



Geometric Verification
DMC III 27545



Camera Geometric Verification Certificate
No: DMC III 27545



For

Keystone Aerial Survey
467 Aviation Way
Frederick, MD 21701

United States

**DMC III 27545 Geometric
Verification**

Camera: DMC III 27545
Manufacturer: Leica Geosystems Technologies, D-73430 Aalen, Germany
Reference: PAN
Serial Number: 00128302 (PAN Head)
Date of Calibration: 13 September 2017
Date of Report: 3 July 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: September 2017

Date of Certification: July 2023



Dipl.Ing. Christian Müller, Product Manager



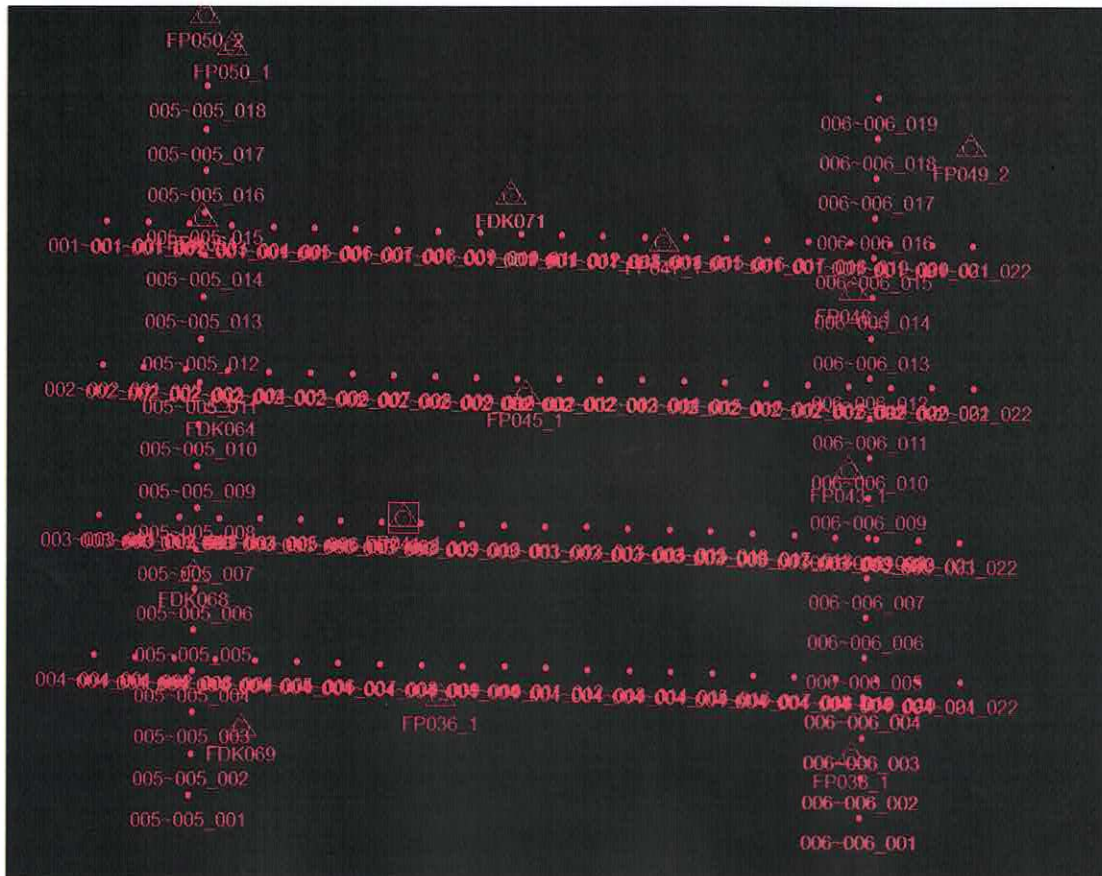
Michael Reading, Senior Support Analyst

Camera Serial Numbers and Burn-In flight

Camera Head	Serial Number	Calib. Date
PAN (reference)	00128302	13.09.2017
MS1 (NIR)	00128778	13.09.2017
MS2 (Blue)	00128808	13.09.2017
MS3 (Red)	00128779	13.09.2017
MS4 (Green)	00128805	13.09.2017

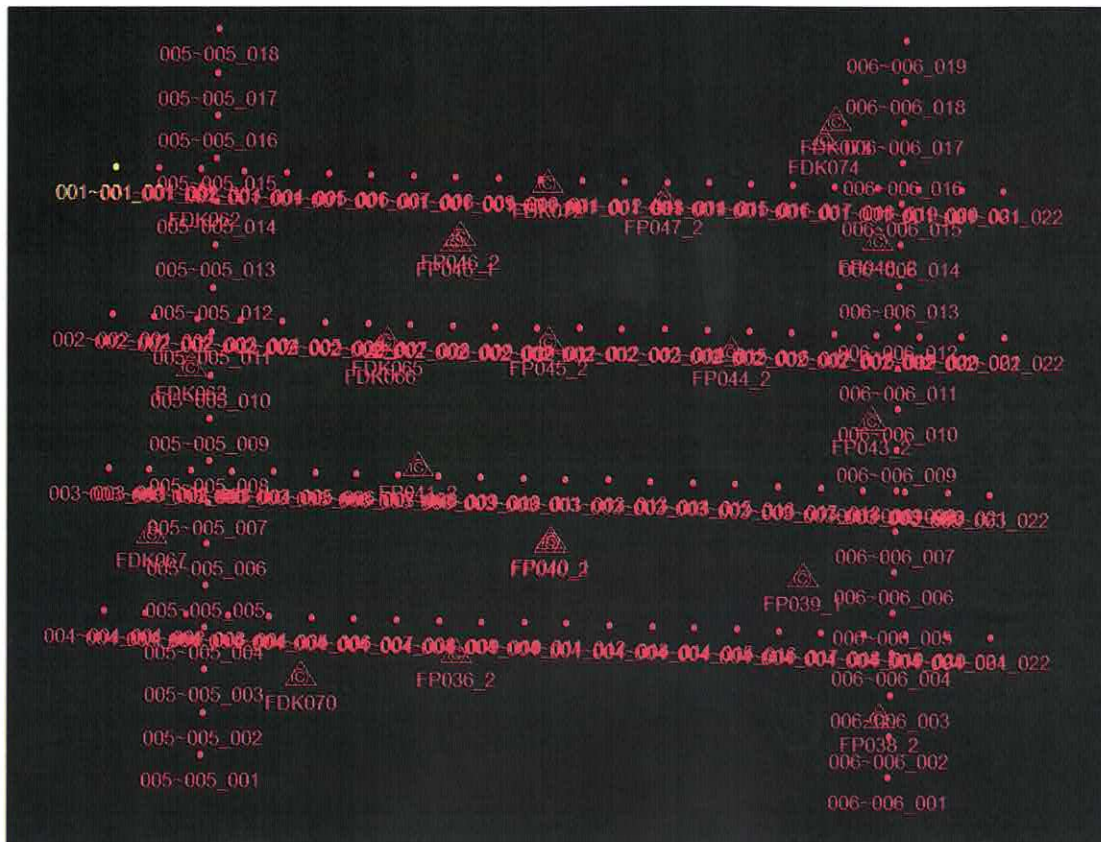
Verification flight performed: 18 June 2023

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	125
Number of Flight Lines	4
Number of Cross Flight Lines	2
Number of Control Points	14
Number of Check Points	22
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]	0.66668
Mean Std Dev Photo Position [m]	0.02112 / 0.02358 / 0.01800
Mean Std Dev Photo Attitude [deg]	0.00093 / 0.00096 / 0.00047
Mean Std Dev Control Points [m]	0.01228 / 0.01279 / 0.02690
Mean Std Dev Check Points [m]	0.02941 / 0.03232 / 0.02773
RMS Photo Position [m]	0.01161 / 0.00862 / 0.01109
RMS Photo Attitude [deg]	0.00072 / 0.00074 / 0.00055

Statistics – Results From Independent Reference Measurements

Parameter	Validation Flight
RMS of Control Points - horizontal [m]	0.03071 / 0.02402
Max Ground Residual of Control Points - horizontal [m]	0.08064 / 0.05506
RMS of Control Points - vertical [m]	0.03288
Max Ground Residual of Control Points - vertical [m]	0.08863
RMS of Check Points - horizontal [m]	0.02903 / 0.03606
Max Ground Residual of Check Points - horizontal [m]	0.06539 / 0.08565
RMS of Check Points - vertical [m]	0.05332
Max Ground Residual of Check Points - vertical [m]	0.09179

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

07.03.2023
Date