PO Box 520 • Blackwood • SA 5051 • Australia www.aerosci.info • info@aerosci.info • Phone: +61 405 141 647

### 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.

AviatrixPRO 20th Sep 2019 Click & drag to mov	ve window	AviatrixPR0	20th Sep 2019	Click & dra
SETUP CAMERA NAV MAP OPTIC	ONS EXIT	SETUP CAN	IERA NAV	MAP
1) Set output folder		1) Set output	folder	
Browse Desktop D:\	F:\	Browse	Desktop	D:\
Folder =		ers\Paul Dar	e\Desktop\Aviatr	ix\2019-10-29 1
2) Import flight plan(s)		2) Import fligh	t plan(s)	
Single Multiple Save unfinished fi	light plan	Single	Multiple	Save unfir
Plan =		Plan =		
3) Camera trigger box (inbuilt GPS)		3) Camera trig	ger box (inbuil	t GPS)
Connect DISCONNECTED Tes	est fire	Disconne	ct CON	NECTED
NO GPS SIGNAL			VALID G	PS SIGNAL
		Lat: -034. Long: 138.6 Height: 85m	92599° 0122°	Heading: Speed: Satellites: UTC date: UTC time:
Camera feedback:		Camera feed	back:	

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:

Select NME	A GPS COM po	ort
Baud: 960	D ~	`
SIMULATE	CANCEL	CONNECT

Select NMEA GPS COM port
COM4 - LOCOSYS Technology GPS Recei $\scriptstyle{\curlyvee}$
Baud: 115200 ~
\$GPRMC,031754.000,V,,,,0.00,0.00,081119,,,N*49 \$CPCSV,1,1,00*79 \$CPCSA,A,1,,,,,,*1E
\$GPGGA,031754.000,,,,,0,0,,,M,,M,,*4C \$GPRMC,031753.900,V,,,,0.00,0.00,0.00,081119,,,N*47
SIMULATE CANCEL CONNECT

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.

TUP CAN	IERA NAV	MAP (	OPTIONS EXIT	SETUP	CAME	RA NAV	MAP	OPTIONS E
) Set output f	folder			1) Set ou	utput fol	der		
Browse	Desktop	D:\	F:\	Brow	vse	Desktop	D:\	F:\
Folder =				Folder =				
2) Import fligh	t plan(s)			2) Impor	t flight p	lan(s)		
Single	Multiple	Save unfinis	hed flight plan	Sing	le	Multiple	Save unfin	shed flight pla
Plan =				Plan =				
3) Connect trig	gger box			3) Conne	ect trigg	er box		
Con	nect	DISCON	INECTED		Conne	ct	CON	INECTED
	Test fi	re trigger	# Tringern			Test fi	re trigger	# Triagona
Con	noot	DISCON	INFOTED		Conno	<b>at</b>	0.01	
Con	nect	DISCON	INECTED		Conne	ct	CON	INECTED
5) Set trigger i	nect mode	DISCON	INECTED	5) Set tri	Conne gger mo	ct de	CON	INECTED
Con 5) Set trigger ( Flight Plan	mode Time	DISCON	Spot	5) Set tri Flight	Conne gger mo Plan	ct de Time	Distance	Spot

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 (<u>info@aerosci.info</u>) 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.