



Geometric Calibration Verification
DMC01-0144



Geometric Calibration Verification Certificate

Digital Mapping Camera (DMC)

DMC Serial Number: **DMC01-0144**

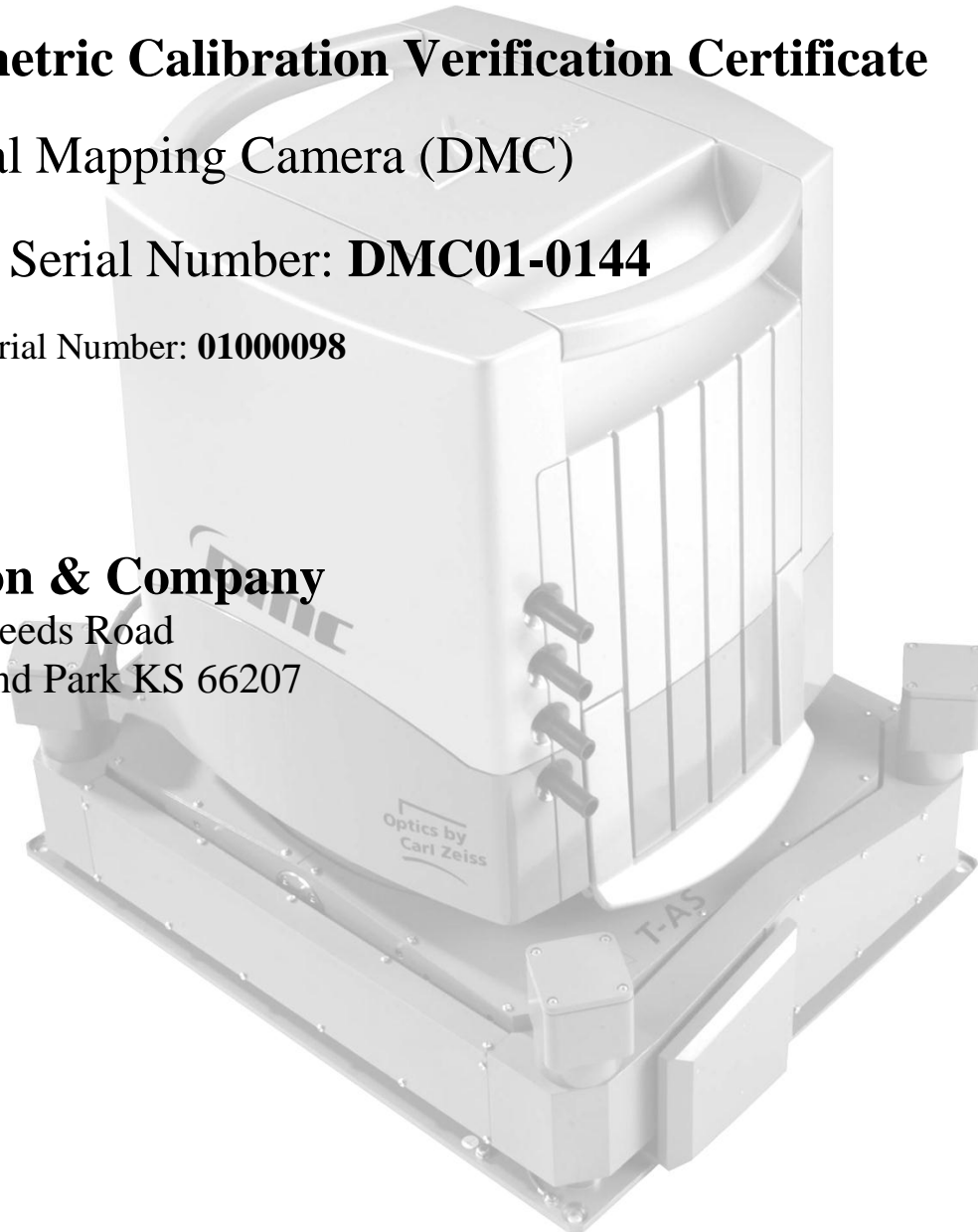
CBU Serial Number: **01000098**

For

Wilson & Company

9401 Reeds Road
Overland Park KS 66207

USA



System Overview

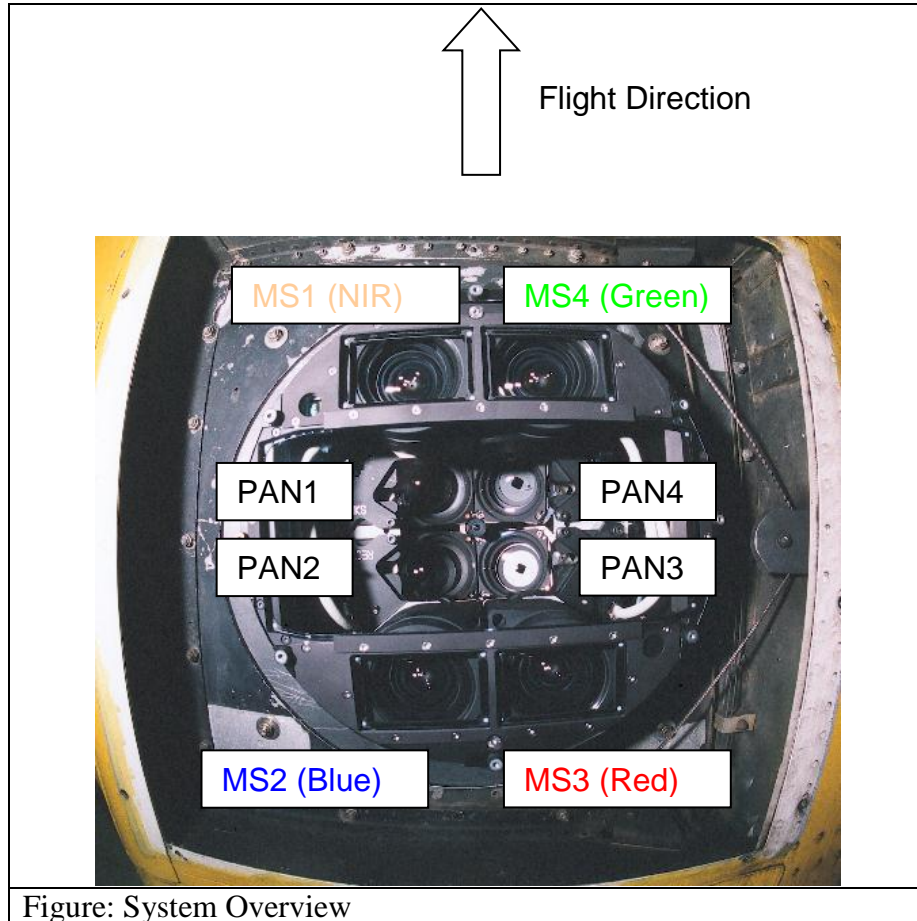


Figure: System Overview

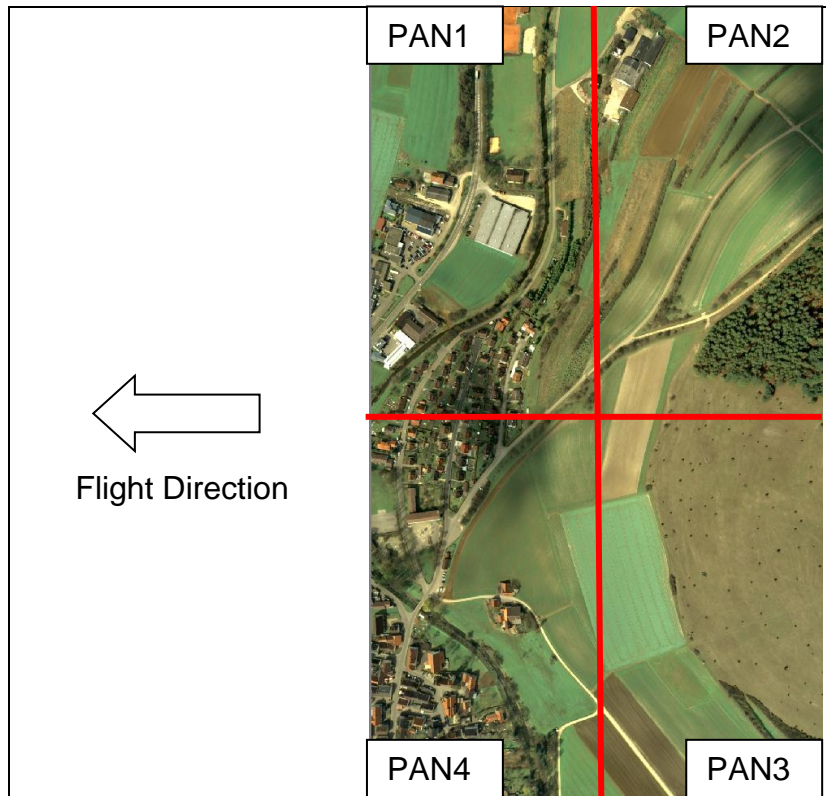


Figure: Image Overview (Pan Camera)

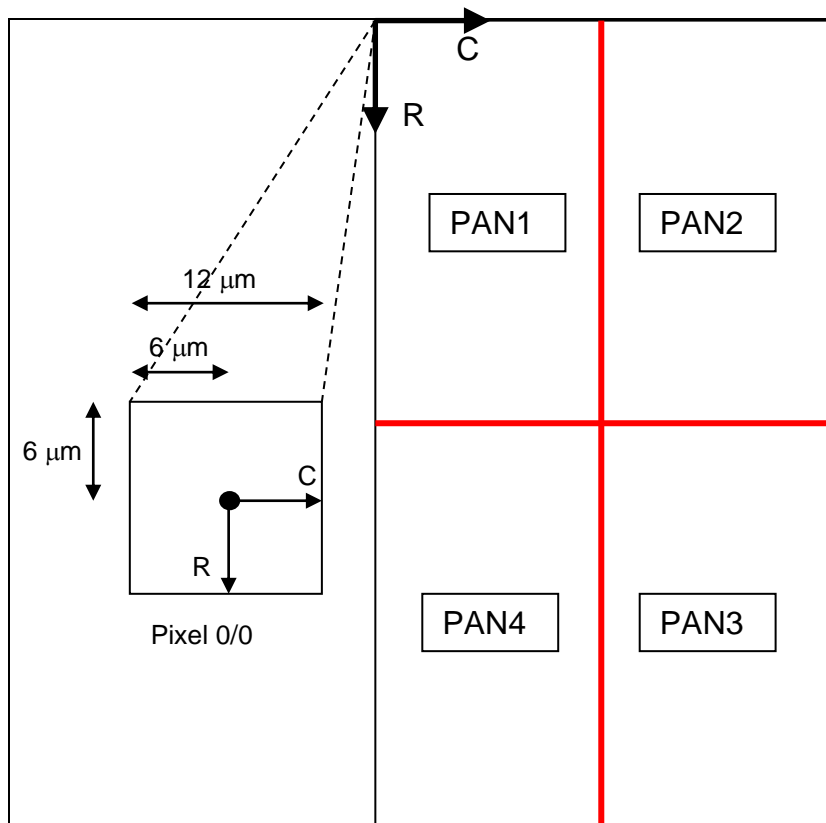


Figure: Image Coordinate System (Pan Camera)

Camera Parameter for Virtual Image (High Resolution)

Virtual Focal Length [mm]	120
Virtual Sensor Size [Pixel]	13824 x 7680
Virtual Pixel Size [μm]	12
Virtual Principle Point [mm]	$x_p = 0.0, y_p = 0.0$

Camera Parameter for Virtual Image (Color Resolution) before Version PPS 5.0.10.3

Virtual Focal Length [mm]	120 / 4.75
Virtual Sensor Size [Pixel]	3072 x 2048
Virtual Pixel Size [μm]	12
Virtual Principle Point [mm]	$x_p = -0.646, y_p = 0.646$

Camera Parameter for Virtual Image (Color Resolution) after Version PPS 5.1.10.3

Virtual Focal Length [mm]	30
Virtual Sensor Size [Pixel]	3456x1920
Virtual Pixel Size [μm]	12
Virtual Principle Point [mm]	$x_p = 0.0, y_p = 0.0$

Camera Serial Number and test flights

Camera	Serial Number	Calib. Date
Burn-in Flight: 18.03.2009		
Verification Test Flights: 19.07.2012		
PAN1	00117337	05.03.2009
PAN2	00117339	27.02.2009
PAN3	00117340	02.03.2009
PAN4	00117344	04.03.2009
MS1 (NIR)	00117618	08.01.2009
MS2 (Blue)	00117616	12.01.2009
MS3 (Red)	00117620	15.01.2009
MS4 (Green)	00117646	16.12.2008

Camera Orientation PAN-Cameras (Verification Test Flight 19.07.2012)

Camera (Serial Number)	X [m] (Standard Deviation)	Y [m] (Standard Deviation)	Z [m] (Standard Deviation)	Omega [Deg] (Standard Deviation)	Phi [Deg] (Standard Deviation)	Kappa [Deg] (Standard Deviation)
PAN1 (00117337)	0.064 (0)	-0.079 (0)	1000 (0)	17.958200 (0.001)	10.115865 (0.001)	86.681414 (0.001)
PAN2 (00117339)	-0.064 (0)	-0.079 (0)	1000 (0)	17.955964 (0.001)	-10.151273 (0.001)	92.776273 (0.001)
PAN3 (00117340)	-0.064 (0)	0.079 (0)	1000 (0)	-17.962271 (0.001)	-10.121191 (0.001)	-93.307228 (0.001)
PAN4 (00117344)	0.064 (0)	0.079 (0)	1000 (0)	-17.952531 (0.001)	10.157002 (0.001)	-86.385063 (0.001)

The data is connected to the virtual projection center of the virtual image.


The above Platform calibration values are initial values and are liable to slight fluctuations between project images and between different projects. The rotation axes of the angles are (in this order)

Omega	x-Axis
Phi	y-Axis
Kappa	z-Axis

The results of the Platform calibration were generated with DMC Postprocessing SW (PPS), Version 6.3 and later, from Z/I Imaging sensor product suite.

Platform calibration verification performed by:

Z/I Employ Name:


Dipl. Ing. Christian Müller

26.09.2012

Date

Aerotriangulation Results (Test Flight 19.07.2012)

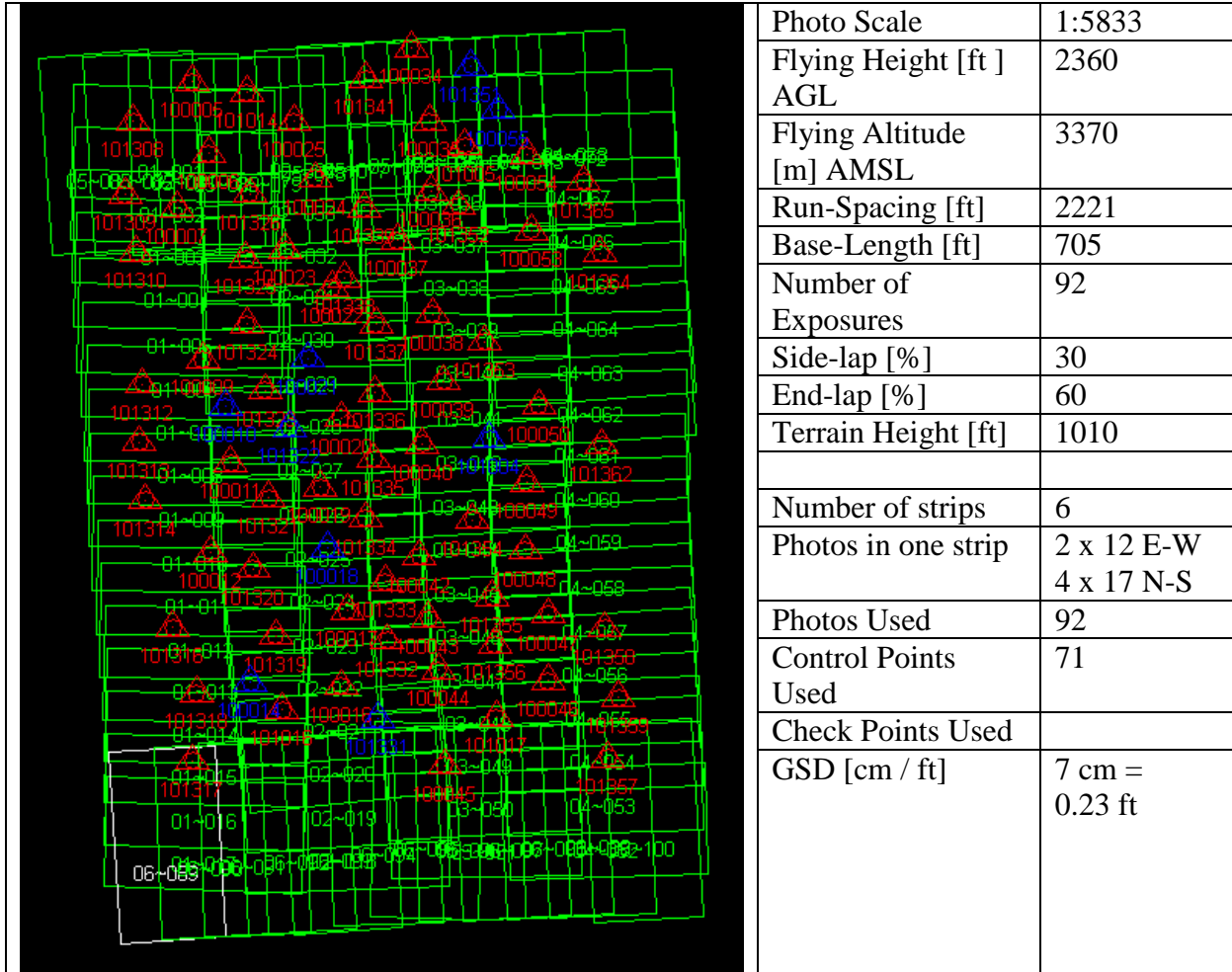


Photo Scale	1:5833
Flying Height [ft] AGL	2360
Flying Altitude [m] AMSL	3370
Run-Spacing [ft]	2221
Base-Length [ft]	705
Number of Exposures	92
Side-lap [%]	30
End-lap [%]	60
Terrain Height [ft]	1010
Number of strips	6
Photos in one strip	2 x 12 E-W 4 x 17 N-S
Photos Used	92
Control Points Used	71
Check Points Used	
GSD [cm / ft]	7 cm = 0.23 ft

Statistic results:



Geometric Calibration Verification
DMC01-0144



Whole Block				Sigma relativ:	2.177	um
Whole Block				Sigma absolut:	2.234	um
Parameter	X/Omega	Y/Phi	Z/Kappa	Key Statistics		
RMS Control	0.133	0.125	0.157	Sigma: 2.2 um		
RMS Check				RMS Image (x, y): 1.7, 1.7 um		
RMS Limits	0.250	0.250	0.250	Number of iterations: 2		
Max Ground Residual	0.451	0.403	0.449	Degrees of Freedom: 12282		
Residual Limits	0.750	0.750	0.750	Gross Image Blunders: 0		
Mean Std Dev Object				Gross Control Blunders: 0		
RMS Photo Position				Image Blunders: 0		
RMS Photo Attitude				Solution Status: Solution Successful.		
Mean Std Dev Photo Position						
Mean Std Dev Photo Attitude						
Current Count				Cameras used: (1).		
Control Points Used: 71	Camera Id		Lens Di...	Grids		
Check Points Used: 0	DMC		Off	Off		
Photos Used: 92						
Photos Not Used: 0						
Image Points Used: 10215						
				Project Settings		
				Linear: Feet	Refraction: Off	
				Angular: Degrees	Curvature: Off	
				North American 1983 - State Plane Coordinate System 1983 (ft)		

The results of the Aerotriangulation were generated with ImageStation Automatic Triangulation (ISAT), Version 6.2 and later, from Intergraph Z/I Imaging photogrammetric product suite.

With this certificate we confirm that DMC01-0144 is within geometric accuracy.

Aerotriangulation performed by:

Z/I Employ Name: Chr. Müller
Dipl. Ing. Christian Müller

26.09.2012
Date