



Geometric Verification
DMC III 27539



Camera Geometric Verification Certificate
No: DMC III 27539



For

Keystone Aerial Survey
467 Aviation Way
Frederick, MD 21701

United States

DMC III 27539 Geometric
Verification

Camera: DMC III 27539
Manufacturer: Leica Geosystems Technologies, D-73430 Aalen, Germany
Reference: PAN
Serial Number: 00129298 (PAN Head)
Date of Calibration: 14 August 2017
Date of Report: 30 June 2023
Number of Pages: 5

This camera system is certified by Leica Geosystems Technologies and is fully functional within its specifications and tolerances.

Date of Calibration: August 2017

Date of Certification: June 2023



Dipl.Ing. Christian Müller, Product Manager

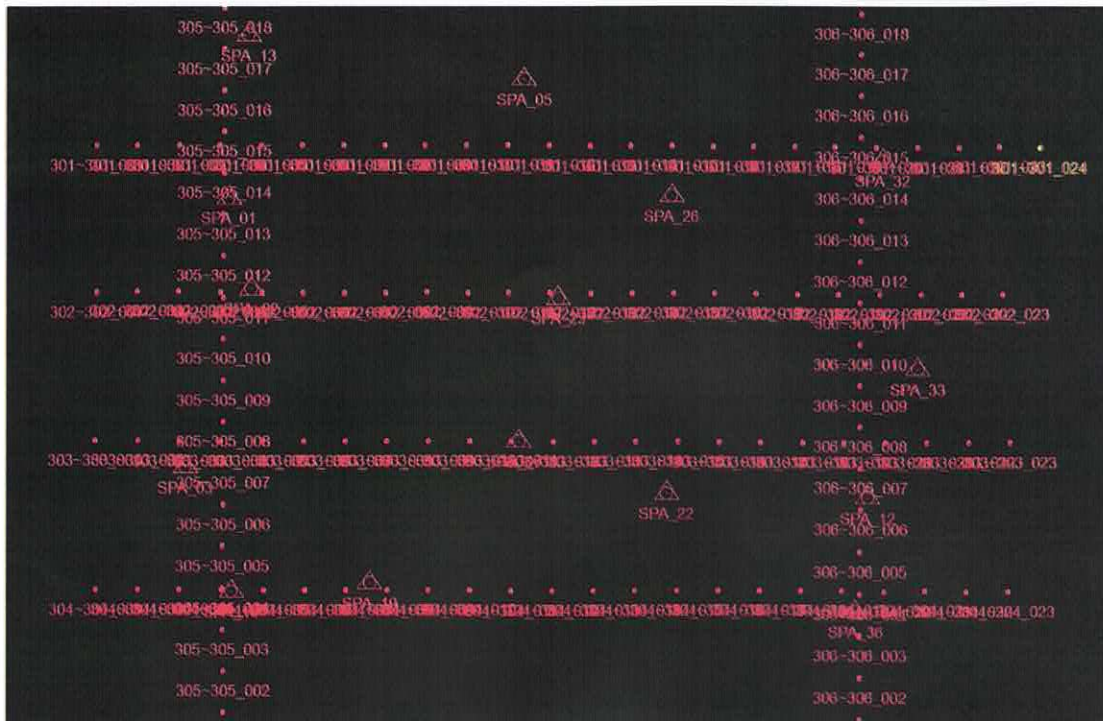
Michael Reading, Senior Support Analyst

Camera Serial Numbers and Burn-In flight

Camera Head	Serial Number	Calib. Date
PAN (reference)	00129298	14.08.2017
MS1 (NIR)	00128326	14.08.2017
MS2 (Blue)	00128342	14.08.2017
MS3 (Red)	00128773	14.08.2017
MS4 (Green)	00128797	14.08.2017

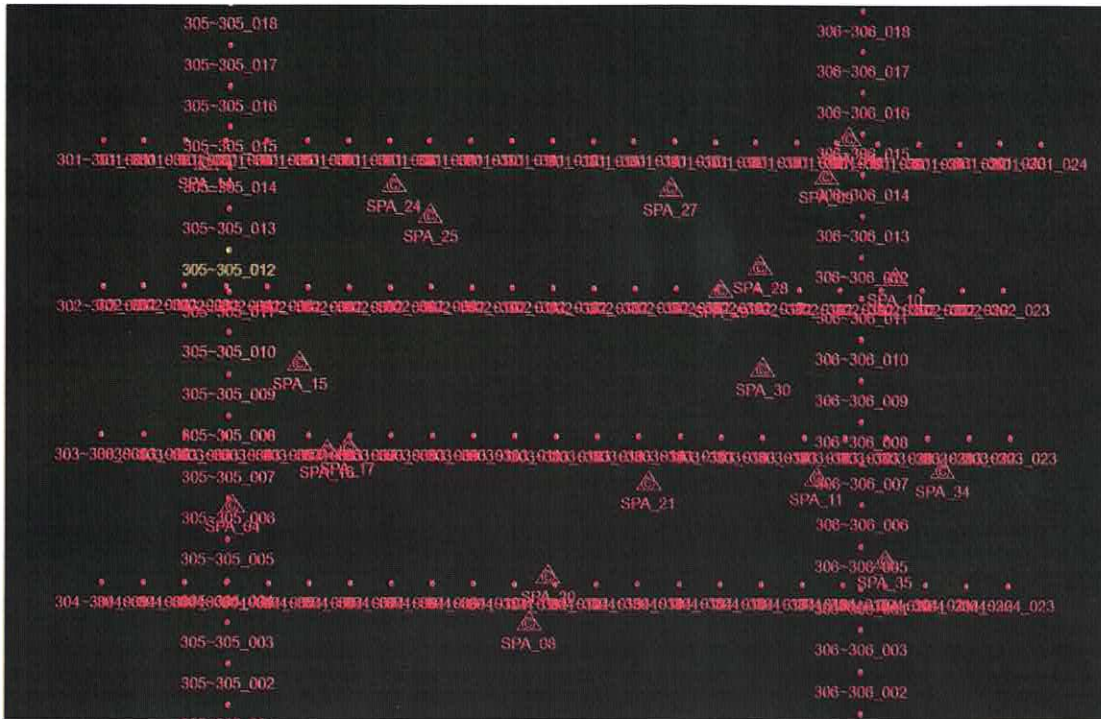
Verification flight performed: 16 June 2023

Flight parameters of 5 cm Verification Flight – Control Points



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Flight parameters of 5 cm Verification Flight – Check Points



Parameter	Validation Flight
GSD (cm)	5
End-lap (%)	70
Side-Lap (%)	40
Number of Exposures	129
Number of Flight Lines	4
Number of Cross Flight Lines	2
Number of Control Points	15
Number of Check Points	20
GNSS / INS	Yes

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Application

Parameter	Validation Flight
Weighting for manual measured image points (um)	2.0
Weighting for automatic measured image points (um)	2.0
Weighting for Control Points (m)	0.080 / 0.080 / 0.080
Weighting for GPS (m)	0.050 / 0.050 / 0.050
Weighting for INS (deg)	0.010 / 0.010 / 0.050
Modeling of GPS systematic residuals	YES
Bore Sight Alignment (YES/NO)	YES
Camera Self Calibration (YES/NO)	NO

Statistics –Bundle Block Adjustment

Parameter	Validation Flight
Sigma0 [µm]	0.71152
Mean Std Dev Photo Position [m]	0.02142 / 0.02438 / 0.01896
Mean Std Dev Photo Attitude [deg]	0.00097 / 0.00096 / 0.00053
Mean Std Dev Control Points [m]	0.01412 / 0.01503 / 0.03435
Mean Std Dev Check Points [m]	0.035105 / 0.021022 / 0.036563
RMS Photo Position [m]	0.01447 / 0.01221 / 0.01361
RMS Photo Attitude [deg]	0.00095 / 0.00099 / 0.00212

Statistics – Results From Independent Reference Measurements

Parameter	Validation Flight
RMS of Control Points - horizontal [m]	0.03235 / 0.03065
Max Ground Residual of Control Points - horizontal [m]	0.07354 / 0.06699
RMS of Control Points - vertical [m]	0.04207
Max Ground Residual of Control Points - vertical [m]	0.09253
RMS of Check Points - horizontal [m]	0.03423 / 0.02049
Max Ground Residual of Check Points - horizontal [m]	0.07616 / 0.04350
RMS of Check Points - vertical [m]	0.03578
Max Ground Residual of Check Points - vertical [m]	0.08919

The results of the aerial triangulation were generated with ImageStation Automatic Triangulation (ISAT), 2022, Version 16.7.0, Build 573 from Hexagon Geospatial.

Aerial Triangulation performed by


Michael Reading

06.30.2023
Date