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DIGITAL MAPPING SYSTEM

Manufactured by:



Summit Evolution Digital WorkStation | FALCON-II (Airborne LIDAR Sensor System) | ILRIS-36D (Laser imaging and digitizing System) | Large Format Digital Printer
 Photogrammetric Software and Suites | Aerial Photo Survey | Airborne LIDAR Hydrography | Airborne LIDAR Surveys | OPS | Terrestrial Scanning | Photogrammetric Activities
 Data Processing | Other LIDAR Applications | Geodessy | GIS | Management Information System | Scanning | Technology Transfer | Training



Digital Camera (Airborne Scanner) 3-DAS-1

High resolution trilinear pushbroom airborne scanner with true RGB forward-nadir-backward channels

Features and benefits

- Complete digital photogrammetric workflow without film development and scanning
- Contiguous seamless images for whole strip with permanent triple overlay.
- Three RGB-sensors from Kodak provide crystal bright 42-bit images.
- Realtime Image view and automatic selection of optimal exposition during the flight.
- Unlimited flight capture time with hot swap RAID storage units.
- On-the-fly lossless compression allows up to 16 hours of capture per terrabyte.
- Selectable stereo for 3D-mapping with 16°, 26° or 42° convergence angle.
- Simple and robust design for easy maintenance.

Technical specification

Parameter Values

Flying height, m	550-4400
Swath width, m	360-2880
Ground sample distance, cm	4.5-36
Number of simultaneous RGB channels	3
Radiometric resolution, bit	42
Angles between nadir and other channels, degree	16/26
Focal distance, mm	110
Field of view (across the strip), degree	36
Line rate, Hz	375-750
Power requirements	DC 28V/20A
Weight, kg (net/whole system with stabilized platform and PC)	32/150
CCD sensor properties	8000xRGB
Active elements	Pixelsize, microns



Camera software

- Provides flight planning and flight management with trajectory control.
- Allows viewing captured images and changing parameters during the flight.
- Creates and process raw and compressed 16/8 bit images of unlimited size.
- Performs calibration and postprocessing for image rectification by GPS/IMU data.
- Provides automatic and semiautomatic DEM extraction for orthophoto.
- Creates seamless orthophoto mosaics with automatic color balancing.
- Allows 3D vector mapping.

Compatibility

Integration interface to popular IMU/GPS such as Applanix POSTrack/POS AV, Leica IPAS10, IGI CCNS/AEROcontrol.

Servo stabilized platform is included (optional adapter allows using Leica PAV30 as an alternative).

Components



Scanning Unit
 3 RGB-channels 8000 x 9 micron x 42 bit
 focal distance 110 mm



Control Computer Rack
 2xOpteron64/PCI-X/RAM 4Gb
 RAID-3 2.0Tb/UltraSCSI-320/Touchscreen



Stabilized Platform
 Compensates aircraft rotations (roll, pitch, yaw)
 to keep camera in constant horizontal position
 with residual deviation less than 0.2°



Flight Management System
 Touchscreen tablet PC in pilot's cabin
 for realtime position and course control



GPS/IMU (Applanix POS AV)
 Measures absolute orientation elements of camera
 (projection center and rotation angles) with 200 Hz frequency



Full View



Digital Photogrammetric Station - Delta

Provides creation/revision digital maps and orthophotos from raster images
Supports full photogrammetric production started from triangulation/adjustment to final symbolized map/ortho output and optionally uses handwheels/footdisk equipment.

Hardware

- The photogrammetric station is based on a standard Intel-compatible computer working on Windows 98/ME/2000/XP system. The software supports video modes from 1024x768xHiColor to 1600x1200xTrueColor.
- Can work with stereoscope (split screen mode) or OpenGL 3D-shutters (page flipping mode).
- The station provides a fixed floating mark and scrollable images in split-screen mode; this functionality does not require any special hardware support.
- Users can move the floating mark with a classic handwheels/footdisk combination and/or with the mouse.
- Stereoscope or stereo shutter glasses can be used for observation.
- One micron encoders and 3D digitize with subpixel accuracy.

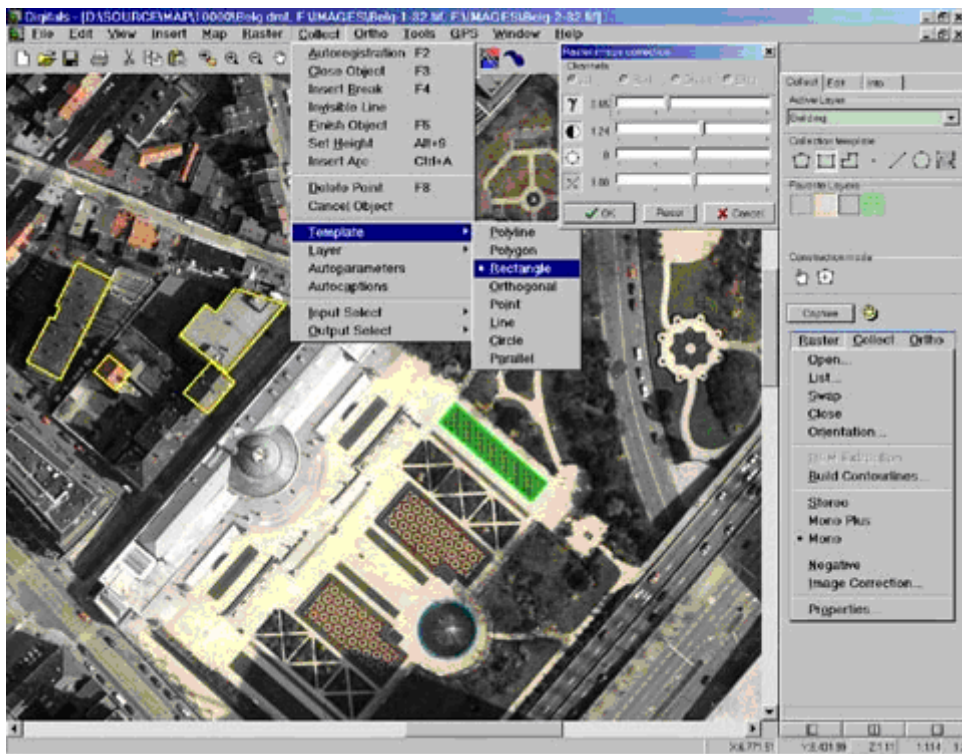
Orientation program

- Provides management of camera and ground point lists
- Semiautomatic orientation of single photos or stereo models
- Works with aerial and satellite images of central and panoramic projection
- Processing aerial, close range and satellite images from various sensors.
- Managing cameras and ground/control points.
- Importing absolute orientation elements from different formats.
- Total error control and correction at every orientation stage.

Mapping software

- Operates both with stereo models and with single photos (using DEM).
- Three-dimensional superimposition of vector data on raster images.

- Can be used for vectorization of orthophotos and scanned maps.
- Allows to customize layers, symbols, object parameters and other map attributes.
- Uses templates of standard object types to simplify data collecting.
- The panel of favorite most used layers.
- Automatic 2D/3D snap at points and lines with indication.
- Automatic and semiautomatic DEM extraction, building and interpolation of contourlines.
- Raster maps and photos in TIFF (including JPEG and ZIP compressed), RAW, JPEG and BMP formats can be used.
- Operates with huge black-and-white and color raster images on a standard computer.
- Supports popular vector formats: DWG, DXF/DBF, Shape, DGN, MID/MIF, ASCII, etc.
- Real-time coordinates exchange with other programs via TCP/IP, OLE and COM-port.



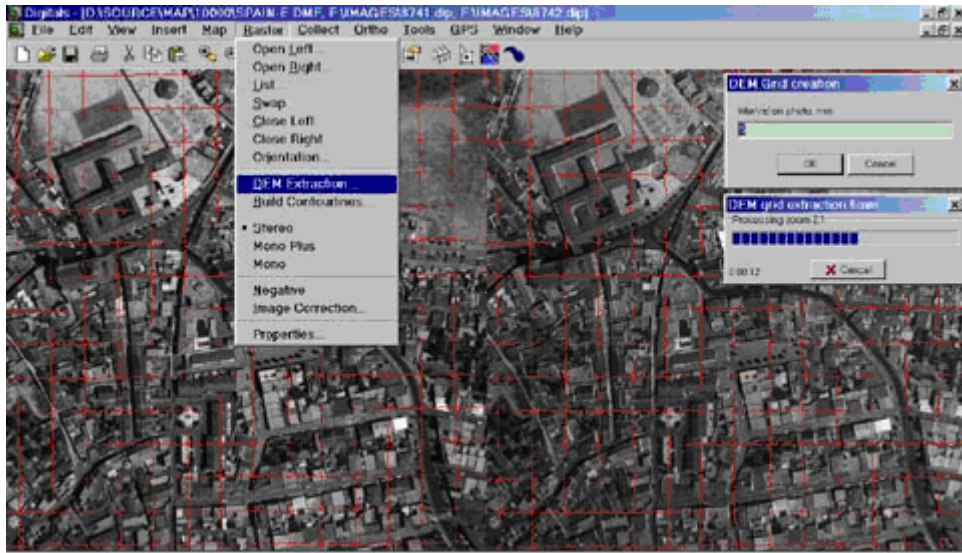
Data collection over a stereo model or single photo

Terrain-related functions

- Automatic DEM extraction for orthophoto and building contourlines.
- Creation of a regular DEM-grids and TINs based on spot-heights and/or contourlines.
- Building contourlines using a DEM or a TIN.
- Contourline interpolation.
- Assign of height to every map object according to spot-heights and contourlines.
- Creation of profiles and sections, volume calculations.
- DEM-grid editing using shutter glasses or stereoscope.
- Import of DEM data from ASCII text or DXF format as spot-heights and/or contours.

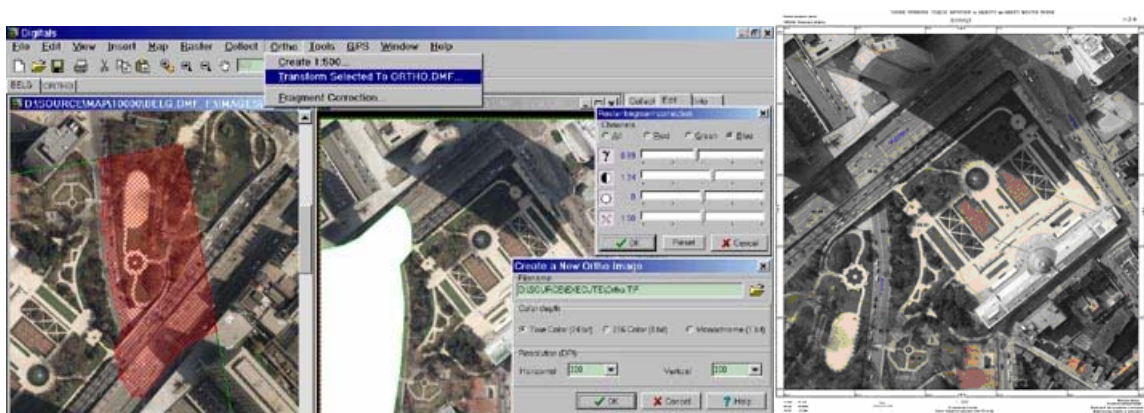
Orthophoto mosaicking

- Creation of a mosaic of any number raster polygons from different photos.
- Creation and editing of raster/vector orthophoto maps with frame, grid and legend using any fonts and symbols.



Automatic triangulation

- Contains own bundle adjustment engine BlockMSG for on-line adjustment and control.
- Uses ground points and GPS data with automatic boresighting calculation.
- Quick correlation algorithm for automatic point transfer.
- Full quality control using correlation, parallaxes and tie-point errors.
- Automatic and semiautomatic modes of measurement.
- Filtering measured points using various criteria.
- Convenient tools for block analysis and error detection, sorting models and points by any parameters.
- Uses 3D-mode for accurate ground points measurements





Color Photogrammetric Scanner - DeltaScan

There are three different scanner models on the same mechanical basis. All scanners have the same resolution, geometric and radiometric parameters, etc. First, professional model has fully automatic film-roll system, second, has manual roll. All the models can scan cut images.

Standard scanner models are intended for roll-films up to 250 mm wide and 168 mm in diameter. It can scan cut images up to 300x300 mm in size. Special, large size model is intended for 300x450 mm satellite images and satellite 300 mm wide films.

Technical Specification

CCD Pixel size	8µm
Geometric resolution	1µm
Geometric accuracy (RMS)	±2µm
Maximal optical density	3.4D
Optical density range	2.7D
Radiometric resolution	12/8 bits per channel
Maximal scanning area	320x320 mm or 320x450 mm
Maximal roll diameter	168 mm
Roll film scanning	Up to 250 or 300 mm wide
CCD-sensor	Color SONY 3x5300x8
Light source	Power LED array
Scanning of non-transparent material	Optional
Output formats	Tiled TIFF, Tiled TIFF(JPEG), BMP , Color 24bit, b/w 8bit

Typical scanning time for standard 230x230 mm photo

Pixel size, µm	Black-and-white 8bit		Color 24bit	
	Time min	Size Mb	Time min	Size Mb
8	12	788	30	2368
16	6	197	15	592
32	4	49	9	148

Geometric parameters

- The scanner provides a high resolution, which is 8 μm (3175dpi).
- Root mean square error of scanning does not exceed $\pm 2 \mu\text{m}$. The value of root mean square error is determined by scanning and measuring the control grid
- Scanner is supplied with a unit for scanning roll films up to 250 mm wide (300 mm for 300x450 model).

Radiometric parameters

- Scanner is equipped with a SONY color linear CCD-sensor and a light source based on a power LED array: components that provide superb quality of output images
- Controller of the CCD-sensor provides an internal 12-bit storage for intensities within each color channel that is transformed by hardware into 8-bit output
- Scanner provides scanning of both color and black-and-white materials and the scanning software stores output as True Color (24 bit) or gray scale (8 bit) image files
- The scanning software automatically detects optimal values of exposition, contrast and gamma for each color channel
- Scanner can perform scanning in two modes: density linear and intensity linear, which provide optimal results for photographs of any quality
- Scanning time for a 230x230 image in True Color mode at a 16 μm pixel size is 15 minutes
- Scanning time for a 230x230 image in grayscale mode at a 16 μm pixel size is 6 minutes.

Scanning software

- Works in single image or batch mode (for automatic model);
- Supports scanning to TIFF (uncompressed or JPEG) and BMP formats where the pixel size is a multiple of CCD pixel: 8,12,16,24,32 ... 128 μm
- Contains a powerful unit for correction and transformation of output images and automatic inner orientation

The Models



Delta Scan 5 - Fully automatic film-roll system



Delta Scan 4- Manual Scanning



**Delta Scan 470 - Large Size Model
for large format scanning**

Scanning software capabilities

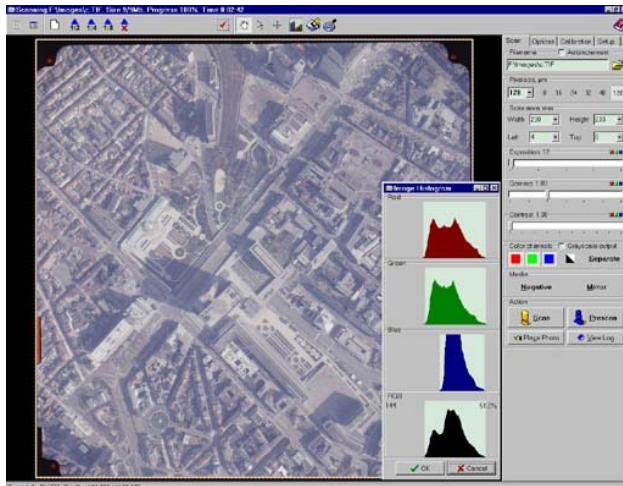
- Automatic detection of optimal scanning settings
- Manual setting of scanning parameters and transformation tables for each channel separately
- Scanning into Tiled TIFF, BMP and DIP formats where the pixel size is a multiple of minimal size: 8,12,16,24,32 ... 128 μ m
- Density linear mode provides maximum detail and uniform distribution of pixel intensities around the image
- Scanning positives and negatives in straight and mirror modes
- The program can apply digital filters during scanning to reduce the noise of the image;
- Geometric calibration and accuracy control by measuring the control grid.
- Radiometric calibration and elimination of irregularity of the light source
- Generation of output images using only one or two color channels; saving color channels in separate files
- An option that allows automatic creation of zoom pyramid during scanning.
- Logging every scanning process allows users to view settings for previous processes and restore them, if necessary.

Batch-processing mode

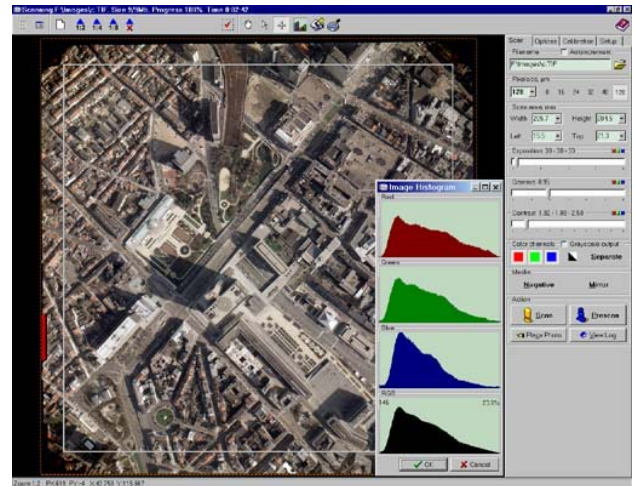
- Supports multiply jobs/setups per film;
- Uses automatic frame-edge search;
- Calculates summary film histogram in full film prescan mode to provide uniform film images;
- Uses customized film layouts for films with arbitrary numerated frames;

Post-processing software

- Image analysis and histograms
- Image correction and applying various filters to groups of raster files
- Resampling images into any other pixel size
- Merging/splitting color channels from/into separate files
- Splitting files into fragments or merging fragments into a single file
- Fast processing of raster files up to 4GB.



Sample prescan image with improper color balance and weak contrast



This is how the scanner output looks after automatic settings have been applied

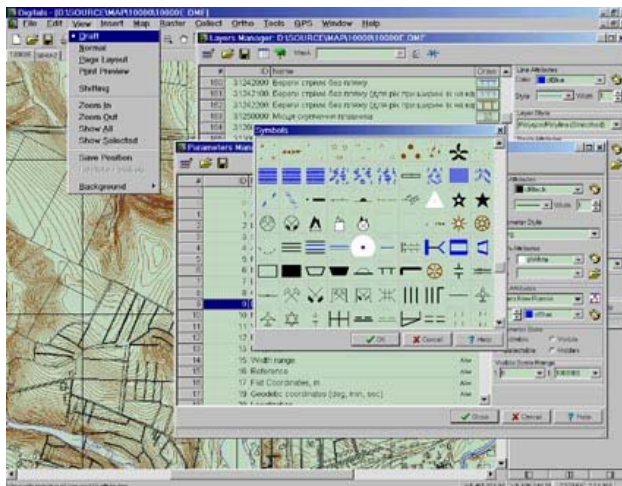
Mapping and cartography software - Digitals

The mapping software is designed for creation/revision of topographic and special maps, map publishing, urban cadastre and land management, solving special tasks. Provides unlimited possibilities for creating/editing/revision of digital maps.

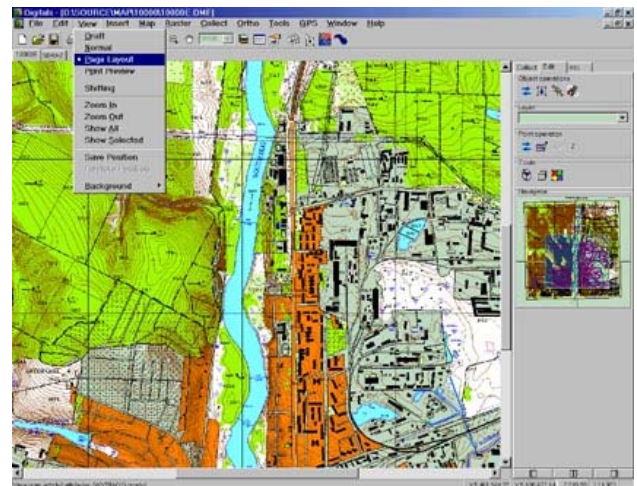
Supports 3D-input from DPS, APS and external formats.

Basic cartographic engine supports

- Unlimited list of layers that define the appearance of objects: line and fill attributes, associated cartographic symbol and other properties
- Unlimited number of object parameters (database fields) and a possibility of arbitrary placement of their values on the map as captions
- Editable library of vector cartographic symbols that contains ordinal, linear, linear-oriented, linear-scalable and areal symbols
- Changeable order in which layers or single objects are displayed
- WYSIWYG mode: the map is displayed on the screen just as it will be output on a printer, plotter, to BMP file
- Saving maps along with its attributes in a single file



Draft view (basic digital model) and visual settings for objects



Page layout mode utilizes all the attributes of objects

Software features

- Multidocument interface with support for standard Copy, Cut and Paste operations within a window or between multiple windows
- Group selection/search of objects by any combination of parameters, performing any operations on the all selected objects simultaneously
- Possibility to enrich with cartographic symbols, color attributes, etc. digital maps created in other systems
- Support for DWG, DXF+DBF, Shape, DGN, MID/MIF, ASCII, etc. formats
- Creating arbitrary types of frames and legends and automatic insertion them into maps
- Creating map templates.

Mapping by using raster images or stereoplottter

- Supports data collection over scanned maps and single photos in TIFF and BMP formats
- Works with black-and-white and color images up to 4 Gb large on standard computers
- Collection using templates of standard object types, automatic polygon assembling

Relief-related functions

- Creating a regular DEM-grid based on spot-heights and/or contourlines
- Building contourlines using a previously created DEM
- Contourline Interpolation
- Reassigning height to all map objects based on spot-heights and/or contourlines

Cadastrre and land management

- Creation of cadastral maps and schemes
- Filling database fields for every object with a search function
- Creation of reports, land distribution lists, custom graphic and text documents
- Automatic area calculation, adjustment of measuring units and formatted output
- Interaction with office applications.



Stereoanagraph Analytical Photogrammetric Station

High precision stereoplotter for mapping and triangulation

Supports processing of aerial and satellite images of up to 300x300mm. Root mean square error of coordinate measurement does not exceed 3 microns. The instrument provides continuous change of zoom and floating mark size. The analytical photogrammetric station is based on a standard Intel-compatible computer running under Windows operating system.

Orientation software

- Camera and ground point list management
- Inner, relative and absolute orientation of photos
- Automatic movement into the ground point zones
- Full error control and correction on each orientation stage
- Works with aerial and satellite photographs of central projection

Data collection for triangulation

- Uses the modes for physical or electronic point marking with Base-In/Base-Out switching
- Full error control by parallaxes and tie-point errors during measurement
- Output to different formats

Basic mapping software

- Creation and revision of multilayer vector maps
- Three-dimensional representation of objects in geodetic coordinate system during collection
- Export into DXF format or online coordinate output to other systems via a COM-port



Technical specification

Maximal format	300x300 mm
Focal distances of photos	unlimited
Overlay zone	0-100%
Geometric resolution	1 μ m
Geometric accuracy, RMS	\pm 3 μ m
Continuous zoom range	7-21
Base-In/Base-Out	present
The diameter of the floating mark	25-100 μ m
Image rotation	360 deg
Control computer	Intel/Windows
Power requirements	220V/50/60Hz
Power consumption	150W (Max)
Weight	250 kg
Dimensions, mm	1600x1400x1000