



*Enhance your
perception*



AISA Hawk

SWIR Hyperspectral System

AISA Hawk is the first small and low maintenance SWIR (1000-2400 nm) hyperspectral system, which provides sensitive high speed data acquisition.

AISA Hawk and AISA Eagle sensor heads can be combined to work parallel with a common data acquisition unit to make a complete 400-2400 nm dual sensor system.



AISA Hawk

SWIR Hyperspectral System

AISA Hawk is a complete pushbroom system that consist of a compact digital hyperspectral sensor head, miniature GPS/INS sensor, and data acquisition unit in a rugged PC. Auxiliary components include a mount to connect the sensor head to the GPS/INS unit, and CaliGeo post-processing software that produces calibrated georeferenced images and image mosaics of the acquired data with an ENVI¹ header. Hawk employs SPECIM's high quality transmissive imaging spectrograph that feature sub pixel smile and keystone distortions, and very low polarization dependency.

The major advantage of the AISA Hawk system is its distinctive size. The smallest SWIR hyperspectral system on the market can be quickly installed into any aircraft with relative ease. The systems ability to capture short wave infrared wavelengths (1000-2400 nm) makes it an ideal tool for applications, which will benefit from data acquisition on spectral signatures characteristic to chemical compounds in natural and man-made targets that can not be distinguished in the VNIR range.

Sensor head	Typical specifications
Spectrograph	High efficiency transmissive imaging spectrograph. Throughput practically independent of polarization. Smile and keystone < 8 microns. Spectrograph is temperature stabilized.
F/#	F/2.0
Pixel size	30 x 30 microns
Spectral range	1000-2400 nm
Spectral pixels	254
Spectral sampling/pixel	5.5. nm
Slit width	30 microns
Spectral resolution	8 nm
Spatial pixels	320
Pixels per swath	300
FODIS pixels	20 (optional)
Standard fore optics	30 mm
FOV	17.8 degrees
Ifov	0.054 degrees
Swath width @1000 m	0.31 x altitude 310m
Camera	MCT camera with maintenance-free cooler
Output	14 bits digital
Image rate	Up to 100 images/s
Integration time	Settable independent of frame rate
Shutter	Electromechanical shutter for dark background registration, user controllable by software
Operating modes	
Hyperspectral	254 spectral bands with max speed
Programmable multi spectral	Yes

GPS/INS sensor

The system employs a miniature, integrated 3-axial inertial navigation sensor for monitoring the aircraft position and attitude. The sensor integrates solid state gyros and GPS with a real time Kalman filter for increased accuracy.

Single sensor data acquisition system and data recorder

Standard data acquisition system supports acquisition from one sensor head and the GPS/INS sensor at a time. It is built in a rugged industrial chassis PC using

- high power processor
- digital PCI frame grabber, and
- hot swap removable hard disk (73 GB or higher) with Ultra SCSI hard drive for data recording. Hard disk can be changed in-flight to add recording capacity.

A very high contrast flat panel display and rugged keyboard are provided with the PC.



There is also an option of using a laptop PC, however it will limit some of the performance characteristics.



Sensor head
Dimension: 21,5 x 22 x 43 cm
Weight : 15,5 kg
Power: <250 W



Data acquisition PC
Dimension: 17 x 33 x 41 cm
Weight : 14 kg
Power: <300 W (typ. <150 W)



Monitor
Dimension: 41 x 31 x 6 cm
Weight : 3.6 kg
Power: 50 W



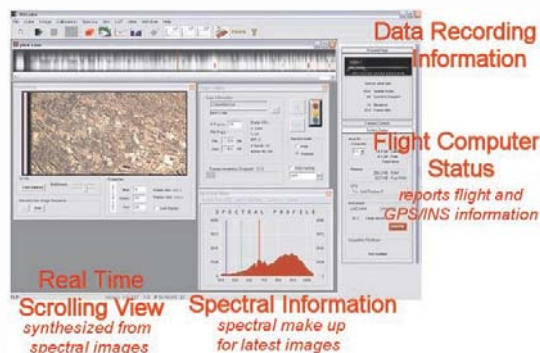
GPS/INS unit
Dimension: 12 x 9 x 8 cm
Weight : 1.1 kg
Power: 18 W

RS Cube flight operations software

The system uses Windows based software to

- control setup options for system operation, like width, position and number of spectral bands to be acquired
- control hardware, like image rate and exposure time,
- display images, GPS/INS status, and other information in real time for monitoring the progress of data collection.

Flight line images (data cubes) are saved in a simple file format that contains the succession of acquired spectral images as the aircraft moves. The flight line image is raw, binary data, saved in ENVI¹ compatible format. Auxiliary information from GPS/INS sensor is stored in a companion file.



Software interface

CaliGeo software *Improved*

Our post processing software, CaliGeo has been improved to provide a more user friendly and fast tool to apply both radiometric calibration and georectification to the AISA images. CaliGeo now exists as an ENVI plug-in running under ENVI user interface, and providing a seamless path from calibrated image to application processing.

System options

Sensor head mount

A mechanical mount is available to quickly install the AISA+ sensor head in an aircraft. The mount has also a place to attach the GPS/INS sensor to the AISA+ sensor head in order that they follow the aircraft movements equally.

Power supply

A power supply is available that takes 18-36 Vdc from the aircraft, and supplies regulated power to the sensor head, GPS/INS sensor, and data acquisition computer.

Spectral Scanner for terrestrial applications

AISA hyperspectral sensors can be equipped with a mirror scanner to scan a fixed target. It makes fixedly-placed (for instance on top of a tripod) AISA sensor suitable for remote sensing in field. The system can measure hyperspectral images over two-dimensional targets, for example leafage, opencast mine walls, and save the image in data cubes with horizontal, vertical and spectral data dimensions.

¹ ENVI is a spectral analysis software package available from Research Systems Software

Dual sensor extended spectrum system 400-2400nm

The AISA Eagle and Hawk sensor heads can be put to work together for simultaneous acquisition in 400-2400nm. It requires upgrading the standard data acquisition system to dual sensor acquisition system. This upgraded system uses

- o Industrial chassis PC with dual input frame grabber to control and synchronize the image data acquired from two cameras and data acquired from the GPS/INS sensor, and assemble all the data in one composite frame.
- o Multiple high bandwidth SCSI hard drives for data recording, capacity 120 GB
- o Very high contrast flat panel display and keyboard.

In dual sensor use, correlation in ground pixel size (IFOV) between sensors is achieved by fine-tuning the magnification of the optics in one sensor head. Optional single FODIS collector with two-branched fiber optics can be used to get downwelling irradiance to both sensor heads.

Applications

AISA Hawk is a versatile tool that has the ability to be applied to a range of commercial, research and public service applications. For example forestry management, vegetation cultivation, environmental investigations, precision farming, geology, target identification, and land use planning.

Its ability to capture short wave infrared wavelengths makes Hawk an ideal tool for geological studies and target detection applications, which will benefit from data acquisition on spectral signatures characteristic to chemical compounds in natural and man-made targets that can not be distinguished in the VNIR range.

Note: Due to continuous development work, specifications are subject to changes without a prior notice.

AISA series instruments offer unbeatable combination of high performance at low cost for complete compact hyperspectral remote sensing system. These instruments are developed and manufactured in a cooperative effort of SPECIM, Spectral Imaging Ltd. and AutoVision Inc. that have extensive experience in hyperspectral imaging systems.

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