Software and hardware for aerial surveyors

aeroSCIENTIFIC

Table of contents

Company background

AeroScientific (a business unit of Spatial Scientific Pty. Ltd.) creates software and hardware for aerial surveyors. The focus of our aerial imaging technology is the award-winning Aviatrix flight management and aerial camera control system. This is supported by our flight planning software: FlightPlanner. AeroScientific draws on many years of practical aerial survey experience, which has enabled us to create imaging systems that make aerial data capture significantly easier, cheaper, and more efficient than any other flight management system available today.

Our parent company, Spatial Scientific Pty. Ltd. (established in 2005), is an Australian developer of custom-built imaging systems, as well as an airborne data provider. The company has an established track record in building fully integrated systems using thermal, multispectral and high resolution imaging technologies for airborne mapping applications. Spatial Scientific operates aircraft from a range of bases around Australia, and for many years has conducted aerial surveys across the Australian continent.

Spatial Scientific is a privately owned company, based in sunny Adelaide, South Australia.

Product range: Overview

We can support all users, whether you're new to the aerial photography industry, or if you've been working in this field all your life.

Entry Level

Our STANDARD flight management system is a lightweight turnkey solution designed for entry level users: it includes flight planning and camera control software, and hardware and cables to trigger up to two digital cameras. A simple, cost-effective solution that is robust and reliable.

Advanced Users

The ADVANCED flight management system is a complete solution aimed at professional operators: we supply all the required hardware (a ruggedized PC, pilot and operator's screens, cables, hard packing case), and we configure the system to work with precision GPS/IMUs, more advanced cameras (such as medium or large format) and gyro-stabilized mounts.

Tailor made solutions

Many of our clients use tailor made systems: these are systems that are designed specifically for their unique requirements. Our long experience in developing software and hardware to control aerial sensors means that we are able to design solutions for almost any scenario.

STANDARD FMS for entry level users

The STANDARD FMS package is specifically designed for entry level users. It includes the following components: Aviatrix Classic flight management software, FlightPlanner Classic flight planning software, trigger box, cables for two digital cameras, GPS antenna and carrying case.

Trigger box

The trigger box enables the computer to fire the camera(s), and to receive feedback. It includes a GPS receiver, which provides navigation data to the Aviatrix software, and meta data for the acquired images. A mid-exposure pulse from the trigger box can feed event signals to an external GPS.

Delivery options

The STANDARD FMS package is built and bench tested at our offices in Australia, before being shipped by courier to the client. Bench testing is carried out with exactly the same cameras that the client will be using. Support for the STANDARD FMS is provided via documentation, videos, email and telephone, for which a small annual fee is charged.

Optional extras

- Nikon Camera Control for interfacing directly with Nikon DSLR cameras
- Upgraded trigger box that can trigger up to five cameras
- Upgraded trigger box that can accept GPS data from an external GPS
- Onsite training

ADVANCED FMS for professional users

The ADVANCED FMS package has been created for operators that require a higher level of functionality. It is designed to be used with medium or large format aerial cameras, coupled with high precision GPS/IMUs and gyro mounts. Each ADVANCED FMS package includes:

- FlightCube computer
- Aviatrix PRO flight management software
- FlightPlanner Pro flight planning software
- Relevant camera control software
- Two daylight readable screens
- GPS antenna
- Ground power supply (110-240VAC)
- Trigger and power cables for two cameras
- Hard case for travel and storage

FlightCube

Our state-of-the-art airborne flight computer, the FlightCube, has been specifically designed for use with the Aviatrix flight management system. It is a ruggedized PC which includes all the hardware to trigger, and receive feedback from, multiple cameras.

Scope of delivery

Each ADVANCED FMS is built on-demand for each client. The system is fully bench tested, and where possible flight tested, using exactly the same equipment as the client. For ADVANCED FMS clients we require mandatory training, either at our base in South Australia, or at the clients premises.

Bespoke FMS solutions

AeroScientific has a long track record of building bespoke airborne imaging systems for a range of clients and a variety of applications. Almost every system that we have built has involved cameras, GPS, IMUs and other components mounted on a manned aircraft. Specifically we have worked with the following technologies:

Cameras:

- Small, medium, large format RGB and NIR cameras
- Short, medium and long wave thermal infrared sensors
- Machine vision panchromatic and narrow band cameras
- Multi-camera systems incorporating a range of different sensors

GPS/IMUs:

- High precision systems (Applanix, Trimble, Novatel, PPP, PPK)
- Lightweight systems (Vectornav, Advanced Navigation, Ublox)

Our bespoke systems are always built around our core Aviatrix FMS technology. We then develop software and/or hardware to complete the integration.

Unlike our turnkey packages, we cannot provide pricing for bespoke systems until we fully understand the exact requirements of the system. At that point we will develop a detailed proposal for the work to be undertaken, with clear definitions of what is and isn't included.

Software overview

AeroScientific produces the following software applications:

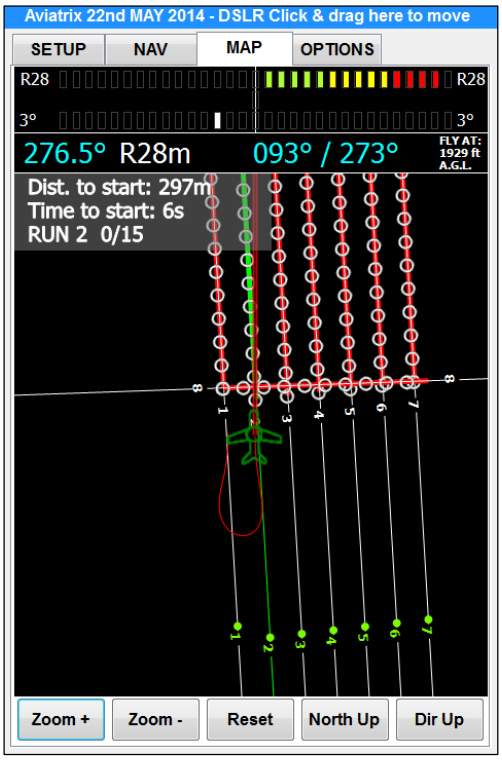
Aviatrix	Our flagship application with two important functions: pilot navigation, and camera control. It undertakes all the tasks to ensure successful image acquisition.
FlightPlanner	A flight planning tool for accurately calculating aerial photography flight lines, that can be used on its own, or with the Aviatrix flight management system.
DJIFlightPlanner	A lightweight flight planning tool specifically developed for DJI drones.
AfterFlight	A post-flight image management software tool that provides a fast method of viewing all the details of an acquisition flight.
AeroAlign	An application for aligning images from multi-camera systems (e.g. RGB & NIR), for creating multi-band images.
Hasselblad Camera Control	An application which controls up to two Hasselblad cameras and interfaces directly with the Aviatrix FMS.
Nikon Camera Control	An application which controls up to two Nikon cameras and interfaces directly with the Aviatrix FMS.

AVIATRIX flight management software

Aviatrix is a Flight Management System (FMS) that has been designed specifically for use on manned light aircraft, either in single pilot operations, or multi-crew operations, with commercially available medium format, mirrorless and DSLR cameras. It can also be used to control multispectral, hyperspectral and FLIR thermal imaging cameras.

All the features expected of a typical FMS

- Real time navigation guidance for the pilot
- Camera triggering based on GPS position, or fixed time/distance intervals
- Real time feedback from the camera
- Full and accurate recording of metadata
- Interface with a wide range of cameras, GPS, IMUs and stabilized mounts



Primary pilot navigation window

Key differences from other systems

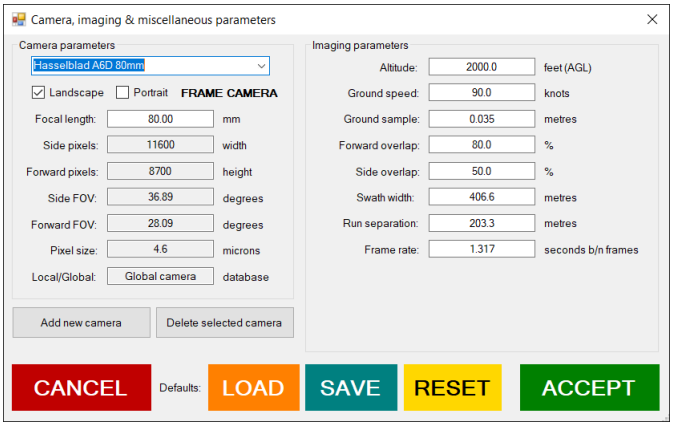
- Aviatrix has been designed to be simple, with all unnecessary features removed.
- Aviatrix has been designed in collaboration with pilots and aerial camera operators.
- All software and hardware is built in-house, which means we can adapt Aviatrix to interface with any third party hardware or software.
- We aim to be the most cost-effective FMS on the market.

Aviatrix in flight

FLIGHTPLANNER flight planning software

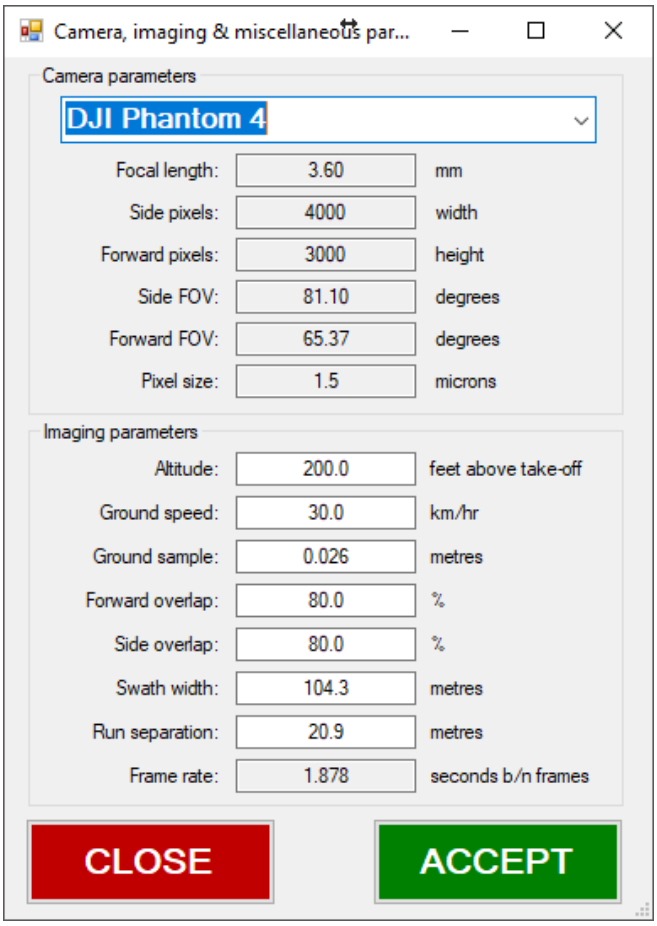
FlightPlanner is an easy to use application that makes the process of flight planning for aerial photography quick and efficient. It has been specifically designed to automatically calculate the ideal layout of photo frames to ensure complete coverage with the minimum amount of flying.

- Plan polygon or linear flight plans
- Support for any type of camera
- Selectable imaging parameters (flying height, pixel size, forward and side overlap etc.)
- Use terrain models to adjust spacing between lines or points to give complete coverage in mountainous areas, or create flight plans with flight lines at different heights to minimize the number of frames
- Automatically calculate area, distance, flight runs, trigger points, number of turns, flying time, to create the optimal flight plan



DJIFLIGHTPLANNER: planning for drones

DJIFlightPlanner is a tool for creating flight plans for DJI drones. It is the easiest way to pre-plan a photogrammetric aerial survey for your Phantom 3, Inspire 1 & 2, Phantom 4, Mavic, and Matrice 100/600. You'll be up and flying in no-time with our powerful yet easy-to-use Windows-based software.



SIX EASY PROCESSING STEPS:

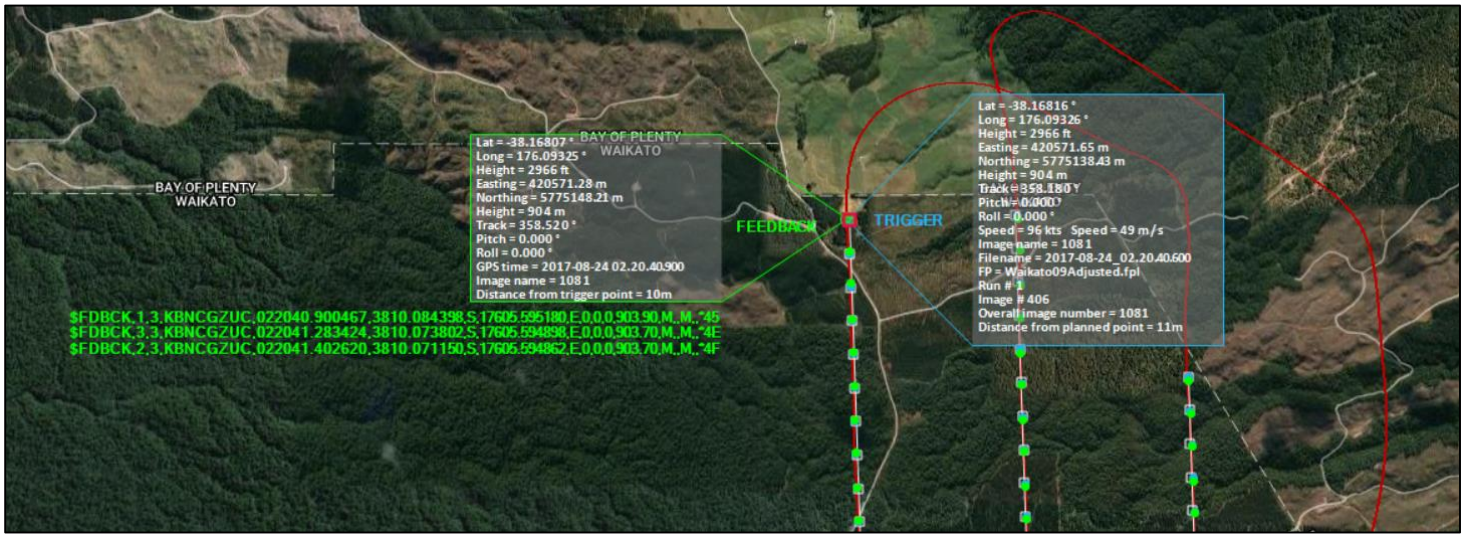
1. Draw a polygon or import a KML file
2. Select the DJI sensor and platform
3. Select pixel size, flying speed etc.
4. Adjust to get the ideal plan
5. Remove unwanted flight lines
6. Export the result

WHAT YOU WILL NEED:

- A DJI drone (Phantom 3 / 4, Mavic, Inspire 1 / 2 or Matrice 100/600)
- A 64-bit Windows-based PC for flight planning
- An Android-based tablet or phone for flying (with DJI Ultimate Flight installed)

AFTERFLIGHT post-flight analysis tools

AfterFlight allows the user to quickly and efficiently visualize, analyse and process image and meta data from an aerial survey flight. It can be used in the air immediately after the acquisition, or on the ground.



Visualisation: AfterFlight will graphically display the following information:

- The location of all the camera stations
- The footprint of acquired images
- The flight path of the aircraft
- Colour-coded acquisition parameters

Analysis: AfterFlight can be used to analyse the meta data from a flight:

- See detailed data for every image captured
- Create statistics for the whole acquisition flight
- Generate reports to be shared with others
- Compare acquisition data from multiple flights

Processing: AfterFlight can be used to post-process images:

- Synchronize imagery to meta data
- Write GPS data to image EXIF headers
- Convert NMEA GPS data to a text file
- Export meta data in commonly used GIS formats

AEROALIGN multi-image alignment

AeroAlign is powerful tool for processing aerial images from small or medium format cameras. It can process a single image pair, or batch process thousands of images autonomously. AeroAlign has two functions:

1. To remove lens distortion from images.
2. To align images from multiple cameras to create multi-band images.

When the lens distortion has been removed, and the multi-camera images have been aligned to each other, they can then be processed using third party photogrammetry software (Pix4D, Photoscan etc.).

RGB camera	NIR camera
Lens distortion removal	Lens distortion removal
Feature point detection	Feature point detection
Feature point matching	
Multi-band image (CIR, NDVI etc.)	
Photogrammetric processing	

AeroAlign can process images from cameras of differing resolutions, such as RGB data from a medium format camera and NIR data from a DSLR.

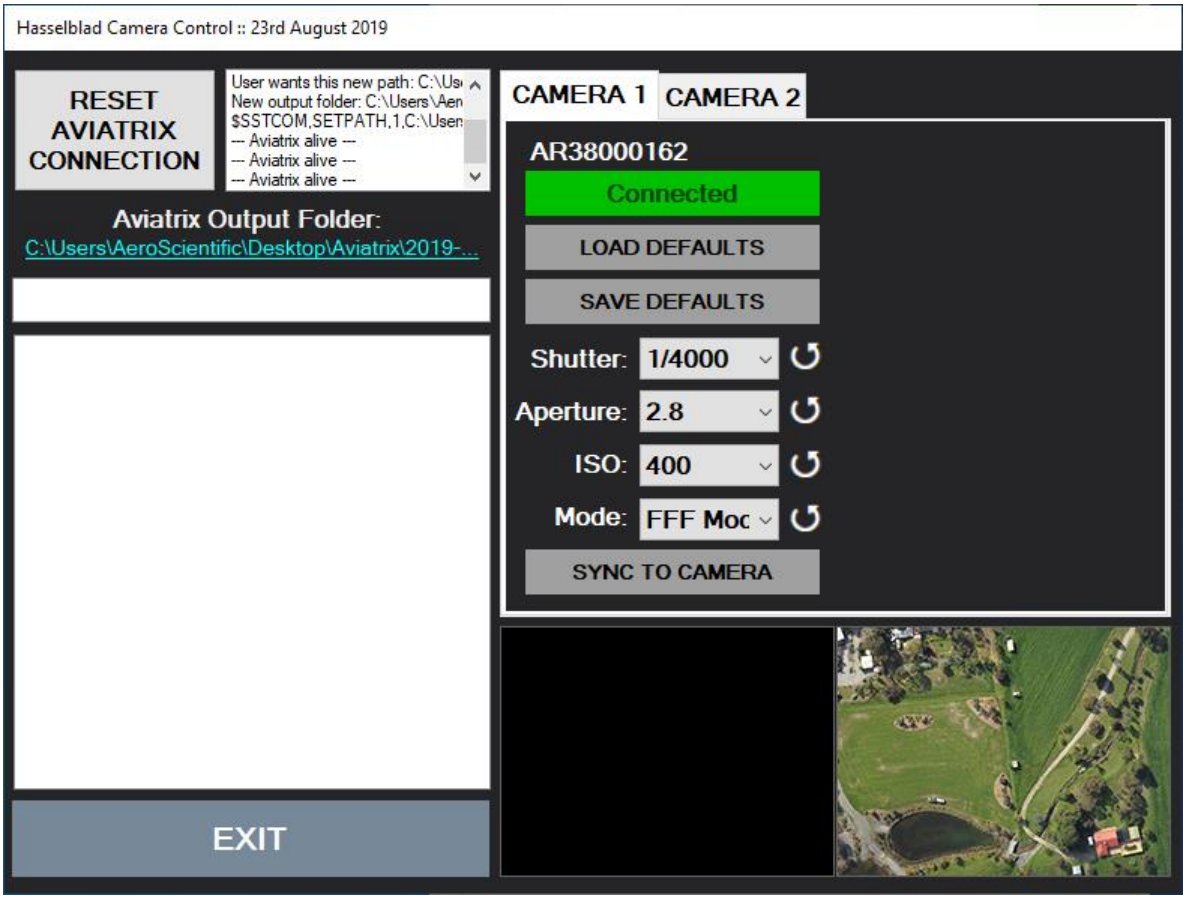
Finally, the latest version of AeroAlign will create 5-band images, so red edge data can also be incorporated (RGB + RE + NIR = 5-band image).

Hasselblad Camera Control (HBCC)

Hasselblad Camera Control (HBCC) enables up to two Hasselblad medium format cameras to be controlled directly from the host computer. The user has full control over each camera, and can change the following settings:

- Shutter speed
- Aperture
- ISO
- Raw format (3FR of FFF)

HBCC displays thumbnails and histograms of the images as they are captured. Importantly, HBCC enables the image file name to be written into the meta data stored by Aviatrix at the time of acquisition. The meta data file can be easily imported into third party photogrammetric processing software such as Agisoft or Pix4D.

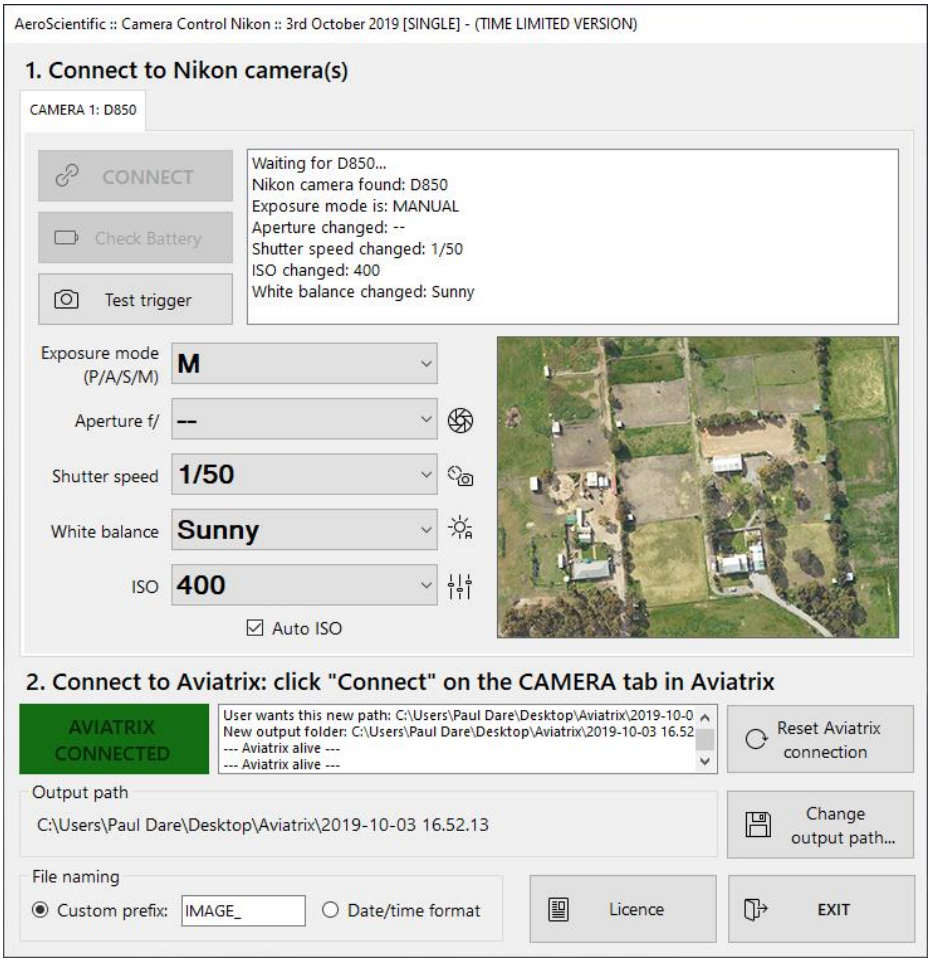


Nikon Camera Control (NKCC)

Nikon Camera Control (NKCC) enables up to two Nikon DSLR cameras to be controlled directly from the host computer. The user has full control over each camera, and can change the following settings:

- Aperture
- Shutter speed
- Shooting mode (manual, automatic, aperture/shutter priority)
- ISO
- White balance

NKCC displays thumbnails of the images as they are captured. Importantly, NKCC enables the image file name to be written into the meta data captured at the time of acquisition. The meta data file can be easily imported into third party processing software (Agisoft, Pix4D etc.).



Software licensing

AeroScientific software is not free: it is licensed to end users who pay an initial fee to purchase a licence to use the software, followed by an ongoing fee for continued use of the software. The software licence comes with certain conditions, listed below.

1. Software licences are locked to one computer

Each software application is licensed to be used on a single computer. The software is locked to that computer through the use of a licence key. When the software is first installed it generates an 8-digit code which uniquely identifies the computer on which the software has been installed. The user is required to send that 8-digit code to us so that we can send back an unlock code. On activation of the unlock code, the software can be used on that computer.

If the software is installed on a different computer to the one on which the licence has been activated, it will not operate. The unlock code will not activate the software on that computer, because the 8-digit code for that computer will not match the 8-digit code from the computer on which the software was originally installed.

Software licensing (contd.)

2. Temporary licences are available

Our software can be licensed via an online licence. Online licences are issued for temporary installations of our software. The user installs the software, and then sends us the 8-digit code in the usual way. On receipt of the 8-digit code, we place the unlock code on the internet where it can be accessed by the computer. So as long as the computer has access to the internet, it will be able to access the online licence. If the computer is not able to access the internet, it will not be able to access the online licence, and the software application will not operate.

3. Network or multi-seat licences are not yet available

Our software can only be used on the computer on which the licence has been activated. Each separate computer requires its own unique unlock code which cannot be shared between computers. There is currently no concept of a network licence or multi-seat licence. An individual and unique licence is required for each computer. We may add network licences to our products in the future, but we're not actively working on it at this point in time.

Software licensing (contd.)

4. Licences can be moved between computers (for a small fee)

To move a licence from one computer to another, the licence has to be removed from the first computer, and then a new licence can be installed on the second computer. As this process puts an administrative overhead on AeroScientific, a small fee is charged for this procedure.

If the licence cannot be removed from the first computer, then a replacement licence can only be issued in extenuating circumstances, such as where the computer has been accidentally damaged or in some way rendered inaccessible. It is therefore very important for any licences to be removed from computers before they are sold, destroyed etc.

5. Ongoing licence fees are required to be paid

In keeping with industry convention, AeroScientific has in place an annual technical support and maintenance fee for its software products. This is known as the annual licence fee. The level of this fee varies from product to product, and client to client. It depends on which products have been purchased, and the level of complication of the overall system. Further details are given in the next section (Annual Licence Fees).

Annual licence fees

In keeping with industry convention, AeroScientific has in place an annual technical support and maintenance fee for the Aviatrix flight management system, which includes all software and hardware components purchased from AeroScientific. The fee covers the following:

1. Software updates

We are continually working on our software products. Most of the time we're making the software more efficient, or addressing hardware compatibility issues. Sometimes we add new features because we want the software to be better. The annual technical support fee means that you get updates whenever they are released.

2. Telephone and email technical support

Call us 24/7. If we're around we'll answer the call; if it's out of office hours, leave a message and we'll return the call as soon as possible. Sometimes we can answer tech support questions on the spot; other times we might have to get back to you. Alternatively, email us at info@aerosci.info. We'll direct your email to the team member most likely to be able to help with your question. We always try to get to a solution to any question within seven days.

Annual licence fees (contd.)

3. Replacement hardware in the event of a failure

On rare occasions, hardware fails. If it does, we'll replace it free of charge, assuming that the failure wasn't due to mistreatment or misuse. Hardware covered under this policy is currently limited to the AeroScientific trigger box, the AeroScientific FlightCube, and the AeroScientific lightbar.

4. Assistance with using the software

Even though our software is easy to use, we'll give you as much assistance as we can to get you up and running. This could include telephone and email advice, or online demonstrations.

5. Assistance with analysing data produced by the software

Sometimes clients need help and advice with the data produced by the system. Again, we can help with this: we have a lot of experience in this field and can usually answer most questions straight away.

6. General advice about aerial survey

We are in a unique position to provide advice about a range of aerial survey related issues, including: aircraft choice, camera pods and mounts, flying survey operations, mission planning, business development, and so on.

Contact details

AeroScientific is based in Adelaide, South Australia

Website: www.aerosci.info

Email: info@aerosci.info

Phone: +61 405 141 647 (Paul) or +61 417 060 743 (Brian)

Postal address: PO Box 520, Blackwood, SA 5051, Australia

Street address: Suite 217, 33 Pirie Street, Adelaide, SA 5000, Australia

Software and hardware for aerial surveyors

www.aerosci.info

info@aerosci.info

aeroSCIENTIFIC