Aviatrix technical note

Internal and external GPS sources

# 8 November 2019

Background

Aviatrix gives users the option of using one of two GPS sources for pilot navigation and image geotagging: either the internal GPS receiver in the trigger box or FlightCube, or an external GPS receiver. This document explains more about these two GPS options.

Selecting the GPS source

On starting Aviatrix, the user is presented with a choice of selecting INTERNAL GPS or EXTERNAL GPS. (Note that SIMULATE GPS is also a choice, but that is not discussed here.)
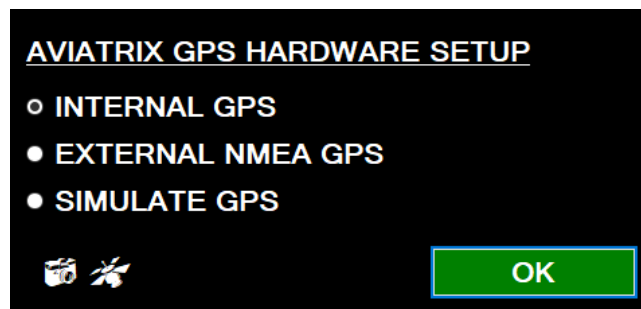

INTERNAL GPS refers to the GPS receiver physically embedded inside the AeroScientific hardware (trigger box or FlightCube). EXTERNAL GPS refers to any GPS that is connected to the Aviatrix host computer and sending NMEA data through a serial (COM) port.
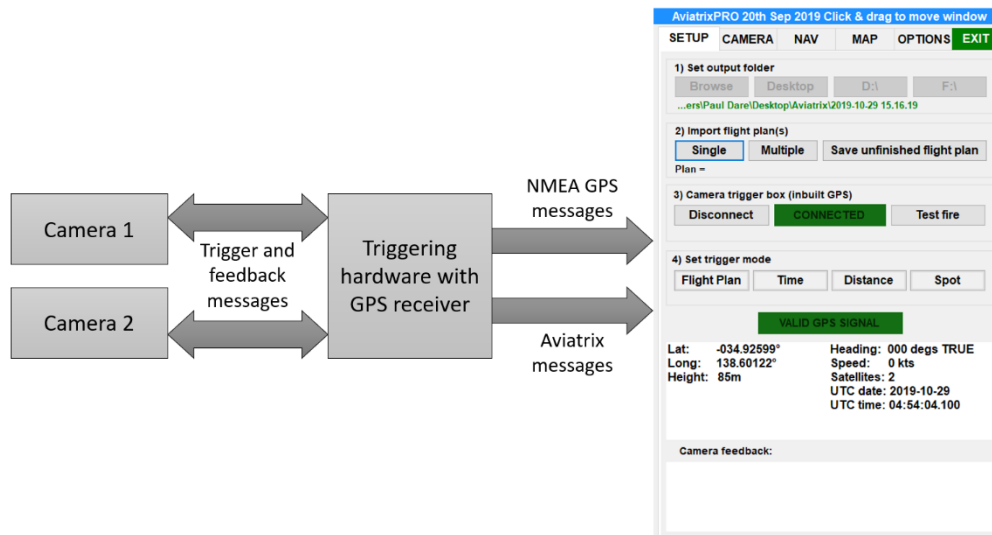
Internal GPS

On selecting INTERNAL GPS, the Aviatrix window (shown below) gives the option to connect to the triggering hardware, but it doesn't give the option to connect directly to the GPS. This is because GPS receiver is embedded in the triggering hardware, and therefore connecting to this automatically connects to the GPS receiver.

When the user selects the output folder (step 1), the Aviatrix software will automatically scan all of the computers COM ports and connect to the triggering hardware. The red DISCONNECTED indicator will turn green. The red NO GPS SIGNAL will firstly turn orange and display GPS INITIALIZING (whilst waiting for a GPS fix), and then turn green when a fix has been acquired.
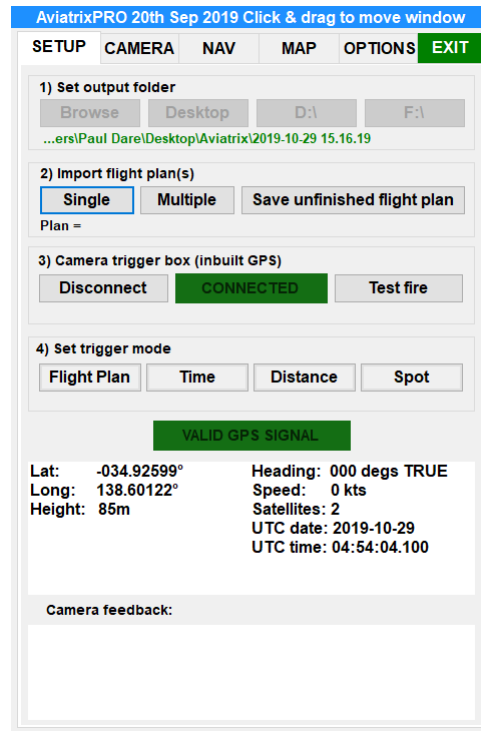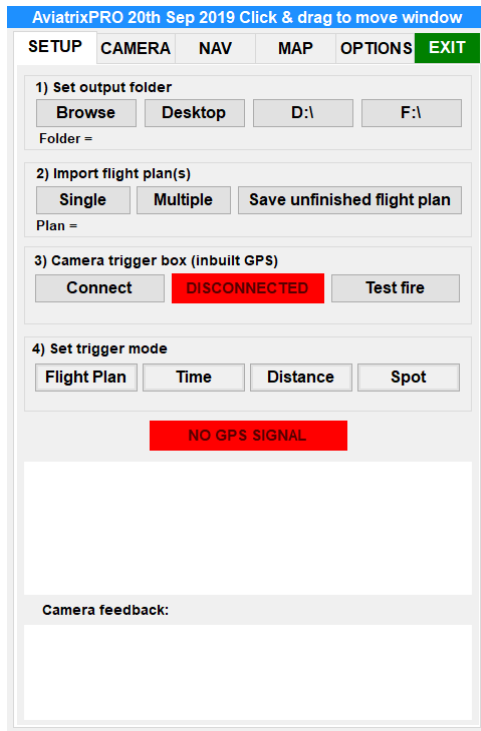
When connected, the triggering hardware sends NMEA-type sentences to Aviatrix. Some of these sentences are normal NMEA sentences (specifically GPGGA and GPRMC); the remainder contain diagnostic and other information that Aviatrix needs to function. The schematic layout is shown below.

An advantage of using the internal GPS receiver is that, with certain cameras, it enables file names of images to be written to the Aviatrix meta data, alongside the corresponding GPS data.

External GPS

On starting Aviatrix, if EXTERNAL GPS is selected, then the user must manually select the GPS. Connection to the trigger box is automatic, and occurs when the output folder is selected. On clicking the CONNECT button under "Connect to GPS", the following dialogue box is shown:

After selecting the correct COM port and baud rate, NMEA sentences will be shown. This confirms that the GPS has been correctly selected. When both the trigger box and GPS are connected, both indicators are green.

Note that the external GPS functionality only supports GPS receivers which send NMEA sentences over a serial (COM) port. It is recommended that the GPS send sentences at either 5Hz or 10Hz. Speeds that are slower or faster could cause potential issues.
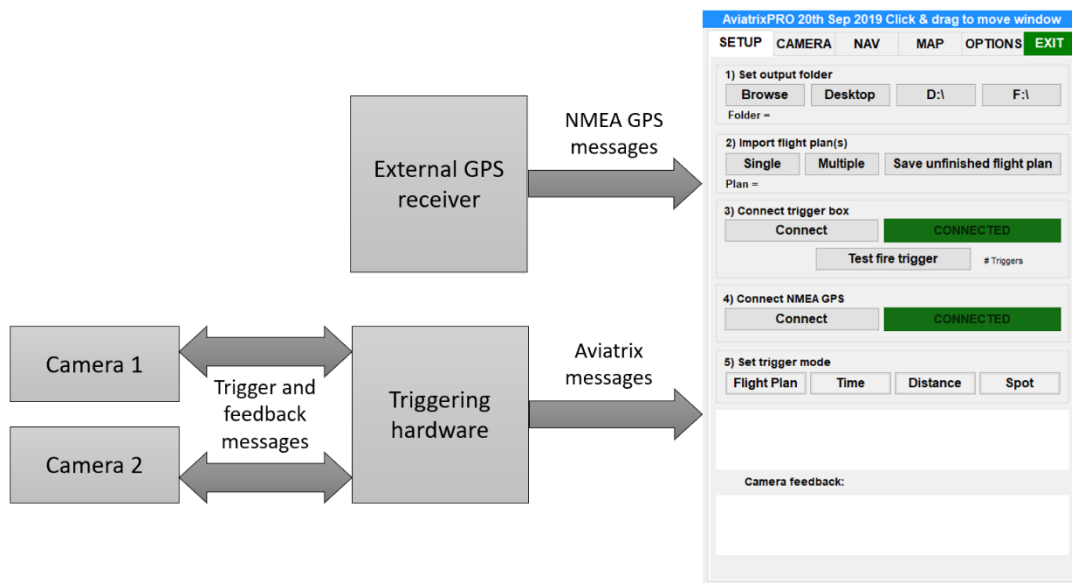
The above schematic shows the relation between the different components of the system. Importantly, the GPS receiver and the triggering hardware are independent of each other.

One final point to note with external GPS receivers is that some of the higher specification units offer the functionality to record their own stream of data, and log event pulses (see schematic below). Note that Aviatrix does not log the high precision GPS data, just the NMEA stream, which it uses for navigation purposes. The user will be required to post-process the data from the GPS to correlate it with the image data.
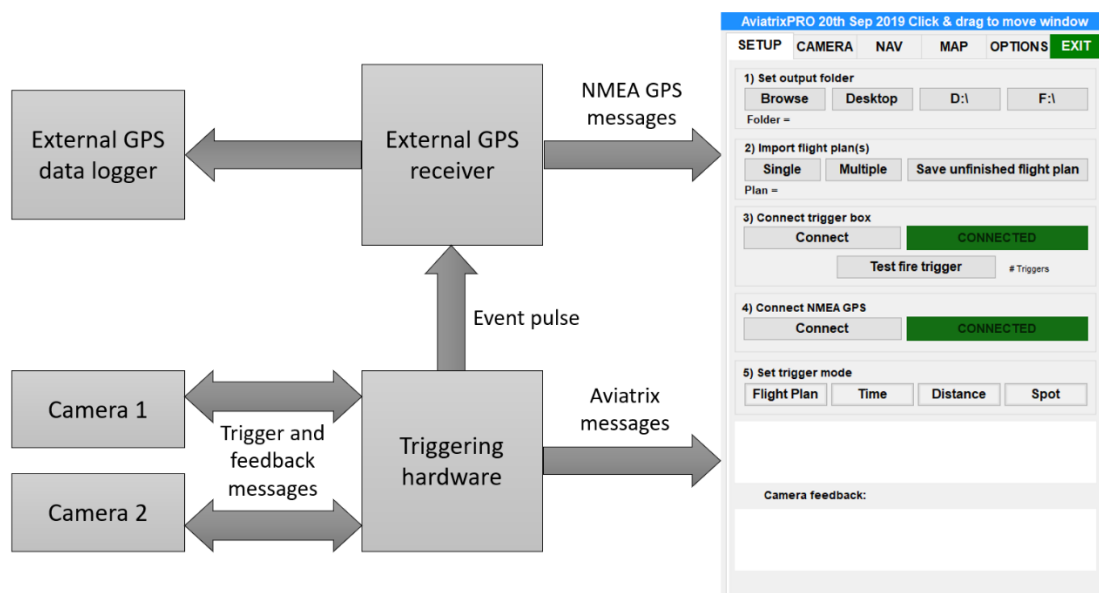
Other supported GPS receivers

Aviatrix has been modified to work with certain other GPS receivers. One of those is the Vectornav VN200. Special builds of the AeroScientific triggering hardware (trigger box and FlightCube) enable the VN200 to be plugged directly into the system and be treated as an internal GPS, even though it is an external device (schematic below).
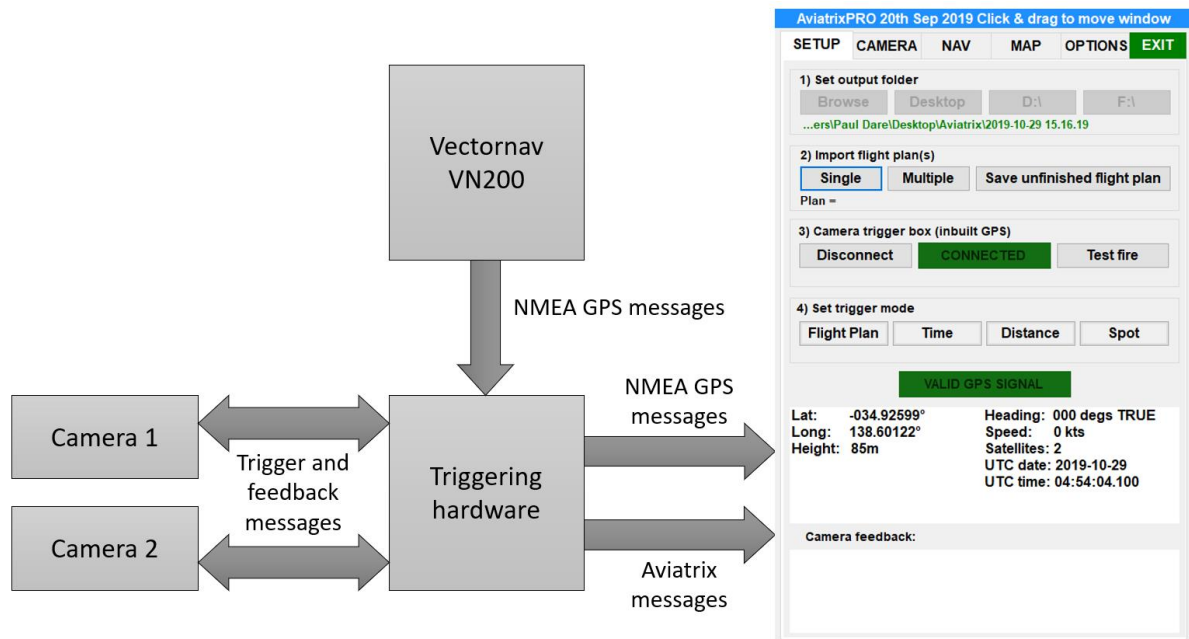
This set up may be repeated for other GPS receivers in the future.

Updating firmware

No all triggering hardware (trigger boxes and FlightCubes) are compatible with all GPS receivers. A firmware update may be required. Please contact us (info@aerosci.info) for further information and guidance. All firmware upgrades to trigger boxes can be done remotely, assuming the hardware is upgradable. All of our latest hardware is upgradable, but some of our early hardware might not be.