dec 2017

## GNSS-Inertial Tools

### Additions

- Added automatic generation of a QC report in PDF format for each project to provide users with a concise diagnostic report on their data processing.
- Added automatic Publishing module for each project to provide users with a single zipped file. This zipped file contains all the necessary outputs generated from processing as well as the log files required for QC.
- Added support for APX LV Human Portable mode.
- Added support for logged differential correction processing for APX products.
- Added support for gimbal mount processing for APX-15 UAV products.
- Added support for APX-18 UAV products.
- Added GNSS Reference station preview feature in Find Base Station function.
- Added Coordinate Manager accessibility for logged differential base stations.
- Added support for 125 new Geoid models.
- Added Real Time estimated DMI scale factor plots with export support.
- Added ECEF position RMS output in Export function.
- Improved performance during GNSS data gaps.
- Improved performance for IN-Fusion PP-RTX processing mode.
- Removed some GNSS Reference station service providers in accordance with their terms of use. These services must be added manually by the User as part of the User Database in order to maintain the same base station database.
- Updated the Trimble antenna/receiver configuration files data base.
- Added `-qc` argument in command line processing to terminate processing at the end of the GNSS QC step.
- Added GNSS heading processing for APX-18 UAV.
- Added support for GDA2020.
- Updated DSS Imaging Tools to better support running under Windows 10. Updated RapidOrtho and InFlight-Ortho to use the latest releases of both OrthoMaster and POSPac MMS.
- Updated Inpho UAS Master project POSEO export profile to include the Inpho project version and XYX, OPK RMS values for each record.

### Addressed issues

- IGS has decommissioned ephemeris download. POSPac will now use CDDIS instead.
- Updated POSPac to be in sync with the FTP address change from CODE. This was affecting PPP downloads in POSPac.
- Fixed an issue where the proxy settings were missing in the *Options -> Internet Download* page.

- Fixed an issue where SmartBase QC fails with Windows 10 German language pack.
- Fixed an issue where some RTCM or CMR datasets crashed in POSPac.
- Fixed an issue where the username and password for GNSS service providers may not be saved.
- Fixed an issue where SmartBase generation fails for datasets longer than 24 hours.
- Fixed an issue where co-installed Sentinel drivers can cause conflicts. This Sentinel driver is now an optional component under custom installation.

## **Software Licensing**

- Fixed an issue where an EID cannot be activated again until the PP-RTX feature has expired.
- Fixed an issue where the Software License Utility hangs if the PP-RTX feature expires before the commuted license expiry date.

# POSPac MMS 8.1 and POSPac UAV 8.1

Release Date: June 2017

## GNSS-Inertial Tools

### Additions

- Added IMU data gap scanning in batch mode (command line only) to determine the processable window times, which can then be used to manually create a new batch with the segmented projects.
- Added multiple export and EO outputs in batch mode (command line only).
- Added new tags in batch (command line only) to enable/disable DMI and/or GAMS.
- Added Single Base fallback processing in the event of a SmartBase failure in batch mode (command line only).
- Improved performance for PP-RTX processing mode.
- Added faster PP-RTX convergence in the Europe region and selected North American regions.
- Improved performance for APX LV during stationary periods.
- Improved performance for APX LV when DMI is not available.
- Improved performance of IMU36 and IMU38 for marine applications.
- Re-designed GUI for Custom Export:
  - Added additional parameters in Header, Data Record, and Footer.
  - Reorganized Header, Data Record, and Footer items.
  - Added additional time formats and the ability to output in GPS or UTC time.
  - Added user-defined custom date time formatting with user defined codes.
  - Added option to export the Calibrated Installation Parameters.
- Added the option to set the maximum search radius for GNSS stations in Find Base Stations -> Search Options.
- Added the ability to process to the end of IMU data interval if any PFI is configured outside of the primary GNSS observables data interval.
- Added the option to select a specific event file for export.
- Updated Trimble antenna/receiver config files.
- Updated the ConvertToRINEX utility to v2.90.0, which contains the leap second correction.
- Added the option to show the *Raw Data Check In* window when user imports base stations through Find Base Stations.
- Added support for ITRF2014.
- Added support for APX-15 with firmware v5.22.
- Added support for IMU71.
- Changed the default Display window size for better visibility.
- Added support for ITRF96 and ITRF97.
- Added support for CTRF2000.



## Addressed issues

- Fixed an issue where custom export file with NMEA messages contained an extra new line after the end of each message and epoch.
- Fixed an issue where POSPac outputs an incorrect NMEA date timestamp at around midnight.
- Fixed an issue where NMEA output would cause an error in POSPac when APX datasets are used.
- Fixed an issue where omega/phi/kappa values cannot be exported if no event file exists.
- Fixed an issue where the PFIX coordinate transformation is incorrect if the PFIX is defined in ITRF00 (1997.00) frame.
- Fixed an issue where having a few DMI records can cause POSPac to fail to import the data.
- Fixed an issue where using POSPav UAV in command line fails when using the command line option `-m UAV`.
- Fixed an issue where POSPac hangs upon start up when attempting to check for updates.
- Fixed an issue where POSPac crashes when importing a T01 file.
- Fixed an issue where early termination of the secondary GNSS data prevents the user from processing the entire dataset.
- Fixed an issue where the Position Fixes and Satellite Events window did not retain its size from the previous session.
- Fixed an issue where Multi-Single Base mode hangs for datasets where the base data does not cover the entirety of the rover data.
- Fixed an issue where IMU jitter can prevent processing. POSPac will now issue a warning but still able to process the data.
- Fixed an issue where datasets with OmniStar would display incorrect modes.
- Fixed an issue where the PPP Rapid Ionosphere model cannot be downloaded because the path was changed.

## Software Licensing

- Added remote commute functionality in Software License Utility.

# POSPac MMS 8.0 SP1 and POSPac UAV 8.0 SP1

Release Date: March 2017

## **GNSS-Inertial Tools**

### **Additions**

- Added support for the following systems:
  - POS AV510/520 (IMU 80)
  - POS LV510/520 (IMU 80)

### **Addressed issues**

- Fixed an issue where POSPac hangs in Windows Server 2012 when accessed via Remote Desktop.
- Fixed an issue where changing the date or number format in Windows Control Panel causes POSPac to crash on launch.
- Fixed an issue where POSPac does not work properly under a non-English display language setting in Windows.

# POSPac MMS 8.0 and POSPac UAV 8.0

Release Date: Nov 2016

## GNSS-Inertial Tools

### Additions

- Introduced Post-processed CenterPoint™ RTX (PP-RTX)-aided-inertial processing as a new processing mode for all products, which provides centimetre level post-processed positioning accuracies without the use of local reference stations. Available as a 6 or 12 month subscription, this new method integrates the Trimble® CenterPoint™ RTX technology directly into POSPac without the need of a real-time subscription.
- Rebuilt POSPac MMS and UAV as full 64-bit applications providing processing speed improvements (~18% for Single Base, ~14% for SmartBase).
- Added a feature to survey user base station coordinates using Trimble® RTX service in manual and batch modes.
- Re-designed POSPac menus and toolbars for a more streamlined work flow.
- Added RINEX 3.02 support for tightly-coupled and loosely-coupled Single Base and Multi-Single Base processing modes.
- Added RTCM 3.2 support with QZSS observation data.
- Improved vertical estimation performance for downtown LV datasets.
- Added an option to use the real time reference to primary lever arm standard deviation for APX products.
- Added support for OmniStar dual modes.
- Enhanced the message logs for Export and EO to contain mapping frame parameters.
- Updated the default almanac for Trimble Planning software.
- Added an option to ignore real time RTK solution for In-Fusion Autonomous and In-Fusion PPP processing modes.
- Added Hong Kong 1980 local datum transformation parameters into the default mapping frame parameters.
- Updated Trimble antenna/receiver config files.
- Support of AV14, NavCom SF3040, Tallysman TWI3870, etc.
- Updated SmartBase database coordinates, and also added 753 base stations to the database.
- Updated the ConvertToRINEX utility to v2.50.0.
- Added Display and NAVDIF support for Sensor 1 and Sensor 2 frame data.
- Added official Windows 10 support.

### Addressed issues

- Fixed an issue where the Project Explorer pane did not properly show ephemeris files after they were downloaded and imported.
- Fixed an issue where the Oblique Mercator projection is incorrect for locations west of the projection center.

- Fixed an issue where correction bases are missing in the plan view for recently logged datasets.
- Fixed an issue where the transformation from NAD83 (2011) to ITRF00 did not apply plate corrections.
- Fixed an issue where the Nav-Ref Orientation parameters entered in NAVDIF GUI were misinterpreted as radians when it should be used as degrees.

## Software Licensing

- Added PP-RTX subscription license.
- Node-locked license has been discontinued - Single licenses can now be shared between computers on the same network without the need of a separate server license.
- Added QC licenses for Single-Base, SmartBase, and PP-RTX modes. Users can commute out these QC licenses for on-site rover data quality checking.
- The Software License Utility now shows more useful commuter information.
- The Software License Utility now displays the latest entitlement ID (EID).
- Fixed an issue where Beta license will replace existing license when using the Import License utility.

## CalQC

- Added WGS84 height option.
- Added K4, K5 terms for radial lens distortion.

# POSPac MMS 7.2 and POSPac UAV 7.2

Release Date: Mar 2016

## GNSS-Inertial Tools

### Additions

- Improved Single Base and SmartBase performance using advanced tropospheric delay modelling and antenna calibrations.
- Improved performance of post-processed Trimble RTX data.
- Added support for heading initialization from magnetic heading for APX products.
- Added supports for the inertial sensor saturation detection and processing time adjustment for APX products.
- Added support for multiple event streams in T04 data.
- Added support for CMR2 and RTCM3.
- Added support for position fix functionality for AV products.
- Added support for post-processed Trimble RTX for AV, LV, and APX products.
- Improved RTK Corrections Single Base solution performance by running GNSS QC.
- Improved MultiSingleBase (MSB) generation speed by adding multithreaded support; improved MSB solution performance by running GNSS QC on each of the base stations.
- Updated Trimble antenna/receiver config files.
- Updated the ConvertToRINEX utility to v2.29.0.
- Added POSPacBatch.exe as part of the installer to run a command line version of POSPac.

### Addressed issues

- Fixed an issue where some T04 datasets are causing exceptions upon import.
- Fixed an issue where the prompt for continuing long baseline processing is reversed for 'Yes' and 'No'.
- Fixed an issue where the custom export of NMEA message GSA incorrectly displayed zero PDOP values.
- Fixed an issue where export only allowed down-sampled output to a maximum of 100 seconds under 'Output Rate'.
- Fixed an issue where the aircraft to reference mounting angles are not extracted correctly for APX products.
- Updated UNAVCO FTP path for high rate data.

## Software Licensing

- Software License Utility can now show users which computer checked out a feature.
- Fixed an issue where the License Software Utility could not be installed due to a failed script in the installer.
- Fixed an issue where non-POSPac applications that use Safenet license can introduce POSPac license errors.
- Fixed an issue where Chinese customers are unable to activate or deactivate software licenses.

# POSPac MMS 7.1 SP3 and POSPac UAV 7.1 SP3

Release Date: Nov 2015

## GNSS-Inertial Tools

### Additions

- Added support for the following systems:
  - IMU 64
  - IMU 44
  - POS LV125 (IMU 69)
  - POS MV SurfMaster One
  - APX15 for Land
- Added multipath settings in .posbat batch file.
- Added GAMS installation accuracy parameters in Message 21. These parameters are specified by the user in real time and can be found in the message log and hardware config file.
- Added GAMS lever arm plots under Calibrated Installation Parameters.
- Added real time trajectory and performance metrics plots in reference frame for LV. This is in addition to the existing real time trajectory and performance metric plots in vehicle frame.

### CalQC

- Improved memory usage for handling large projects.
- Added the ability to export Adjusted EO parameters to a text file.
- Added the generation of a log file for Model Based Ground Points.
- Resolved inconsistencies between CalQC and USGS format lens distortion coefficients.

# POSPac MMS 7.1 SP2 and POSPac UAV 7.1 SP2

Release Date: June 2015

## GNSS-Inertial Tools

### Additions

- Added support for Beidou and QZSS satellite systems for GNSS-Inertial and GNSS QC processing in Single Base mode. This includes the updates of satellite observable and QC data plots as well as the relevant message logs and statistics to include Beidou and QZSS. Same with GPS and GLONASS, Beidou and QZSS satellites can be disabled under Project Settings.
- Improved PPK performance.
- Added support for IMU69 and POS MV SurfMaster IP68 (IMU70).

### Addressed issues

- Fixed an issue where certain plots cannot be viewed simultaneously.
- Increased batch manager 'batch name' and 'project name' character limit for better legibility.
- Fixed an issue where datasets cannot be processed fully in some corner cases.

## Software Licensing

- Users may activate and deactivate a node lock license without having to contact customer support.



# POSPac MMS 7.1 SP1 and POSPac UAV 7.1

Release Date: Feb 2015

## GNSS-Inertial Tools

### Additions

- Improvement of navigation performance and robustness.
- Added support for Smart Select Single Base in manual mode. This was previously only supported in batch mode.
- Added support for T0x base in batch.
- Updated GNSS QC display design to provide more information and in a more organized manner.
- Updated the GUI for the Find Base Station window.
- Improved diagnostic logs for T0x rover and base files.
- Added the capability of specifying an IMU time offset for APX-15 systems.
- Added unrepairable inertial data gap detection along with a GUI for time interval selection.
- Added support for MV120 and MV320 systems.

### Addressed issues

- Fixed an issue where IN-Fusion Single Base and IN-Fusion SmartBase may not process in corner cases.
- Fixed an issue where incorrect update notification window is shown.
- Fixed an issue where using illegal characters in the project name in batch caused an exception. Appropriate warning window is now shown.
- Fixed an issue where OLG high-rate data cannot be downloaded.
- Various warning dialogs/windows are automatically bypassed during batch processing to avoid requiring user's input.
- Fixed an issue where downloading FLEPOS data did not provide download progress.

### Updates

- Updated Trimble Antenna Config

## Photogrammetry Tools

### CalQC fixes and enhancements

- Fixed an issue where CalQC can crash if the photoID file is selected under "Project Files" and if the focal length is zero.
- Fixed an issue where GCP report is missing some GCPs.
- Added support for DSS560A camera.

## Software Licensing

- Added software licensing for POSPac UAV.
- Added support of proxy setup for the Software License Utility.
- Fixed an issue where manually revoking multiple license tickets will overwrite the previous one without warning.

# POSPac MMS 7.1 and POSPac UAV 7.1

Release Date: Dec 2014

## GNSS-Inertial Tools

### Additions

- Improved RTK performance.
- Added IN-Fusion GNSS Nav Single Base processing mode.
- Added IN-Fusion GNSS Nav SmartBase processing mode.
- Added new GNSS QC processor to check the quality of GNSS observables before running GNSS-Inertial processing.
- Improved GAMS algorithm to assist the GNSS-Inertial processor.
- Added lever arm estimation option for GAMS.
- Added support of user-chosen frames for imported PFIxes.
- Added the capability for the user to define the target epoch for export, so that the tectonic plate corrections bring the data to target epoch rather than the datum's reference epoch.
- Added support of high rate data downloads for Trignet (South Africa) and ReNEP (Portugal service).
- Added support of long station names for SWEPOS FTP service.
- Added fields in batch file for reference to IMU lever arms, reference to IMU mounting angles, reference to DMI lever arms, GAMS lever arms.
- Increased observable buffer size to accommodate increased satellites and signals.
- Support of Windows 8.0 and Windows 8.1.
- Added diagnostic logs for event guard times and PPS out shape control for uPOS.
- Added SWEREF99 as a new mapping frame.
- Added user name and password fields in the GUI for GSI FTP data services.

### Addressed issues

- Fixed an issue where navigation data gaps are reported when the receiver tracks 25 or more satellites.
- Various warning dialogs/windows are automatically bypassed during batch processing to avoid requiring user's input.
- Fixed an issue where some POS files are recognized as Trimble real-time format.

## Updates

- Updated SmartBase database.
- Updated the ConvertToRINEX utility to version 2.2.5
- Updated Trimble Antenna Config
  - Support of AT1675-540TS

## Photogrammetry Tools

### CalQC fixes and enhancements

- Added 'Scale the Height Output' option for EO generation.
- Improved error reporting for missing USB licenses.
- Fixed issue with Select Folder dialog not appearing.
- Added ability to generate EO at user-specified target epoch.

## Software Licensing

- Software Licence Utility now shows the number of feature licenses from the license server when launched.
- Users can now configure the number of days for commuted licenses.
- License Server from Software License Utility now provides relevant statistical information.
- Fixed an issue where deactivating license causes an error when a non-server computer has commuted one set of license.
- Fixed an issue where expired commuted license will cause an error every time the Software License utility is launched.

# POSPac MMS 7.0

Release Date: April 2014

## GNSS-Inertial Tools

### Additions

- A batch project file can be created (XML format) without the use of the POSPac GUI or the use of template files. POSPac is backwards compatible with using previous versions of batch project files.
- Various warning dialogs/windows are automatically bypassed during batch processing to avoid requiring user's input.
- POSPac now supports Smart Select and download of base stations from both SmartBase Database and User Database to improve the SmartBase performance and availability.
- POSPac now supports Auto Select & download of a base station from both SmartBase Database and User Database for SingleBase processing in batch.
- POSPac now supports station matching feature for reference stations that are manually imported.
- POSPac will automatically choose the next best Primary Station and rerun SmartBase generation when possible if the original chosen Primary Station returned VRS low percentage warning messages.
- Batch logs are now updated after each project is processed in order to provide useful information in the event of a crash.
- Default initial heading method for POS LV115 and POS LV125 has been changed to GNSS track heading for better initialization.
- Further inertial navigation tuning for better performance.
- Added Primary Marinestar Nav as a GNSS Mode for the GNSS-Inertial Processor. The appropriate solution status will be displayed in Display Plots.
- Added support for AV 220, AV 320, and AV 420.
- Added support for decoding PNCTGGA messages in AUX processing mode.

### Addressed issues

- Fixed a GUI bug in defining the lever arm values in Export.
- Fixed an issue where improper FDIR 3 warnings are triggered in reverse processing.
- Fixed a GUI bug where incorrect frame is set and the Mapping Frame button is greyed out.

### Updates

- Update CRX2RNX converter tool to Version 4.0.5.
- Updated Trimble Antenna Config
  - Support of LEIGS12 NONE, LEICA GS8, LEICA AR20, LEICA AR20 w/LEIM Dome

## Photogrammetry Tools

### CalQC fixes and enhancements

- A bug in tiepoint layout logic has been fixed. Some of the tiepoints were assigned incorrect heights, causing the tiepoint matching to fail. This issue was most pronounced in high elevation areas, and could result in lack of tiepoints between adjacent strips.
- Support for the Phase One IQ180, IQ160, IQ140, IQ280, IQ260, and IQ260 Achromatic cameras has been added.
- Added the ability to automatically identify the mission date if a suitable POSpac ancillary data file is present.
- Fixed the reading of PhotoID files that have time delay information so that strip numbering is preserved.
- Ensured that custom POS standard deviation values are saved and recovered correctly when re-loading a project from file.
- Fixed an issue with correct scaling of POS standard deviations when display units are changed.
- Updated the MIDAS batch processor so that it does not display a dialog box after automatic tiepoint generation.
- Fixed an issue with scrolling of the MIDAS Camera Settings GUI. The GUI had been disabled to prevent the user from modifying the parameters, but the scrollbar was also disabled.

### Software Licensing

- Introduction of standalone node-locked and concurrent network software licenses (with option to commute a license). The type of software license will determine how many instances are allowed for a particular licensed feature. Please refer to the Overview of Changes for detailed information.

# POSPac MMS 6.2 Service Pack 2

Release Date: November 2013

## GNSS-Inertial Tools

### Additions

Additional functionality now provides support for:

- Trimble RTX™
- Trimble OmniSTAR® G2

### Support of new systems

- The following table shows the support of new POS systems and their corresponding IMUs:

Systems	IMU #
AP15/POS LV 115	IMU 55
AP15/POS LV 125	IMU 55
AP60/POS LV 610	IMU 57
AP15 (airborne)	IMU 55
AP60 (airborne)	IMU 57

# POSPac MMS 6.2 Service Pack 1

Release Date: July 2013

## GNSS-Inertial Tools

### Changes

- Implemented 14-parameter transformation for Export and output of Exterior Orientation for AV applications.
  - The new supported reference frames include:
    - NAD83 (CSRS, CORS96, 2011, MA11, PA11)
    - GDA94
    - CH1903+
    - ITRF (2005, 2008, 1994,2000)
    - ETRS89
    - ETRF00\_R05
    - JTSK03
    - NZGD2000
  - The 14-parameter transformation implements as well rigid plate models for velocity estimation.
- Export and EO now implements multi-step frame transformation to accommodate custom transformations from other frames than ITRF00. For more information, refer to PUBS-CINS-005124.

### Addition

- Improved batch processing by eliminating warning message window popups.
- The header of export files has been reverted back to POSPac MMS 6.1 header format.
- Further GLONASS measurement model tuning.
- Further IN-Fusion GNSS Autonomous tuning and performance improvement.
- Output of satellite mask angle in GNSS-Inertial processing log files.
- Batch processing now supports output through Export AND EO during the same processing run.

### Addressed issues

- Fixed an issue where SmartSelect would stop responding when *centralized archive* is used.
- Fixed an issue where incorrect Start Time can be selected under project settings.
- Fixed an issue where deleting the CMR reference point on the Plan View would cause an exception.
- Fixed an issue where the decoding of certain DCB files would cause an exception.
- Fixed an issue where processing in IN-Fusion Autonomous mode would give different results if a Loosely-Coupled mode was used in between processing.
- Addressed backward compatibility issues with previous versions of the User Database file.
- Addressed issues with *station matching* feature for cases where the User Database file does not exist.



- Fixed installation issues where uninstalling previous versions of POSPac would “corrupt” the later version and data import would fail.

## Updates

- Update of SmartBase Database.
- Added support of new antenna models including:
  - JAVAD Triumph-1R and SEPCHOKE\_MC.

## Photogrammetry Tools

### Changes and addressed issues

- Fixed an issue where switching the units back and forth in the *MIDAS Camera Configuration* dialog produces incorrect values.
- Added support for DSS 539, DSS 580, and the Nikon D800.
- CalQC now writes the true/full boresight values to the HTML or text report.
- CalQC now supports 14-parameter transformations.
- Added Nikon D800 to the list of cameras that can be used as part of a MIDAS system.

# POSPac MMS 6.2

Release Date: March 2013

## GNSS-Inertial Tools

### Major Changes

- Implemented Multi Single Base processing for corridor mapping.
- Implemented 14-parameter transformation for the coordinate conversion of input reference stations. The transformation was implemented as well for output of SBET solution through export (LV and MV application). Supported reference frames include:
  - NAD83 (CSRS, CORS96, 2011, MA11, PA11)
  - GDA94
  - CH1903+
  - ITRF (2005, 2008, 1994,2000)
  - ETRS89
  - ETRF00\_R05
  - JTSK03
  - NZGD2000
- Implemented rigid plate models for velocity estimation.

### Additions

- Support for IN-Fusion SmartBase processing of high altitude flights.
- Interpolation of GNSS observation data for small outages when primary receiver data is collected at higher rate than 1 Hz.
- Support of Krovak Projection in EO and Export function.
- The base coordinates of CMR corrections can now be changed when wrong coordinates were entered in the field.
- Added support for new GNSS data services:
  - Land Information New Zealand (LINZ) ([www.linz.govt.nz](http://www.linz.govt.nz))
  - TrigNet Reference Station Web Server covering South Africa ([www.trignet.co.za](http://www.trignet.co.za))
  - Geoscience Australia ([www.ga.gov.au](http://www.ga.gov.au))
  - Institute of Geography and Statistics of Brazil (IBGE) ([www.ibge.gov.br](http://www.ibge.gov.br))
- Added NMEA format export.
- Support of new IMU types:

IMU #	Application
MU 44	MV
IMU 45	MV
IMU 46	AV and LV
IMU 48	MV
IMU 49	MV
IMU 50	MV

IMU #	Application
IMU 51	MV
IMU 52	AV, LV and MV

## Addressed issues

- The Export function no longer crashes when the export file is read-only or used by another process.
- SmartBase generation no longer introduces gaps when the mission covered the GPS week rollover.
- Tuned and improved IN-Fusion SmartBase performance with network including legacy receiver data.
- Addressed two scenarios in batch where process halts pending user input.
- Timing settings under Export are no longer reset to Entire Interval each time the *Project Settings / Export* window is reopened.
- The degree “°” character no longer displays as “Â°” in message logs.
- Base station import no longer fails when importing a RINEX file with inserted comments at end.
- SmartBase Generation terminates with fatal error when processing certain high rate data.

## Updates

- Update of SmartBase database of reference stations.
- The Trimble ConvertToRINEX 2.14.0 utility now addresses leap second updates.
- The Trimble Antenna Configuration utility supports more antennas including the TOPCON GR-5 and NOV702L\_1.03\_NONE antennas.
- Sentinel Protection Installer 7.6.6.

## Photogrammetry Tools

### Changes and addressed issues

- Better support when loading previous versions of CalQC projects: Standard Deviation values of “Other” POS AV system are no longer set to zero; the user is now prompted for selection.
- The calibration no longer fails when running MIDAS cameras in batch mode.
- Addressed memory issue when running calibration.

## **DSS Tools**

### **Changes and addressed issues**

DSS Mission View:

- Addressed an issue with an ActiveX component.

DSS RapidOrtho:

- Now supports the GeoTIFF format.

# POSPac MMS 6.1

Release Date: June 2012

## GNSS-Inertial Tools

### Changes

- Implement Dynamic Position Fix capability for LV applications. Details on this new feature can be found in POSPac MMS 6.1 – Overview of Changes (PUBS-CINS-004754).

### Support of new systems

- LV 210 and LV 220 with IMU2.

### Addressed issues

- SmartBase generation would reject Rapid or Ultra-rapid precise orbits and only use the broadcast ephemeris information. The impact was felt when processing recent data sets for which final precise ephemeris data was not yet available. (The final orbits have a latency of 12 day).
- SmartBase generation would falsely return "PROC\_STATUS\_VRS\_LOWPERCENTAGE" status when processing GPS and GLONASS observations.
- SmartBase generation would fail with certain receiver types due to an issue with the SmartBase processor handling a specific receiver name length.
- GLONASS satellites selection and de-selection was unsupported under Project Settings/Satellite Selection.
- Find base station would return an exception when downloading high rate observation files, particularly when retrieving hourly files from some providers and 15 minute files from others.
- Decoding of auxiliary GNSS (NMEA) data would in certain cases fail due to a parsing issue.
- RINEX decoding would fail if the fractional part of the observation time exceeded 1 millisecond. (Apply to certain old receiver types).

### Updates

- Trimble ConvertToRINEX to version 2.13.0.

## Photogrammetry Tools

### Changes

- Better support on loading older CalQC projects: Standard Deviation values of "Other" POS AV system are no longer set to zero(s), user will be prompted for selection.

### Addressed issues

- Kappa cardinal rotation fields on the angle & shifts pane would be greyed out when DMC II 140 camera type was selected.
- Fixed issues surrounding ground control points (GCPs) calibration options:
  - GCPs set to 'Don't Use' no longer causes the calibration to fail in some cases.

- GCPs set to 'Don't Use', which had their measurements deleted from the project, no longer appears in the calibration report.
- GCPs set as 'Check Points' are no longer rejected in the calibration process.
- Changed Lens Distortion Coefficient definition to be compatible with USGS standard.

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**C CAUTION** – Limiting the minimum Lens Distortion Table entries to be 20 rows, film camera user shall use USGS lens distortion coefficient.

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- Addressed viewing issues with MIDAS project and 1024 x768 resolution.
- Addressed issue with the import of BLUH format file, which required the user to modify the file for proper import in CalQC.
- Addition in processing option of a default MiDAS 100 mm lens setup.

**Note** – *Standard Deviation for Xpp, Ypp, Focal length is now reported after calibration.*

## DSS Tools

### Changes

#### 4-band Co-Reg

- Improved point matching algorithm with blunder detection and Standard Deviation setting.
- Allowing band stacking to run without point matching.

#### RapidOrtho

- Addressed memory issues which caused RapidOrtho to fail/vanish after saving output files.
- Addressed issue where synchronous processing would terminate unexpectedly.
- Changed default mask colour to black.

# POSPac MMS 6.0

Release Date: May 2012

## GNSS-Inertial Tools

- Support of GPS+GLONASS observations in IN-Fusion Single Baseline and Applanix SmartBase (ASB) tightly coupled solutions for optimal performance.
- GLONASS observations are also supported in IN-Fusion Autonomous mode.

## Changes

### Find Base Station

- Capability to download reference stations with GPS or GPS+GLONASS.
- Capability to download broadcast ephemeris for GPS and GLONASS satellites.
- Capability to download precise orbits for GPS and GLONASS satellites.
- Tabulated information from the download and validation procedure including observable type (GPS or GNSS).

### Smart Select 2.0

- Pre-selects all the reference stations in proximity of the rover trajectory.
- Retrieves the available reference stations with optimal geometry and data quality.
- Creates the best network of reference stations (considering GPS and/or GLONASS observations and related statistics) that will be used in Applanix SmartBase (ASB) generation.

### Applanix SmartBase 2.0

- Selection of Primary base station has been enhanced to take into account the network configuration in terms of GPS+GLONASS availability and requirements.
- New generation Applanix SmartBase processor which supports GLONASS ephemeris data and observations.

### Plan View

- GNSS station identification.
- On the plan view, the reference stations with GPS+GLONASS observations are clearly identified by the colour green.

## Addressed issues, updates and enhancements

- Trimble Configuration Utility has been updated to the latest release.
- Trimble ConvertToRINEX has been update to version 2.1.2.0.
- Sentinel Protection Installer has been updated to version 7.6.5.

### Display module

- Capability to plot GLONASS satellites used in the GNSS-Inertial solution.
- L1/L2 satellite lock/elevation plots updated for GLONASS.
- GNSS measurement residuals plots updated for GLONASS.

## Photogrammetry Tools

Addressed issue with decoding of PATB file format.

## DSS Tools

DSS 422/439 ImageView

- In-flight dark does not work if MissionView renames DSS mission data with Prefix or Suffix.

DSS 460 ImageView

- GUI implementation for Lens Falloff and Radial Blur corrections.

RapidOrtho Integration

- DSS RapidOrtho
- Add support for NAD83 datum (in UTM projection).
- Add support for USGS Lens distortion coefficients.
- Corrected 12/16 bit no data mask handling.



# POSPac MMS 5.4 Service Pack 2

Release Date: Jan 2012

## GNSS-Inertial Tools

### Support of new systems

- AV410, LV 420 and MV320 with IMU40.
- AV 410 with IMU type 25.
- LV 120 and LV 221 systems.

### Updates

- Update of the SmartBase Database for new CORS stations.
- Update of the latest Trimble Antenna library. Added support of new antenna models, including NAVCOM NAV-ANT3001BR.

### Changes

#### Batch Manager and Templates

- Relative path cannot be used when POSPac is run from command prompt.
- *Format and Export Navigation data* option would not run in Batch Manager on Windows 7.
- *Mapping Frame and Datum* settings would not be applied when set in a Template.

#### Import

- Exception would be returned when no broadcast ephemeris files are available.
- Incorrect real-time solution status decoded and displayed with BD960/BD982 data and VBS corrections.
- Support decoding of antenna diagnostic for BD982 data.
- Implemented conversion of BD982 to RINEX when a 2nd antenna is connected (applies to AV only).

#### Export

- Add transformation of ITRF2000 to GDA94 reference frame.
- Orthometric height using USGM02 models would return an error.

### Addressed several issues

- Position filter would fail or stop responding after GNSS-Inertial processing when base observation file covered partially the rover time period.
- Differences in IN-Fusion SmartBase solution when network included proximate stations.
- Applanix SmartBase generation would fail in very specific cases.
- In *Find base station* option, tuned SmartSelect to select optimal network.
- In GeoidConverter, issues with positive and negative longitude values.
- In POSGNSS, issue with Lambert Projection.

## **Photogrammetry Tools**

No changes were made to Photogrammetry tools.

## **DSS Tools**

No changes were made to Photogrammetry tools.

# POSPac MMS 5.4 Service Pack 1

Release Date: May 2011

## GNSS-Inertial Tools

- Implementation of a New SNR-dependent model for land applications.
- Enabled use of Rapid orbits for tightly integrated GNSS-Inertial Precise Point Positioning (IN-Fusion PPP).
- Support of igs08.atx parameters for IN-Fusion PPP processing.
- Creation of New Display plots:
  - *SBET IAKAR Separation*, which provides better insights of the solution quality.
  - *L1/L2 Satellite Lock/Elevation*, displaying L1/L2 cycle slips, signal interruptions and satellite elevation angle.
- Enhancement to *Find Base Station* function, which now includes high rate data in the search and download of CORS reference stations.
- Enhancement to the *User Base Station Database*, which now enables many users to access the same database file centralized in one location.
- Creation of a *New Reference Stations* option, which optimizes the access to Internet downloads by archiving the reference station observation files locally.
- Creation of a *New Import* option, to optimize POS data import when data contains a great amount of events.
- Addition of LiDAR Point Cloud processing in *Batch Manager*.
- Improved POSPac user interface for Japanese and Chinese OS.

## Support of new systems

- Trimble BD982 dual antenna receiver for airborne, land and marine applications.
- Added support of IMU type 25 for AV 410 systems.
- Added support of IMU types 36, 37, 38, and 39 for marine systems.

## Addressed several issues

- Data extraction issue when GNSS differential corrections are collected simultaneously on two ports.
- Download of P1-C1 parameter file which may fail on year change.
- Export issue with CH1903+ mapping projection.
- BINGO output format changes, to put back POSPac version number in file header.
- Display Plot where the Events logged after the week rollover would not be displayed.
- Removed output of PBF and PTF files in Export and EO output functions.
- GeoidConverter issue where the Geoid input file would not convert properly if the region covered positive and negative longitudes.
- Automatic update which could cause *Find Base Station* function unusable on Windows 7.
- Reviewed POSPac Templates relative to the extraction of POS installation parameters.
- RINEX to .gpb conversion issue in POSGNSS, where any files collected in 2011 could not be converted.

## Updates

- SmartBase reference station database (addition of 182 new stations).
- Update FTP addresses of SPICC, AUSLIG, ROB and DUT GNSS data services.
- Trimble Antenna Library Version 7.18.
- Trimble ConvertToRINEX Version 2.1.1.0.
- Trimble Planning Version 2.90.

## Photogrammetry Tools

No changes were made to Photogrammetry tools.

## DSS Tools

- DSS RapidOrtho.
- Updated license control in "Process Ortho Photo".
- Added DEM min/max filtering option.
- Changed the ortho project file to be the same as input image name.
- Changed the ortho log file to be the same as output ortho.

### DEM Utility

- 32 bit floating point GeoTIFF DEM output.
- Corrected GSD disagreement between source and converted DEM.
- Enhanced projection support for LAS format with user defined projection dialog.
- Corrected legend discrepancy when loading GeoTIFF DEM in Geographic coordinates.

# POSPac MMS 5.4

Release Date: Nov 2010

## General

POSPac MMS 5.4 now supports Windows XP and Windows 7 operating systems (32-bit and 64-bit).

## GNSS-Inertial Tools

- New tightly integrated GNSS-Inertial Precise Point Positioning solution (IN-Fusion PPP).
- Improved Smoother algorithm, which eliminates or significantly reduces position discontinuities, thus improving performance, especially with LV Data.
- Improved GNSS Converters.
- More reliable decoders are now implemented for BD960, NetR5 and RINEX file formats.
- Refined GNSS Interpolator for improved handling of data gaps.
- Including interpolation of CMR and RTCM (18/19 and 20/21) corrections.
- Updated POSPac MMS Antenna library to support new antenna types, as well as corrections to some existing antennae.
- Upgrade of POSGNSS to version 5.3.

## Additions

- Support of AP10 GNSS-Inertial OEM System.
- Capability to export the User Coordinate Database into CSV file format.
- Addition of alternate GNSS Service FTP sites for Precise Ephemeris data download; providing options when the initially selected FTP site is down.
- Configurability of the Primary or Secondary GPS data to use for processing in batch mode.
- Capability for users of Dual Receiver systems to display and plot secondary GPS Data.
- Addition of output parameters specified in EO or Export. This information is contained in the log file.
- Creation of a new Customized Bingo EO format. This new profile enables users to modify the standard Bingo rotation sequence and units of the different parameters.
- Capability to download and use broadcast ephemeris data from GNSS Services in the cases where the ephemeris data from the primary receiver has gaps, is missing ionospheric model parameters, or is missing entirely. The decision to download broadcast ephemeris is made automatically by the software.

## Addressed several issues

- Plan View issue, in which the trajectory colours would not update according to the specifications in the View Filter Manager.
- Base Station Search and Download issue, in which the download of GNSS reference stations would stop occasionally.
- Batch editor issue, in which the configured Antenna height would not be applied to the reference station coordinates.
- Template issue, in which the Lever Arm Standard Deviation values would not be taken into account when used in Batch mode.

- Export issue, in which Google KLM Output would fail when performed as a Non-Admin user.
- Decoding issue with Trimble .DAT base file format, which resulted in poor processing results.
- Decoding issue with NovAtel OEM4/5 base station files, whose format was simply not recognized.

## Photogrammetry Tools

### CalQC 5.4

- Support of new Camera systems:
  - Ultra Cam D
  - Ultra Cam X
  - Ultra Cam Xp
  - RMK D
  - RMK Dx
  - DMC II 140
- Image size for digital cameras is now by default in Pixel.
- Implemented colour codes in the plan view for Ground Control Points depending on their type (Check Points, Full Control, Horizontal or Vertical Control).
- Enabled user to change the Ground Control Point type directly from the Main View.
- Addition in the Ground Control Point table of the RMS column, enabling you to quickly identify the GCP which are outside a priori Standard Deviation.
- Addition of an option, enabling users avoid running EO before starting the calibration.
- Addition of a Pan button in the main view area, which enables use of View Footprints and Tie Ground Control Points.
- Addition of an option to save all MIDAS cameras in \*.cam file.
- Batch mode for MIDAS system is now including Auto-strip generation and Calibration options.
- Access to “MIDAS Camera Setting” from the “Camera Configuration” table.
- Default value of standard deviation for MIDAS image coordinates is now set to 5 times the Pixel Size.
- Features not available anymore in CalQC 5.4:
  - Import of DEM File
  - Block/Strip Calibration
  - Earth Curvature and Atmospheric Refraction
  - Non Square SF and Lens Distortion
  - Strip boresight calibration
  - *Estimate Accuracy* option
  - Scale Omega/Phi/Kappa computation for Datum Shift
  - *QC Strip Data* in the *Advanced Calibration Option* dialog

## **DSS Tools**

- Added support for ImageView WideAngle 60MP Sensor.
- Implementation of automatic In-flight dark processing in ImageView.
- Instance control in RapidOrtho synchronous processing.
- Enhancement to turn off point matching in 4-band Co-registration.

# POSPac MMS 5.3 Service Pack 3

Release Date: July 2010

## GNSS-Inertial Tools

- Support of LV-520 system.
- Tuning of Sagem IMU filter file (IMU type 14).

## Updates

- POSPac MMS Antenna library to include support of new antenna types, as well as corrections to some of the existing antennae.
- Applanix SmartBase reference station database for CORS, EPN, SOPAC, UNAVCO and IGS services.
- Trimble ConvertToRINEX software.

## Addressed several issues

- Important extraction issues which could in certain cases generate data gaps.
- BD960 observations file conversion which in certain cases would crash.
- Option *Do Not extract POS Installation Parameters in Project Settings* would not work properly in Batch mode using Templates.
- Reference to Secondary GPS lever arm values being overwritten when using Templates.
- Download of Reference Station files in *Search and Download* would not be responding when GNSS data FTP site is down.
- POSGNSS batch processing would not take specific Start and End time.
- Imported rover file in POSGNSS batch would have default antenna height set to 1.0 m.
- Conversion of RINEX to .gpb files would skip some epochs.
- POSGNSS Batch would not change the coordinates once the baseline has been processed.



## POSPac MMS 5.3 Service Pack 2

Release Date: April 2010

### Addressed issues

- POSPac MMS Converts BD960 GNSS observation file to RINEX format every time POSGNSS is launched. Normal behaviour of converting the file only once was re-established.
- Fixed the issue which forced user to run Differential GNSS with very first POSGNSS solution. Any later POSGNSS solutions were ignored. This issue was specific to PRI receiver in the case of AV dual receiver systems.

## POSPac MMS 5.3 Service Pack 1

Release Date: Jan 2010

### GNSS-Inertial Tools

- POSPac MMS Antenna library updates: support of new antenna types and corrections to some existing antennae, including:
  - ASH701945B\_M SNOW
  - ASH701945C\_M SNOW
  - ASH701945D\_M SNOW
  - ASH701945E\_M SNOW
  - ASH701945G\_M SNOW
  - ASH701945C\_M UNAV
  - ASH701945D\_M UNAV
  - ASH701945E\_M UNAV

### Addition

- New Custom Smoothed BET export format.
- Possibility for user to specify start and end time of POS data extraction.
- Support of alternate FTP site for NGS GNSS-service.
- Possibility for user to import boresight angles from certain output file format for Riegl Q240 and Q560.
- Upgrade of POSGNSS to version 5.2.
- Update of Applanix SmartBase reference station database for CORS, EPN, SOPAC, UNAVCO and IGS services.

### Addressed several issues

- POSPac getting slow to react when consulting project settings.
- Memory leak and memory allocation issues, which lead in specific cases to strange behaviour of POSPac.
- Search radius in Search and Download, when field was left blank it would generate an exception.
- Modified Speed Threshold for AV IMU type 21, IMU type 8 and IMU type 6.
- Extraction of corrupted records in POS files, which results in termination of extraction process.

- Extraction of LiDAR only data.
- Reference station data files downloaded from SPICC GNSS service data.
- Q560 intensity values.

## Photogrammetry Tools

Export of Lens Distortion Parameter File, which can be used in Rapid Ortho.

### Addressed issues

- PhotoID format selection (3 fields strip #).
- Description of DSS 422 image dimension in *MIDAS Wizard*.
- Default image dimension in *Camera Configuration wizard*.
- Camera description in project options; EO precision not being updated accordingly to POS AV type used.
- Export of distortion coefficients in CalQC camera file.
- Mapping frame parameters not being updated when modified in POSPac.
- Export of boresight and lever arm values would differ from the one in the project.
- Backward compatibility of favourite camera system information in CalQC.

## DSS Tools

- Updated Image Co-Registration GUI to support GeoTIFF Input and Output.
- Enabled user to manually set the match point for band alignment.

DSS Rapid Ortho Tools

- Support of Lens Distortion Parameter file.

### Addressed issues

- File path displayed being invisible.
- Orthomaster failing to launch on certain computers.
- Inconsistency of UTM Zone and Kappa Rotation input values across Orthomaster and POSPac batch forms.
- POSEO import option not automatically being enabled after GNSS-Inertial processing.

# POSPac MMS 5.3

Release Date: July 2009

## GNSS-Inertial Tools

- Implementation of SAR Processing (Smoothed Free Inertial Navigation).
- Integration of Track'Air flight planning module.
  - Addition of *Search and Download* search for reference stations around the *Flight Plan*
  - This option includes the possibility to validate and run SmartBase Quality Check on those reference stations
  - Requires POSTrack Xtrack version 2.30V or later to run
- New Grid Correction Converter Utility, to convert Grid Corrections from ASCII to Binary, so they can be used from within Exterior Orientation and Export functions.

## Addition

- *Export* function in Batch Manager.
- Output Exterior Orientation (EO) in Batch Manager.
- Belgium Lambert 72 (BEREF) Mapping Frame in *Export*.
- Belgium Lambert 2008 Mapping Frame in *Export*.
- Automatic check and download of the latest Applanix SmartBase Database from Applanix FTP site when available.
- Possibility for user to cancel *Import* when too many events are extracted (Event 1 and Event 2).
- In *Project Settings / Export*, the option to export height values in WGS84 of a link to the new Applanix SmartBase™ web page, which displays all reference stations on Google world map. This can be launched from the *POSPac MMS / View Menu*.
- Options to specify *Start and End times* in the *Export* module.
- In GNSS Obs Validator log file - output of details on validation failure.
- Addition of new *Import* settings:
  - In the case Datum of differential corrections was not properly set in the field; the user now has the possibility to change the value (WGS84/NAD83) once data is imported to POSPac project; differential corrections are converted accordingly.
  - Support, in *Coordinate Manager*, of new Coordinate file format: Lat/Long in decimal degrees and degree, minute, seconds (DMS) are now accepted.
- POSPac MMS Antenna library update, to include support for the following antenna models:
  - Leica AR25 LEIT
  - Leica AR25 NONE
  - Trimble
  - Zephyr Geodetic 2 RoHS
  - GNSS Choke w/SCIT
- Updates to the Applanix SmartBase reference station database, to include updates to CORS, IGN, SOPAC, UNAVCO and IGS services.

## Support of new system and IMU types

- AV 010
- MV 610
- LV 510 and LV 210
- LV IMU type 31
- MV IMU types 32 and 33.

## Addressed issues

- POS files format not recognized; leaving no possibility for the user to process data in POSpac.
- Decoding of BD960 observation files with strange page sequencing (ExtGPS16).
- Decoding of NMEA message which resulted in creation of jumps in vertical component.
- Import of large Compressed RINEX files, which resulted in termination of import process.
- When LV data is collected with Autologging and DMI records exist before GPS time synch, DMI smoothing used the wrong start time, and created false records in POS time.
- Addressed issue with Geoid Converter.

## Updates

- Use latest Trimble ConvertToRINEX Software v2.0.0.5
- Use latest Trimble Planning Software v 2.8.

## Photogrammetry Tools

- *Exterior Orientation* now includes:
  - Support for high rate events
  - Corrected issue of outputting wrong RMS values when using custom user formats
  - Addition of option to specify start and end times
- *Calibration and Quality Control* module now includes:
  - Oblique support workflow enhancements
  - Support for MIDAS 25 mm and 50 mm Nadir with 85 mm Oblique
  - Automatic Strip ID generation
  - Import Photo IDs with 3 Fields (*Time, Photo ID, Variable Time Delay*)
  - Import/Export DEMs
  - Batch Mode
  - Shapefile export

## DSS Tools

No changes were made in DSS Tools.

## DSS Rapid Ortho Tools

- Rapid Ortho 2.0: increased throughput for increased productivity; now 3 to 4 times faster than previous version.

### **Minimum requirements**

- Pentium 4 @ 2GHz or better, 2GB RAM
- WIBU Codemeter USB Stick (supplied by Applanix)
- WIBU Codemeter Runtime can be downloaded from [www.codemeter.de/us/service/downloads.html](http://www.codemeter.de/us/service/downloads.html).

### **Addition**

- Addition of new DEM Conversion Utility.

### **LiDAR Processing Tools**

- Addition of option to specify start and end times.
- Display of the start and end times of each LiDAR line processed in the log file.

# POSPac MMS 5.2 Service Pack 1

Release Date: February 2009

## GNSS-Inertial Tools

- Option to choose between Window's-based proxy configuration or Internet Explorer-based proxy configuration. This option can be selected from the *Tools / Options / Internet Download* window menu. The default is Window's-based proxy configuration.
- Addressed issue when displaying PhotoIDs that contain non-alphanumeric characters in the *Plan View*.
- Improved processing workflow when using AV Secondary GNSS receiver with POSGNSS.
- Addition of a new *Import* option, that automatically sets the POSpac MMS kernel name to match the name of the imported POS data file.
- When using the option to *Copy Imported Files to Import Folder* in the *Tools / Options / File Locations* window menu, the POS data files will no longer be copied to the project folder.
- POSpac MMS Antenna library update, to include support for the following antenna models:
  - NOV702GG
  - LEIAR25 LEIT
- Updates to the Applanix SmartBase reference station database, to include the latest CORS stations.
- Real-time residual plots are now available again using the *Display Plots* command.
- Support for AV OEM Board set.

## DSS Rapid Ortho Tools

- Addressed issue when attempting to use grey scale images as an input to the Rapid Ortho engine.

# POSPac MMS 5.2

Release Date: November 2008

## GNSS-Inertial Tools

- Support for Windows XP/VISTA 32-bit and 64-bit.
  - Note** – To run POSGNSS on Vista machines, POSPac MMS must be installed in any folder outside of `c:\program files`.
- Full support and performance improvements for POS LV data.
- Addition of a *Batch Manager* command, that allows setting up and automatically processing of multiple POSPac MMS projects. The option to run POSPac MMS via command line is also available.
- Addition of a new option in the *Find Base Station* command called *Smart Select*, that attempts to automatically select and download the best available Applanix SmartBase network of reference receivers, and import them into the project. This will not only attempt to choose the tightest network fully encompassing the trajectory, it will also validate the observation data quality to determine if the stations are suitable for the network.
- POSPac MMS now displays *Event 1*, *Event 2*, and/or *Photo ID* on the main *Plan View*.
- Applanix SmartBase Quality Check message log has been expanded to include the original and adjusted coordinates.
- When attempting to download reference stations and ephemeris data using the *Find Base Station* command, POSPac MMS will automatically cycle through the different available services, in the event that one service is not available.
- Full support for BD960 with OmniSTAR VBS/XP/HP for AV and LV data that have OmniSTAR corrections enabled.
- POSPac MMS Antenna library update, to include support for the following antenna models:
  - Leica AT302 w/Ground Plane
  - Javad Navigation Systems JNSCR\_C146-22-1
  - Trimble Zephyr - Model 2 Rugged
  - Trimble GA530
  - Trimble GNSS Choke w/SCIT Dome.
- Addition of MV real-time heave plots.
- Addition of new option to export the SBET in Google KML format.
- Support for IMU Type 31 for AV and LV.
- New Geoid Converter Utility, that allows the creation of geoid files in the Applanix .dat format. This utility can be launched from the POSPac MMS *Tools* Menu.
- GAMS option now available for AV customers with dual GNSS receivers.
- Improvements to the BD960 GNSS receiver decoder.
- Updates to the Applanix SmartBase reference station database, to include:
  - New services: SOPAC, UNAVCO, and ICC
  - Updates to CORS, IGN, and IGS services
- Addition of new *Import* settings: Users can now specify start and end time of data to be extracted and imported.

- Specification of the differential corrections datum. If the differential corrections data outputted by a receiver are logged in a datum other than WGS-84, users can specify this before importing POS Data that contains the logged differential corrections. The only known receivers that output differential corrections in NAD83 are the Trimble Ag332/132 when used in North America.
- Support for TG IMU types 2 and 7.

## Photogrammetry Tools

- Support for Albers Equal-Area Conic Projection.
- Addressed issue in *Exterior Orientation* module, where the c:\program files\common files folder was not being located correctly on non-US versions of Windows operating system.
- Addition of an option allowing users to specify the Exterior Orientation output file name.
- Several improvements to the *Calibration and Quality Control* module.
- Support for DSS 439 with 250 mm lens.

## DSS Tools

- Addition of a Linear Gradient Correction function.
- Addition of batch mode to co-register ortho-rectified dual cam images.
- Addressed issue in Mission View Strip Generator where it would not correctly handle image events that have north headings.
- Support for DSS 439 with 250 mm lens.

## DSS Rapid Ortho Tools

- Support for processing southern hemisphere mission data.



# POSPac MMS 5.1 Service Pack 1

Release Date: July 2008

## GNSS-Inertial Tools

- Addressed issue, where the user-created mapping frame parameters created from within the *Project Settings / Exterior Orientation / Mapping Frame*, were stored in a different location than the user-created mapping frame parameters created from within *CalQC* module. The correct path for the user-created mapping frame parameters file (*UserMappingFrame.ini*) is: *C:\Program Files\Common Files\Applanix*.

**Note** – To ensure all previously user-created mapping frame parameters created in previous releases of POSPac MMS exist in POSPac MMS 5.1 SP1 and later versions, you may need to copy or manually merge the *UserMappingFrame.ini* file from *C:\Documents and Settings\All Users\Application Data\Applanix\POSPac MMS\5.1* to *C:\Program Files\Common Files\Applanix*.

- Addition of support for IMU type 29.
- Updated Antenna library to include support for LEIAT302+GP.
- Addition of a new feature allowing viewing of epoch information, and setting of processing start/end times graphically from the *Plan View*. This can be achieved by right clicking on the *Mission 1 / POS / Real-time* item from within the *Project Explorer*, choosing the option to *View Epoch*, and then clicking on the desired point from within the *Plan View*.
- Improved stability of BD960 receiver decoder and GPS interpolator algorithms.
- Addition of support for AV Secondary GNSS receiver processing including:
  - Automatic conversion of both Primary and Secondary BD960 GNSS receiver to RINEX when required for Differential GNSS or PPP processing.
  - Automatic import of Secondary GNSS Lever arm settings from real-time when available.
- Reporting of BD960 on-board OmniSTAR status (VBS, HP, or XP) during extraction.
- Several improvements to Applanix SmartBase processing module, including:
  - Improved robustness of RINEX decoder
  - Updated Applanix SmartBase Reference Station Database
  - Addition of support for 2-second and 3-second reference station observation data rates, when used as part of an Applanix SmartBase Network

## Photogrammetry Tools

- Support for *Photo ID* file names of up to 50 characters.
- Several improvements to the *Calibration and Quality Control* module, including:
  - Support for the MIDAS system
  - Addition of the following camera types:
    - DSS 322 (90 deg)
    - DSS 322 (180 deg)
    - DSS 322 (270 deg)
    - DSS 439 (180 deg)

## DSS Tools

- *DSS Tools: Image Processing* security key option is now required to use all the *DSS Tools* functionality. If this option is not enabled, or if the security key is not available, *DSS Tools* may still be used in QC mode, which will output hash marks on top of all the developed images.
- Support for processing of data with more than 128 flawed records.

## DSS Rapid Ortho Tools

- Addition of option to process using the real-time EO instead of using the RNAV or SBET. This option is only available for DSS 439 systems with the real-time EO option enabled and the real-time EO data selected for logging.

## LiDAR Tools

- Support for LiDAR line-by-line processing of Q240 data, when used with POSTrack or DSS systems. Each LiDAR line will have an individual .las file associated with it.

**B Tip** – When using a DSS with Q240, it is important to import the POS Data containing the LiDAR data first, followed by the Nav Data logged via Ethernet onto the DSS removable drive.

# POSPac MMS 5.1

Release Date: April 2008

POSPac MMS 5.1 is the next release of POSpac Air 5.0. All customers with maintenance contracts are entitled to receive it without charge.

## GNSS-Inertial Tools

- Support for data from all models of POS MV, including GAMS and Differential Corrections.
- Improved handling of GPS week rollover in GNSS-Inertial processor.
- Addition of an option in the GNSS-Inertial processor, to select either the Primary or Secondary GNSS receiver for processing. In the *Project Settings / GNSS-Inertial Processor* menu, a new setting is also available to enter the *Reference to Secondary GNSS Lever Arm*. This option is only available for POS AV systems with dual GNSS receivers.
- Several Improvements to Applanix SmartBase processing mode, including:
  - Support for downloading and processing using ULTRA RAPID precise ephemerides
  - Improved Applanix SmartBase Quality Check and Generation log files
  - Enhanced algorithm for detecting "Bad Estimate" in the Applanix SmartBase Quality Check engine
  - Improved handling of Applanix SmartBase network of reference stations with mixed data rates
  - Updated Applanix SmartBase Reference Station Database
- Addition of *SBET* to the list of available export formats. This allows users to export their SBET solution from the reference frame to their desired frame, by translating and rotating, using the *Reference to Output Lever Arm* and *Output w.r.t. Reference Mounting Angles* settings in *Project Settings / Export* (e.g., generating postprocessed solution at Sensor1/2 location for POS MV data).
- Addition of *Fixed Wide Lane* and *Fixed Narrow Lane* processing Modes to the *Display Plots, Solution Status, Processing Mode* plot and the main *Planview's Colour Code by Processing Mode* option in the *View, View Filter Manager, Real-time/Post-processed, Display Styles, Trajectory* menu.

## Changes

Several improvements to the Differential GNSS and PPP processing using POSGNSS:

- Addition of Advanced RTK (ARTK) engine, able to provide fix ambiguity solution on long vectors in short amount of time (shorter than current POSGNSS KAR engine). Generally, ARTK also has fewer failed fixes than KAR, and tends to produce a lower separation between forward and reverse trajectories.
- Addition of a Multi-pass option in the PPP processor, able to refine the original solution with another pass. Accuracies can be improved significantly (~40% on the data sets evaluated). Significant improvements happen on trajectories with shorter observation times. The PPP processor also applies higher order corrections, further improving accuracies.

- Addition of a tropospheric bias corrections state to the Kalman filter, to remove tropospheric error for high altitude or long distance data sets. Previous methods have often had problems in differential mode, now solved by using the POSGNSS PPP processor to compute the tropospheric bias trajectory for each base station. This tool can also be used to check the base station's coordinates.
- In multi-base mode, base stations can be rejected if the base-remote distance is longer than a user-set tolerance.
- Satellites with low C/N0 can be rejected from the filter.
- Full support for ITRF2005.
- The latest manufacturer data files, such as favourites, download stations, satellite offsets, DCB corrections and antenna models, can be set-up to automatically download twice per month. This is recommended for PPP processing, and can be enabled from the *Settings / Preferences / Update* menu.

## Photogrammetry Tools

Support for generation of Exterior Orientation based on *Event 1 Time* or *Event 2 Time*.

## DSS Tools

- Addition of new function, allowing the appending of strip numbers based on changes in heading to the end of each record, when exporting image EVENTS from Mission View.
- Addition of panchromatic chip image processing functions in *Image View*, including *Contrast stretch*, *Mission contrast stretch* and *Gamma corrections*, when developing panchromatic images.
- Addition of an *Adobe DNG* export function to *Image View*. This allows the user to export radiometrically-corrected DNG files, which can be imported into any third party software that supports the format.
- Addition of *Mission specific histogram stretching*, allowing the user to select a key frame indicative of the mission as a whole, and applying the stretch to all images based on the key Frame's histogram. This will allow for seamless mosaics in *Ortho Vista*.
- Corrected a memory leak during the development of Greyscale JPEG images.
- Fixed an issue where the correct image count was not displayed on the *Exposure Normalization* window.
- Addressed an issue where the *Principal Point* was set to (0,0), when lens distortion parameters were entered manually and not by loading an \*.ldm file.

# POSPac Air 5.0 Service Pack 1

Release Date: March 2008

## GNSS-Inertial Tools

- Support for POS AV systems with BD960 GLONASS enabled GNSS receivers. Processing GLONASS data is only available using Differential GNSS (POSGNSS) loosely coupled mode. The GNSS data, logged by the POS AV system, is extracted and automatically converted to RINEX just prior to running POSGNSS. The RINEX file can be imported into the POSGNSS project to generate the GNSS solution.
- Addressed issue related to excluding more PRNs than selected in the *Satellite Selection* section of the *Project Settings* window.
- Addition of a *Select All/None* button in the *Find Base Station* window.
- Improvement to automatic detection of short vs. long baseline for *Single Base* processing mode.
- Fixed issue when importing coordinates from an improperly formatted file into the *Coordinate Manager*.
- Addressed issue when simultaneously importing multiple files of different types into a project.
- Fixed issue when deleting the real-time trajectory and start point from within a project.
- Improved data gap detection in RINEX observation files.
- Better handling of RINEX data that contains new site occupation flags on each hour (ex., Leica GRX1200 GG Pro).
- Fixed issue with *Export* not running when an *EVENT* file is missing, even when a fixed output rate was specified.
- The *boresight angles* and *lever arm* units in the *Export* section of the *Project Settings* now correspond to the units set in the project.
- Addition of user configurable *Favourites* plots in *Plotting* utility.
- Addition of option to allow users to set their own scale for each plot.
- Corrected orientation of satellite azimuth plots for base and rover receivers.
- Improved cancelling of lengthy operations.
- Fixed issue when adding external tools to the toolbar.

## Photogrammetry Tools

- Addressed issue with *Exterior Orientation* processor not running with only *Event 2* data.

# Technical Support

Contact Applanix technical support at the numbers listed on our website.

On the home page, select *Support* and then select *Contact Support* from the top menu bar. If voice communication is required, select the *Contact* link.

For general inquiries, please visit our website, or call +1 905 709 4600.

# List of Abbreviations, Synonyms and Symbols

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ARP	Antenna Reference Point
ASB	Applanix SmartBase
ASCII	American Standard Code for Information Interchange
ATG	Automatic Tie Point Generation
C/A	Course Acquisition
CalQC	Calibration and Quality Control
CCD	Charge Coupled Device
CDM	Camera Data Mode
CFA	Colour Filter Array
CIR	Colour Infrared
CORS	Continuously Operating Reference Station
DEM	Digital Elevation Model
DGPS	Differential Global Positioning System
DMI	Distance Measuring Indicator
DOP	Dilution of Position
DSS	Digital Sensor System
DTM	Digital Terrain Model
EC	Exposure Control
ECEF	Earth Centered Earth Fixed
EGM96	Earth Gravitational Model 1996 (a global Geoid Model)
EO	Exterior Orientation
GAMS	GPS Azimuth Measurement Subsystem
GCP	Ground Control Point
GLONASS	Global Orbiting Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GUI	Graphical User Interface
IGS	International GPS Service
IMU	Inertial Measurement Unit
IAKAR	Inertially Aided Kinematic Ambiguity Resolution
IARTK	Inertially Aided Real Time Kinematic
KAR	Kinematic Ambiguity Resolution
LIDAR	Light Detection and Ranging
LSR	Local Space Rectangular
MSAS	Multi-functional Satellite Augmentation System
NAVDIF	Navigation Differencing

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Orthophoto	An ortho rectified image that compensates for image tilts and relief displacement (incorporating a DEM)
OTF	On-the-Fly
PDOP	Positional Dilution Of Precision
POS	Position and Orientation System
POS AV	Position and Orientation System for Airborne Vehicles
POS LS	Position and Orientation System for Land Survey
POS LV	Position and Orientation System for Land Vehicles
POS MV	Position and Orientation System for Marine Vessels
POSEO	Position and Orientation System External Orientation
POSGNSS	Position and Orientation System Global Navigation Satellite System
POSPac	Position and Orientation System Postprocessing Package
POSProc	Position and Orientation System Postprocessing
PPP	Precise Point Positioning
QA	Quality Assurance
QC	Quality Control
RGB	Red, Green, Blue
RINEX	Receiver Independent Exchange Format
RMS	Root Mean Square
RNAV	Real Time GPS Inertial Navigation Solution
SAR	Synthetic Aperture Radar
SBET	Smoothed Best Estimate of Trajectory
SF	Scale Factor
SFIN	Smoothed/Free Inertial Navigation
STG	Semi-Automatic Tie Point Generation
USGS	U.S. Geological Survey
USNO	United States Naval Observatory
UTC	Coordinated Universal Time (or Universal Time, Coordinated)
VIS	Visual/Visible (True Colour)
VNAV	POSProc Real-Time Navigation
VRS	Virtual Reference Station
WAAS	Wide Area Augmentation System
WGS84	World Geodetic System 1984
wrt	With Respect To

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