Simactive HIGH-END PHOTOGRAMMETRY SOFTWARE

CORRELATOR3D[™] RTK - PPK Assisted AT Quickstart Guide

OVERVIEW

In Correlator3D's AT Module, an RTK/PPK Assisted bundle adjustment can be performed. Selecting this option indicates to the software that the image positions (X, Y and Z) are known to be accurate via a Real Time Kinematic (RTK) or Post Processed Kinematic (PPK) survey method. These corrected positions are imported directly into Correlator3D during the project setup through the image EXIF information or with an accompanying text file.

This guide will describe both processes in Correlator3D[™] for first-time users covering the workflow from input imagery to final products. A more detailed description of the software can be found in the user manual.

THE DIFFERENCE BETWEEN RTK AND PPK

RTK requires a base station on-site. in order to achieve a solution, the base station must be on and collecting data over a known point prior to, during flight and after the drone lands. The benefit: results are processed in real time. The drawback: if the base station goes down or there is a loss of signal between the base station and drone, the mission will have to be restarted.



PPK uses a networked reference station either private or public in the vicinity. While an on-site base station is not necessary, it is recommended. If an onsite base station is present, results can be processed in real time upon completion of the mission, or post processed without at a later time. The benefit: successful GPS data collection is not reliant on an on-site receiver. The drawback: short delays are possible in post-processing if using PPK only. Delays depend directly on the desired level of accuracy.



RTK / PPK ASSISTED BUNDLE ADJUSTMENT OPTIONS

With the development of drones and the incorporation of RTK and/or PPK enabled positioning equipment, some users are under the false impression that these can reduce or completely do away with the need for survey/ground control. This is not the case. It is true that with an RTK / PPK assisted bundle adjustment, Correlator3D can produce an AT solution that is accurate relative to itself. However, check points (GCPs) are required to verify this.

PROJECT SETUP WIZARD

Use the project wizard to start a new project. Select the project type.



Once the images to be used have been selected, the Exterior Orientation Parameters dialog will be displayed.

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Imported images will default to Longitude/Latitude WGS84, with ellipsoid height in meters. Label the columns appropriately.

Since imported imagery is in ellipsoid height, conversion to orthometric height may be required.

Fortunately, there are many online tools for determining the geoid offset of a project. The National Geodetic Survey (NGS) offers one which can be found via this <u>link</u>. Simply choose an image in the center of the project, paste the latitude and longitude values into the NGS conversion tool and the geoid offset for that location will be provided. This offset should be entered into the Altitude Offset field.

Note: If the projection of the project is in feet, this value needs to be manually converted to feet before.

6/21/2021	GEOID COMPUTATIONS
Output from GEOID18	
Station Name USER LOCATION	latitude longitude error (95% confidence interval) ddd mm ss.ssss ddd mm ss.sss meters 29 18 54.22190 261 37 9.534 -25.685 0.042

Exterior Orientation Parameters X **Exterior Orientation Parameters** EXIF information has been read from the images. You can replace that information with EO parameters imported from an ASCII file or a legacy EO file. Inputs Text File Delimiters Tab Semicolon Space Other: ? Comma Parameters Input Angular Units Degrees 🗸 Position System Longitude/Latif 0° ~ Camera Mount Rotation Orientation System Roll/Pitch/Yaw Add Extension to Image Name None ~ Altitude Units Meters \sim 84.267 Altitude Offset Images ✓ Longitude ✓ Latitude ✓ Altitude ✓ Roll ✓ Pitch ✓ Yaw ✓ ss(DJI_20210619022749_0001.JPG -98.3848469 29.3131575 273.892 3.3 -0.2 17.7 ges\DJI_20210619022753_0002.JPG -98.3847851 29.3133257 273.847 4 -20.5 16.2 4.2 -23.2 16.1 ges\DJI_20210619022756_0004.JPG -98.3846795 29.3136121 273.848 4.8 -15.7 16.8 ges\DJI_20210619022757_0005.JPG -98.3846246 29.3137599 273.898 17.2 4.2 -11.2 ges\DJI_20210619022758_0006.JPG -98.3845711 29.3139017 273.903 3.2 -13.2 17.3 des\DJI 20210619022800 0007.JPG -98.3845173 29.3140459 273,872 4.7 -14.1 16.6 ges\DJI_20210619022801_0008.JPG -98.3844645 29.314189 273.893 -13.3 16.8 4.4 Cd webbil 20210510022802 0000 IDC 00 3044136 ------172 011 16 7

Proceed through the project wizard following the remaining steps as usual.

RTK / PPK ASSISTED BUNDLE ADJUSTMENTS WITH GCPS



If GCPs were not added in the Project Setup Wizard, they can be added in the AT module. Import GCPs as check points.

Add >>

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Once imported, tag each GCP in the images.



BUNDLE ADJUSTMENT

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When running a bundle adjustment, select RTK / PPK Assisted for the EO Adjustment and Ground Control Points for the Ground Reference

Bundle Adjustmen	t	×
Bundle Adjustment	Settings	
EO Adjustment	RTK/PPK Assisted	~ *
Sensor Calibration	Unconstrained	~
Ground Reference	Ground control points	\sim
Image Filtering	None	~
	Process	Cancel

PROJECT SUMMARY

The project summary of the quality report indicates that the image tie points quality assessment was excellent. With an average projection error of less than half a pixel and an average number of tie points per image at 152, the resulting DSM, DTM and orthomosaic will have an excellent relative accuracy. When compared to the check points, once again the average projection error is less than half a pixel, meaning they were correctly located in each image to within less than half a pixel.

1. PROJECT SUMMARY

PROJECT Project type Aerial Projection EPSG:6588 NAD83(2011) Texas South Central Planar units FEET Elevation units FEET 795 images (DJI Zenmuse P1) Camera 1 Total images 795 IMAGE TIE POINTS EXCELLENT Quality assessment Average projection error 0.45 pixels Standard deviation 0.22 pixels Average number of tie points per image 152.8

GROUND CONTROL POINTS				
Average XY error	-			
RMS Z error	-			
Average projection error	-			
Standard deviation	-			
Number of GCPs	0			

CHECK POINTS

Average XY error	0.373 ft
RMS Z error	0.671 ft
Average projection error	0.37 pixels
Standard deviation	0.07 pixels
Number of check points	5