

NaviGuard

How-To Guide

December 2023

We are excited to introduce you to the NaviGuard feature, a revolutionary flight safety feature for pilots and operators. For the first time in an EFB you can plan, detect and plot your way out of possible trouble caused by GPS spoofing/jamming.

The purpose of this quick guide is to assist you with your initial use and understanding of the NaviGuard feature in RocketRoute FlightPlan iOS, as well as the GPS Interference layer.

The GPS Interference layer allows you to make smart safety-of-flight decisions, leading to a more secure and efficient flight experience. Our GPS Interference Map displays reported areas of GPS interference, providing you with a clear understanding of potential navigation challenges.

Armed with the knowledge of potential GPS unreliability, you can make proactive decisions to modify your routing, or prepare in advance, ensuring a better prepared and safer flight.

The NaviGuard feature has been developed in response to a growing need from our Users to have an independent means to alert you in real-time to possible GPS spoofing, interference, or technical issues.

We've gone further than just letting you know there's a potential problem. With Independent Aircraft Location Plotting you can plot fixes on the map so you can immediately compare and contrast your GPS location with your radio navigation derived position.

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GPS Interference Map

Introducing APG's GPS Interference Map: Enhancing Flight Safety

Aircraft Performance Group (APG) is proud to announce the release of our GPS Interference Map. Users can anticipate areas of GPS unreliability and make informed decisions to modify their routing if necessary.

The GPS Interference Map provides valuable insights for a wide range of users, including commercial flight operators, business flight operators, operations managers, commercial pilots, and general aviation pilots. By utilizing this map in their flight planning processes, aviation professionals can make smart safety-of-flight decisions, leading to a more secure and efficient flight experience.

Key Benefits of APG's GPS Interference Map:

1. **Comprehensive Interference Data:** Our GPS Interference Map displays reported areas of GPS interference, providing users with a clear understanding of potential navigation challenges.
2. **Informed Routing Decisions:** Armed with the knowledge of potential GPS unreliability, pilots and dispatchers can make proactive decisions to modify their routing, ensuring a safer and more efficient flight.
3. **Enhanced Flight Safety:** By anticipating areas of GPS interference, users can avoid potential navigation issues, reducing the risk of accidents and enhancing overall flight safety.

The development of the GPS Interference Map exemplifies APG's unwavering commitment to excellence in aviation. By integrating this state-of-the-art map into our flight planning solutions, we aim to elevate the safety and efficiency of the aviation industry. Stay ahead of potential navigation challenges with APG's GPS Interference Map and experience a new level of confidence in your flight operations.

Accessible from the Map Library

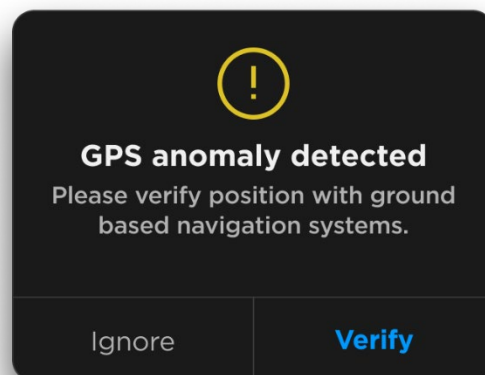


Anomaly Detection

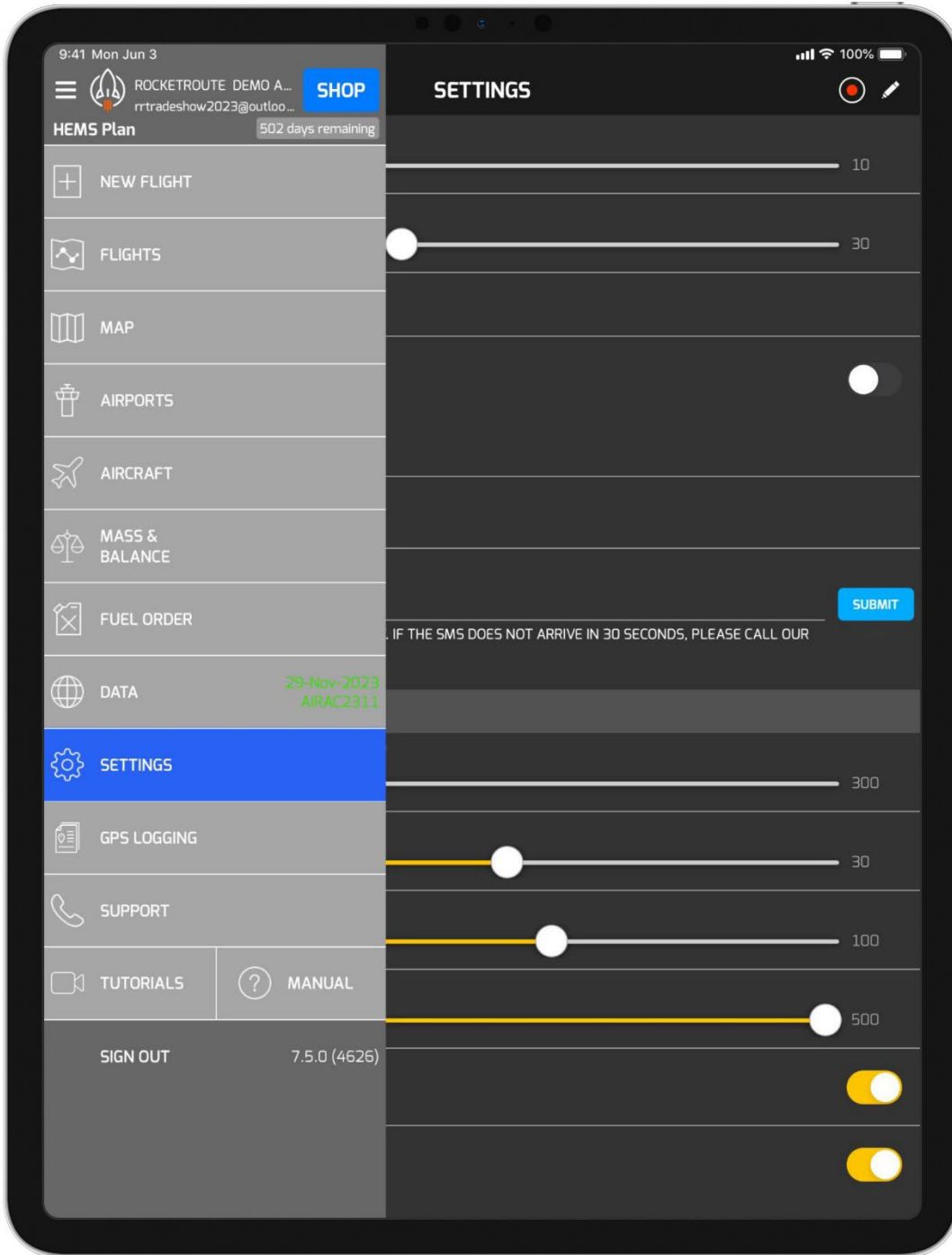
We have received information that in the real-world GPS spoofing events the position data would suddenly change (jump) and/or the signal strength would increase or decrease suddenly. This leads to the ability to detect GPS anomalies and actively alert the flight crew using either the on-device (iPad) GPS or a Bluetooth connected GPS.

The trigger events can be described as follows:

1. *Sudden variation in reported speed*
 - a. If the calculated GPS speed over ground (SOG) exceeds the aircraft capabilities (assume > Mach .99)
 - i. AND the accuracy of the GPS signal is reported as “acceptable”:
 1. In RR app use the existing user selected accuracy threshold
 2. in FlyQ use 100 m as threshold
 - b. If the calculated GPS speed over ground (SOG) experiences 20% change in speed in 1 second
 - i. Significant slow down or acceleration exceeding 20% per second.
 1. AND the accuracy of the GPS signal is reported as “acceptable”:
 - a. In RR app use the existing user selected accuracy threshold
 - b. in FlyQ use 100 m as threshold
2. *Sudden unrealistic change in position*
 - a. Sudden directional change (Backwards) 160 - 200 degrees turn between two subsequent GPS points without dropouts i.e. these measurement must be no greater than 3 seconds apart
 - i. AND the accuracy of the GPS signal is reported as “acceptable”:
 1. In RR app use the existing user selected accuracy threshold
 2. in FlyQ use 100 m as threshold
 - b. Sudden position change (forward) i.e. if the calculated speed based on the location and time of two subsequent points exceeds Mach 0.99
 - i. AND the accuracy of the GPS signal is reported as “acceptable”:
 1. In RR app use the existing user selected accuracy threshold
 2. in FlyQ use 100 m as threshold

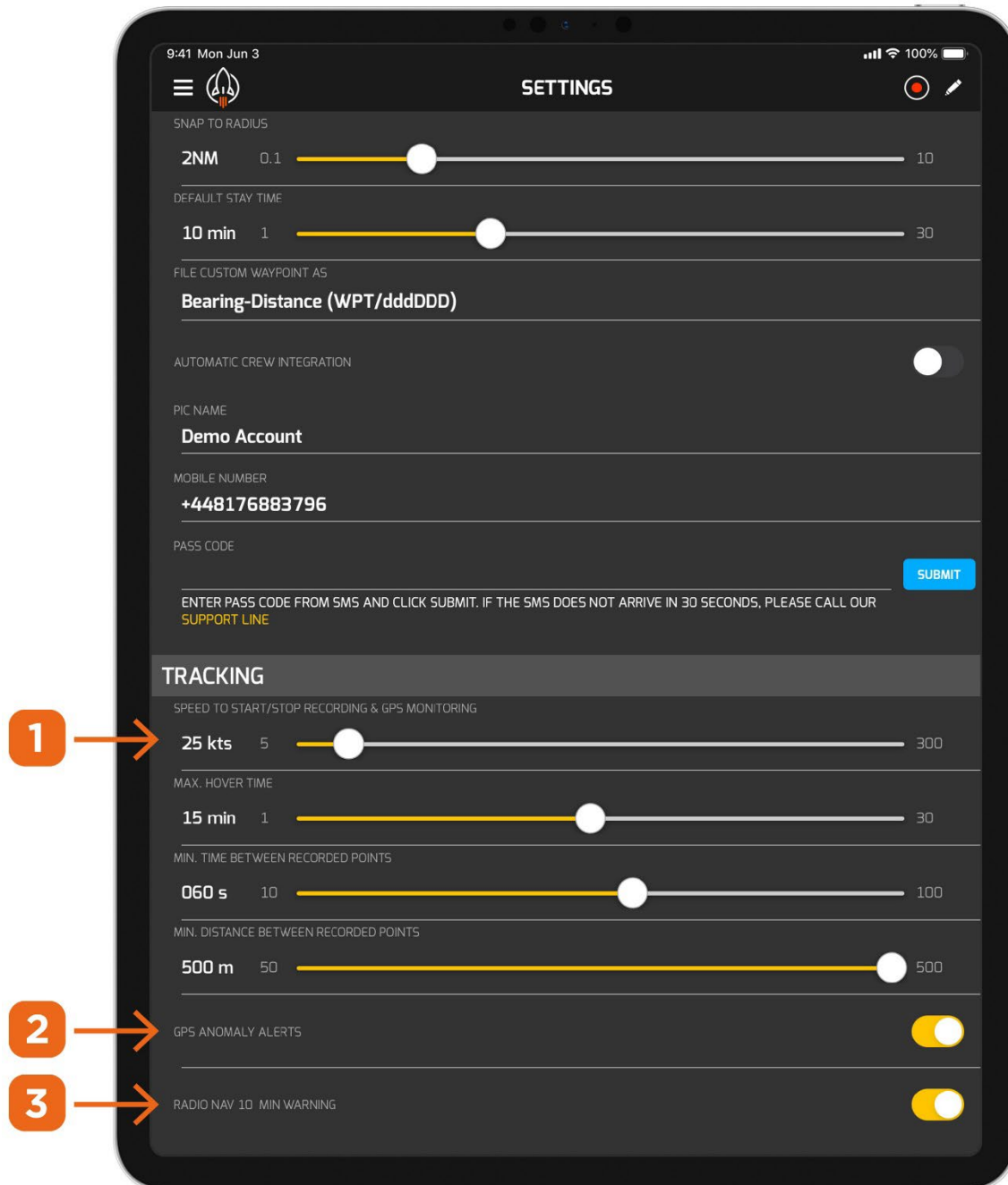


Settings



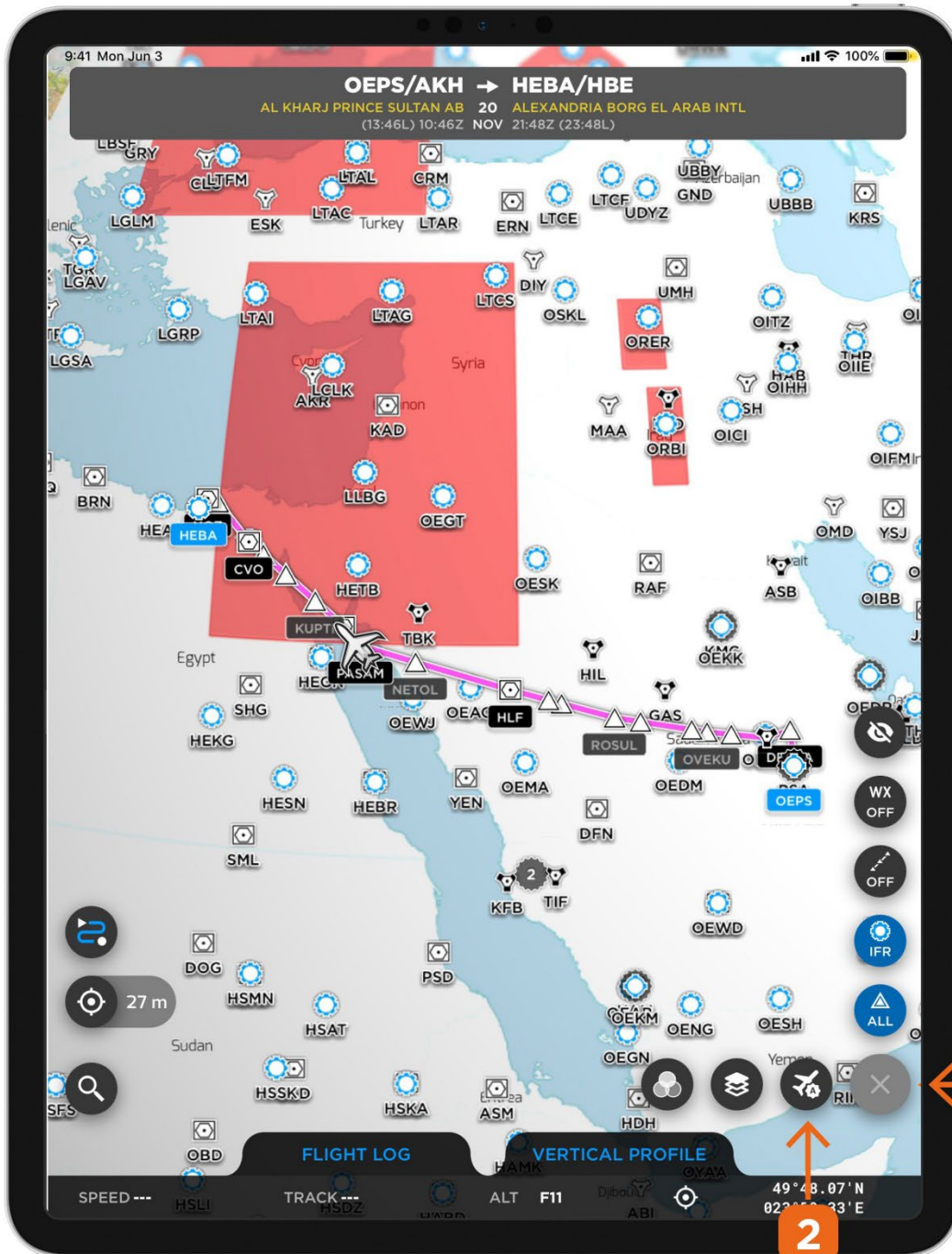
Settings

- 1) Anomaly detection will start when the speed of the aircraft exceeds the Speed to Start/Stop Recording & GPS Monitoring
- 2) GPS Anomaly Alerts can be disabled. This does not disable detection, so the GPS Log will continue to log anomalies, just the alerts will be suppressed
- 3) The 10 minute highlighting of the Input Fix for the Radio Nav functionality of NaviGuard



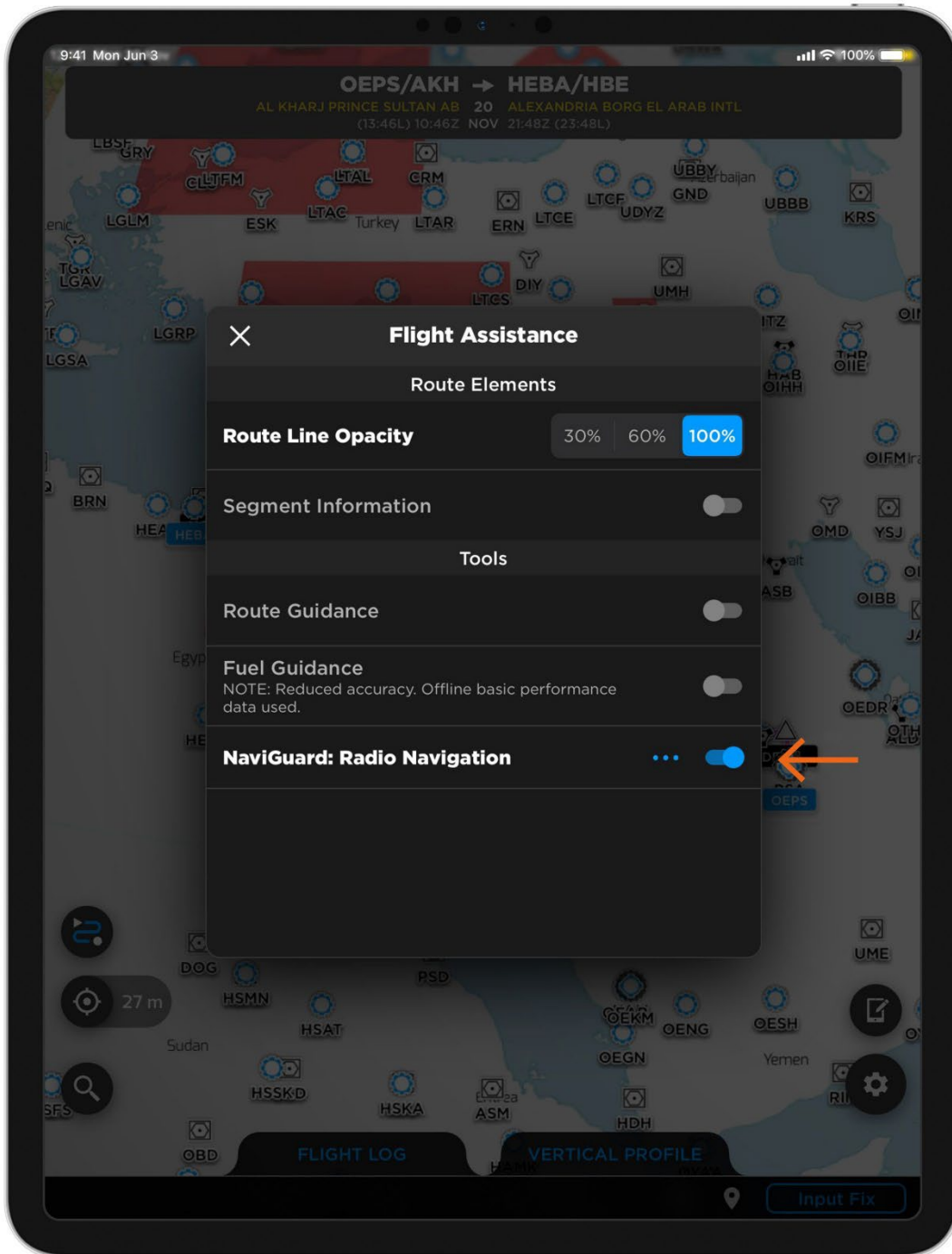
Map

- 1) Open Options Menu
- 2) Open Flight Assistance Menu



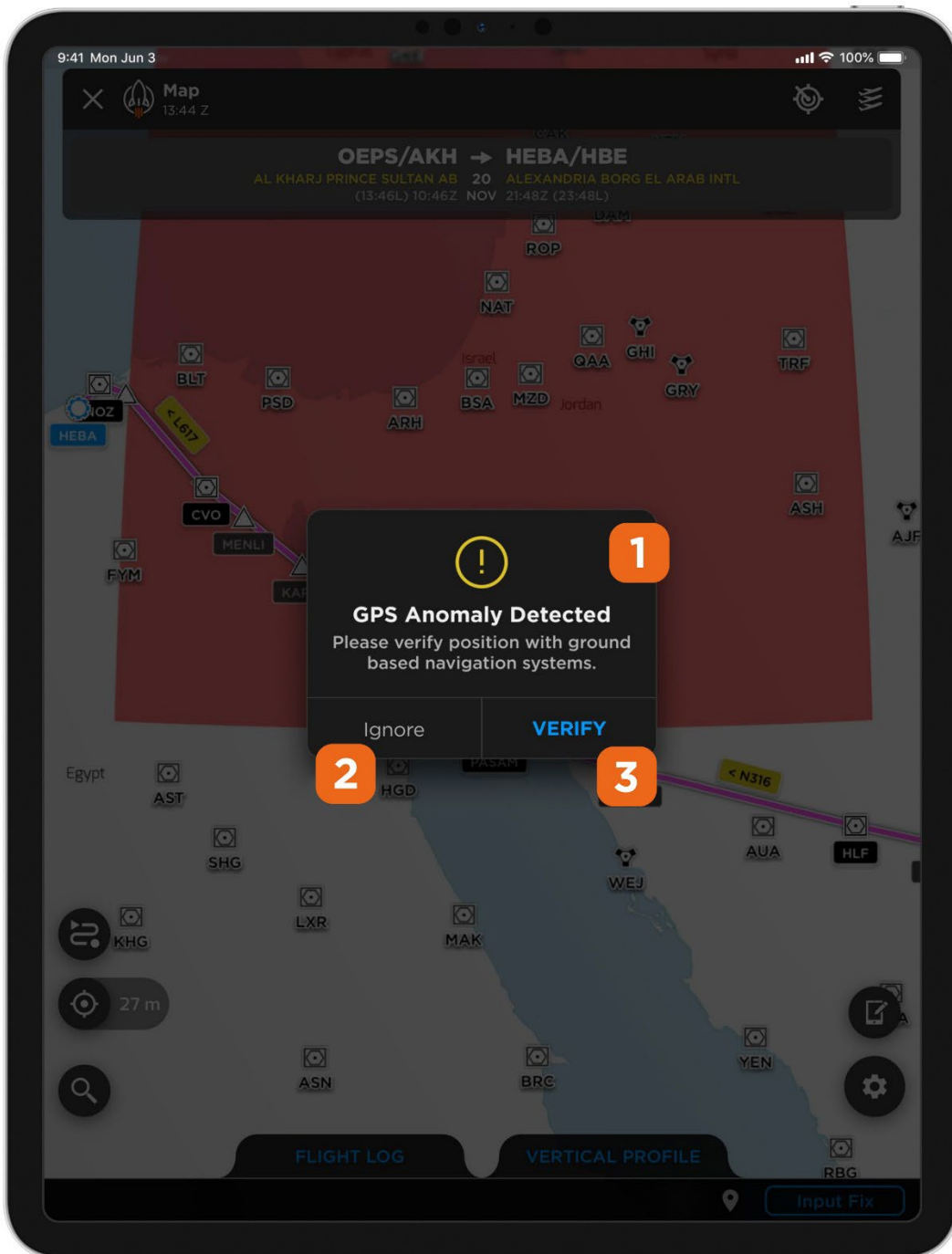
Map

- 1) Enable NaviGuard



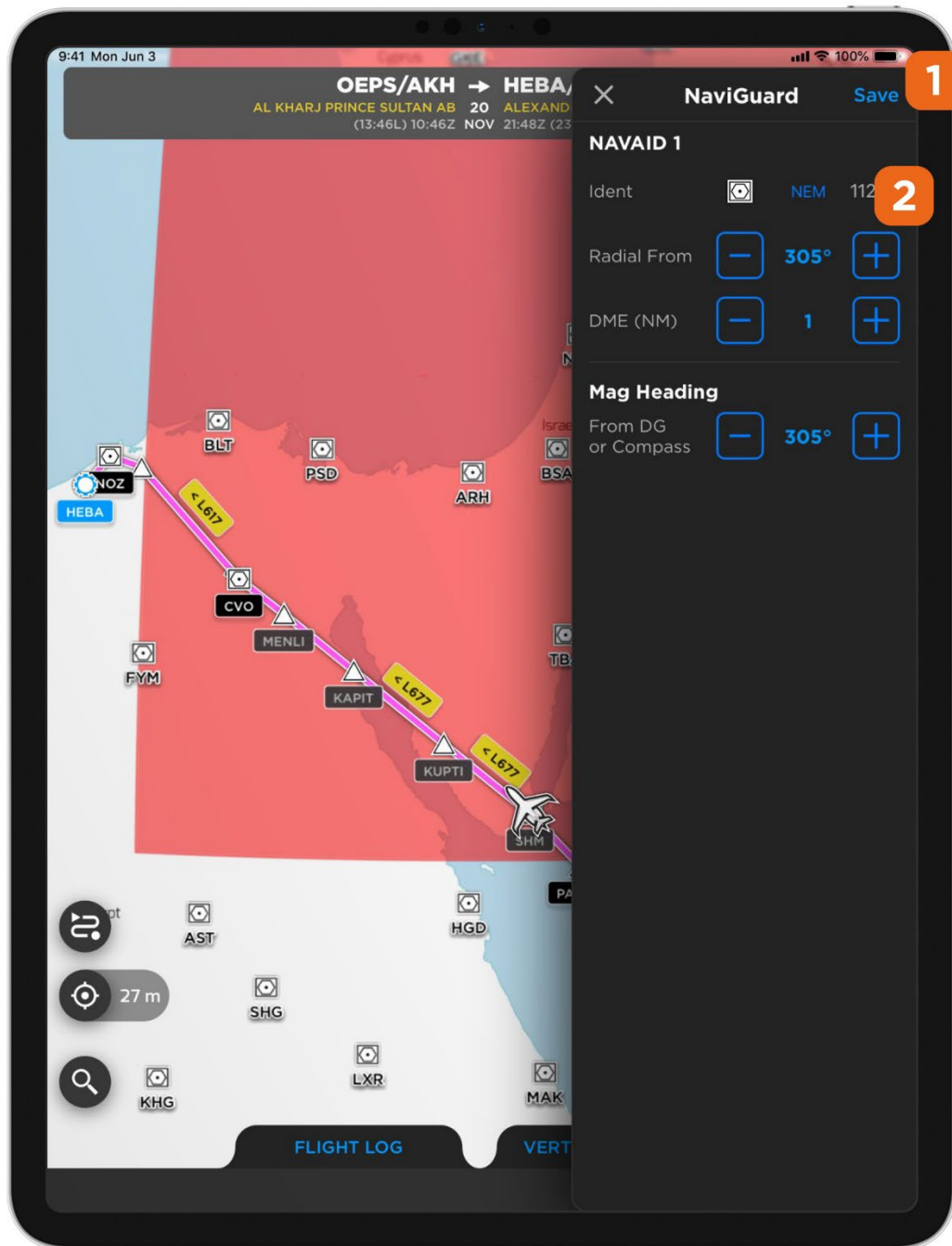
Map

- 1) Alert received
- 2) Ignore (suppresses alerts for 1 minute)
- 3) Verify (launches Position Fix functionality)



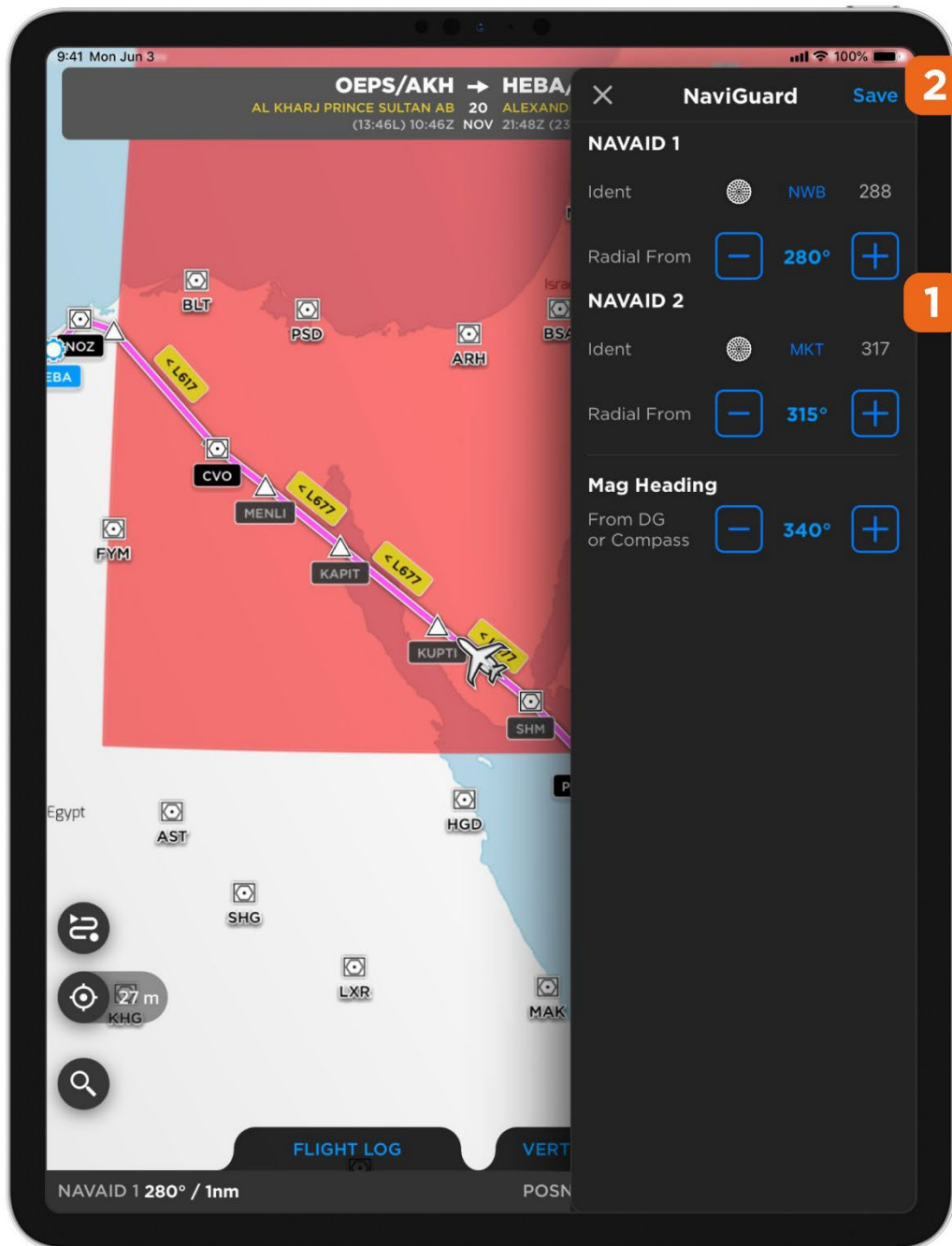
Map

- 1) Input the Nav Aid and reading from your onboard systems
- 2) Press Save



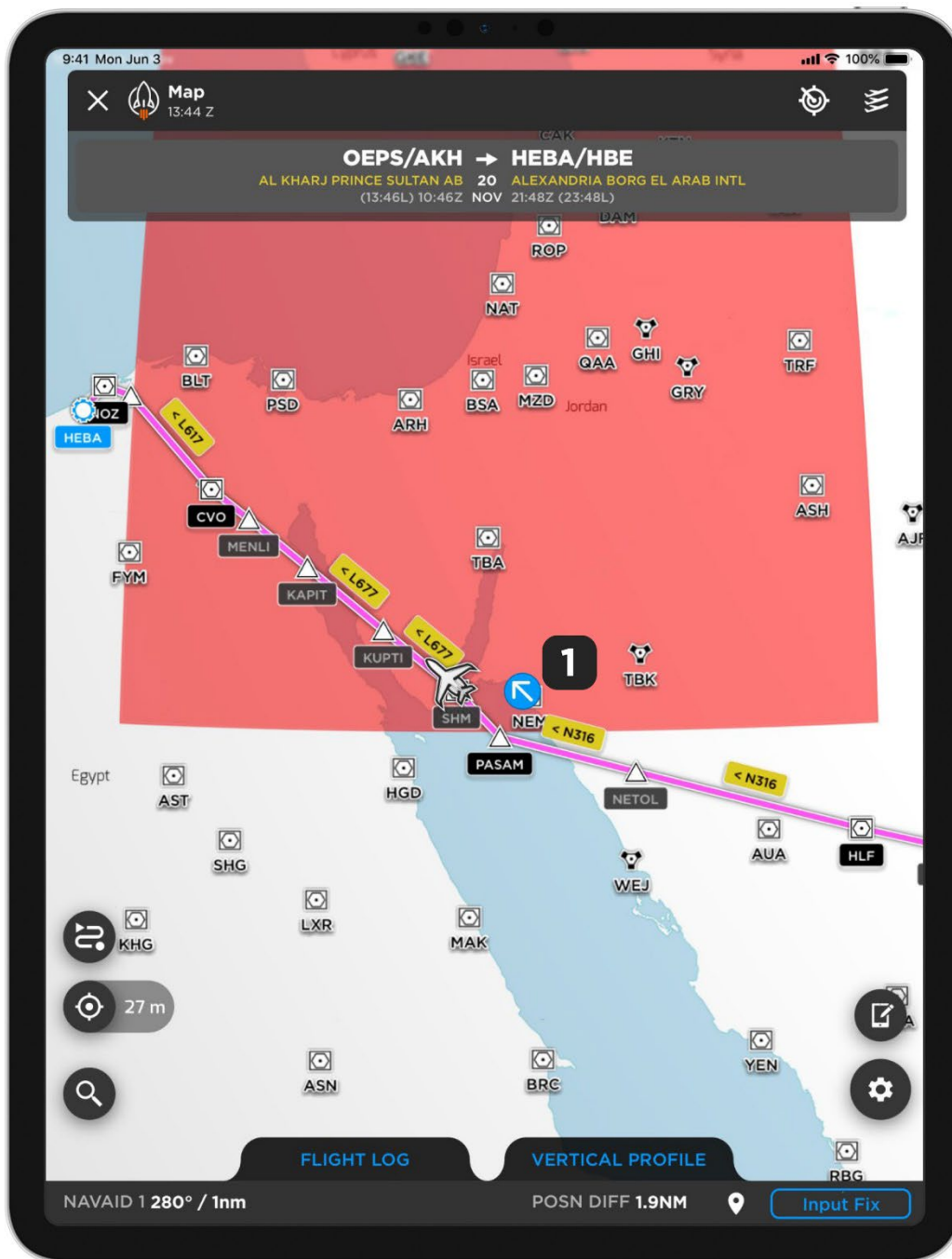
Map

- 1) If your Nav Aid does not have DME then you will be asked to input 2 fixes
- 2) Press Save



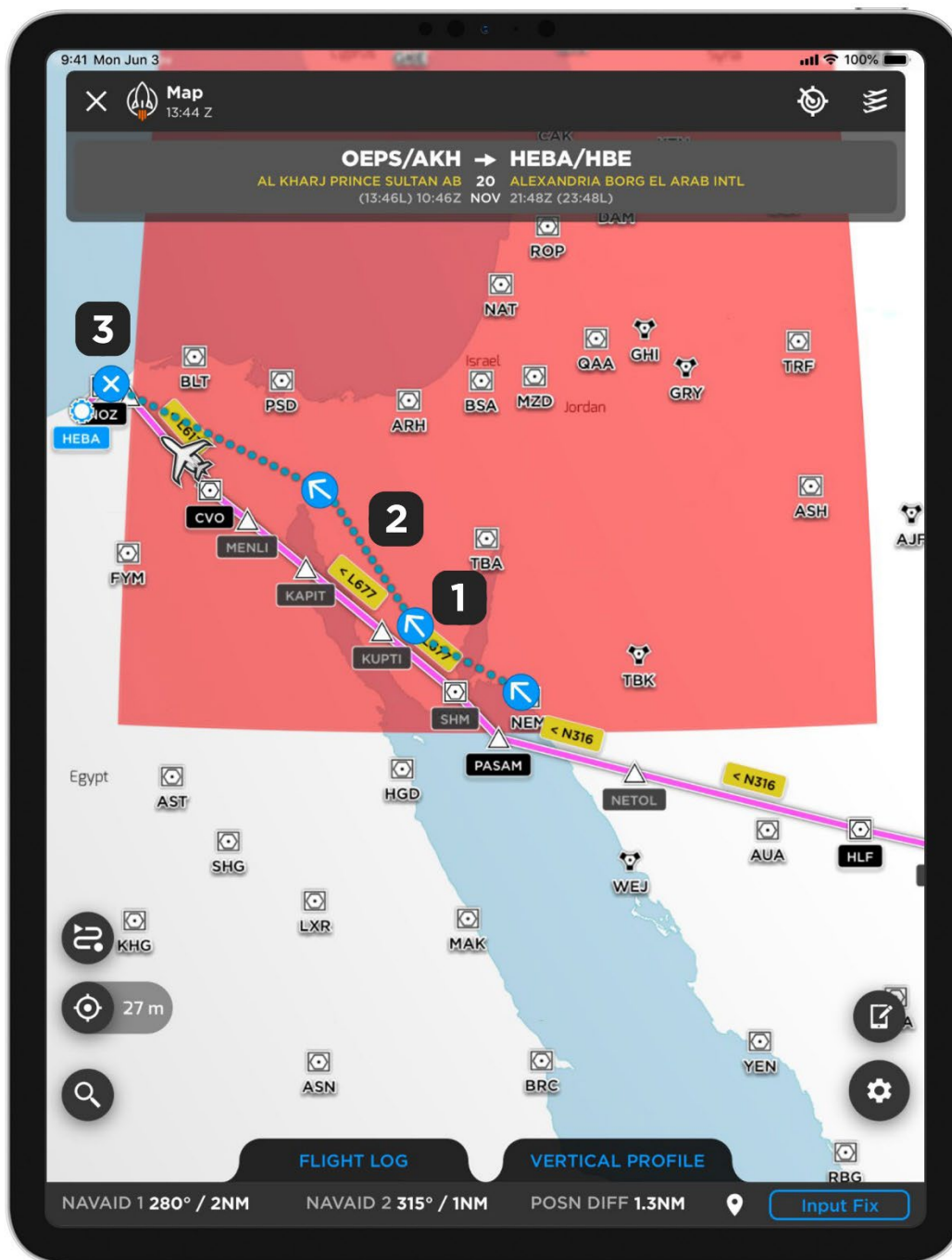
Map

- 1) Your fix is now plotted.
- 2) The fix icon is pointed in the direction of the Magnetic Heading you inputted.



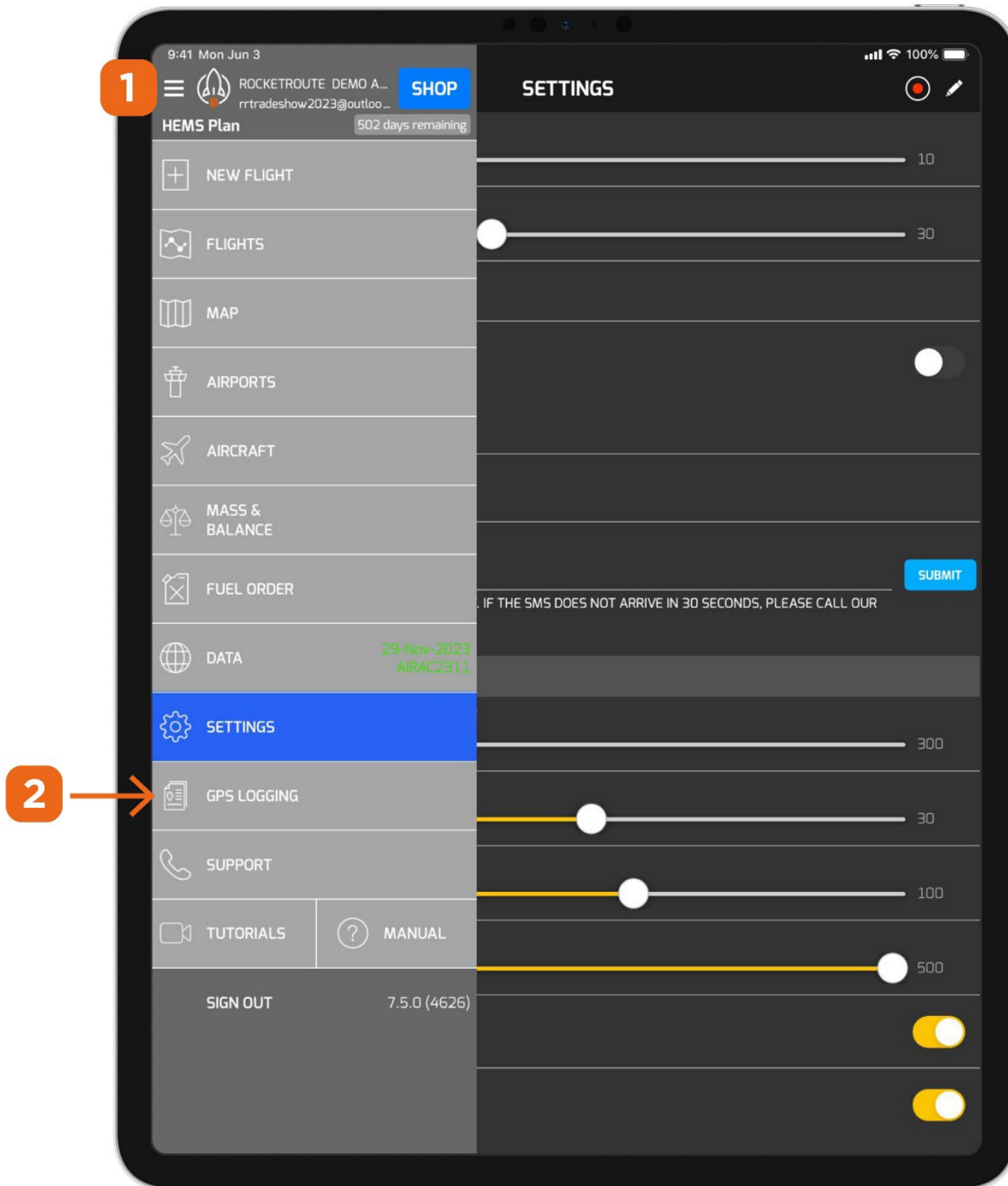
Map

- 1) As you plot more fixes they will appear on the map
- 2) Your fixes will be joined by blue dotted lines
- 3) Any fix you input without a Magnetic Heading will have the X icon



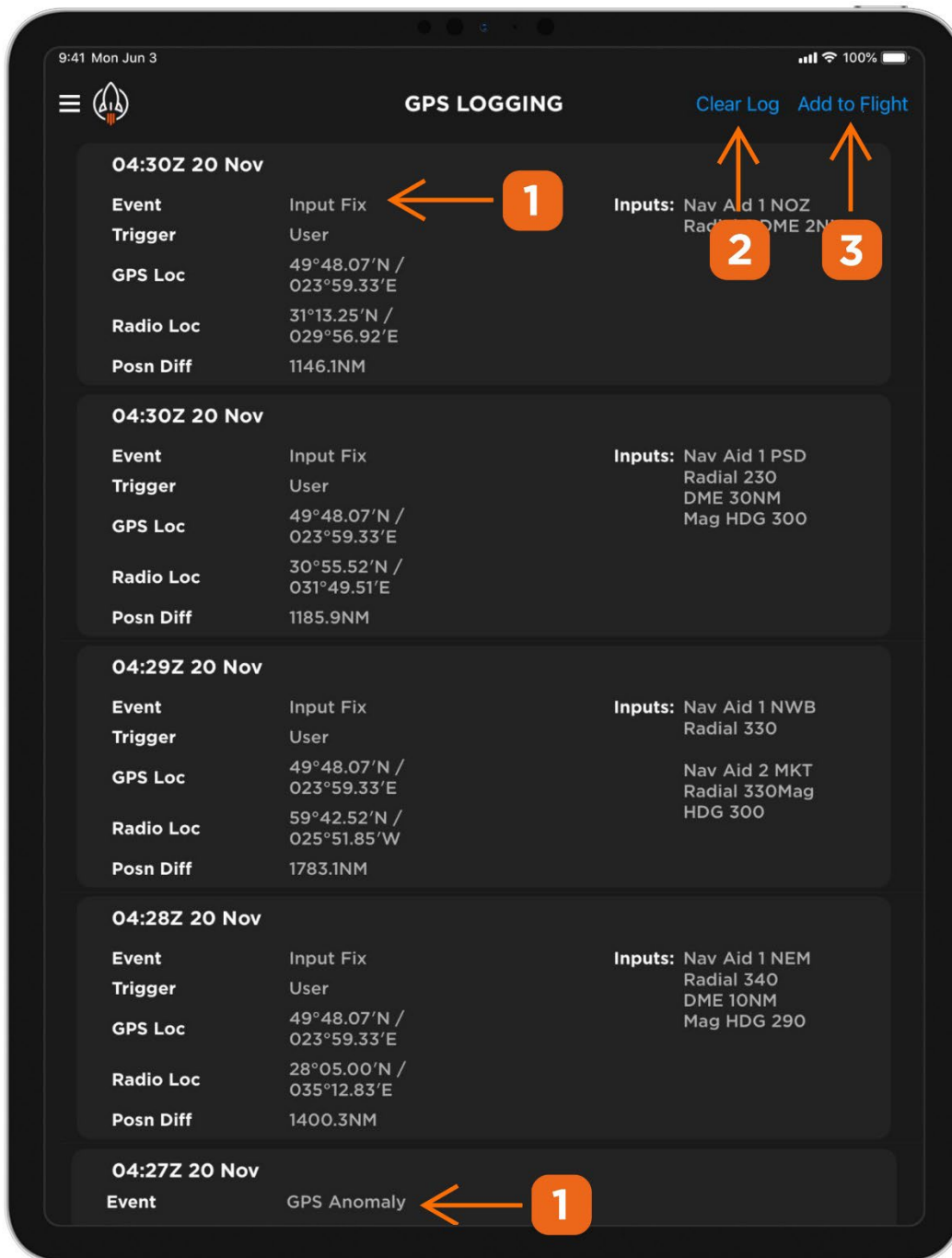
Menu

- 1) Open the Menu
- 2) Tap on GPS LOGGING



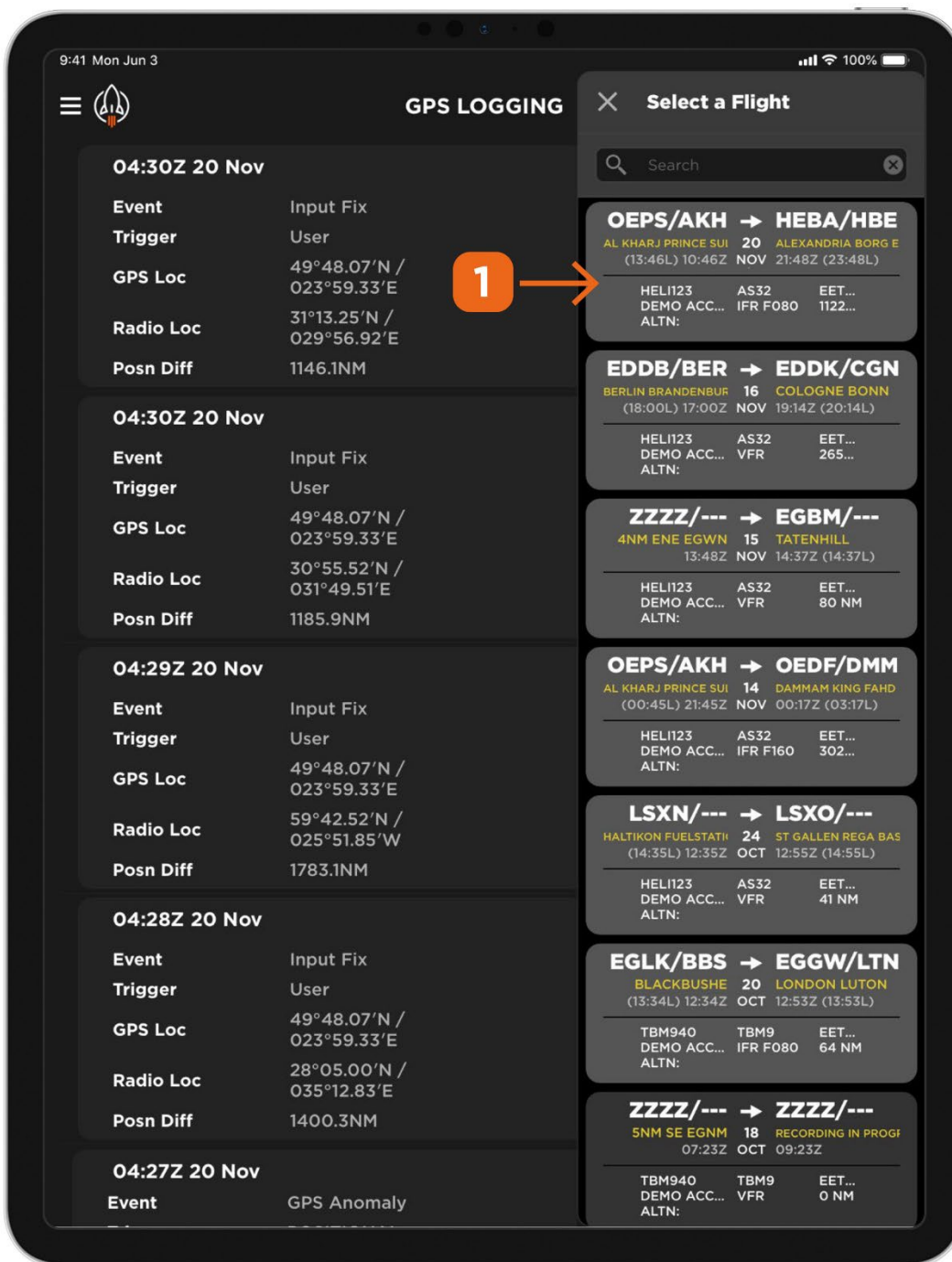
GPS Logging

- 1) You can now see a log of your Input Fixes and Anomalies Detected
- 2) You can clear the log or add the log to a flight
- 3) We recommend Clearing the Log after each flight, but make sure you Add to Flight first!



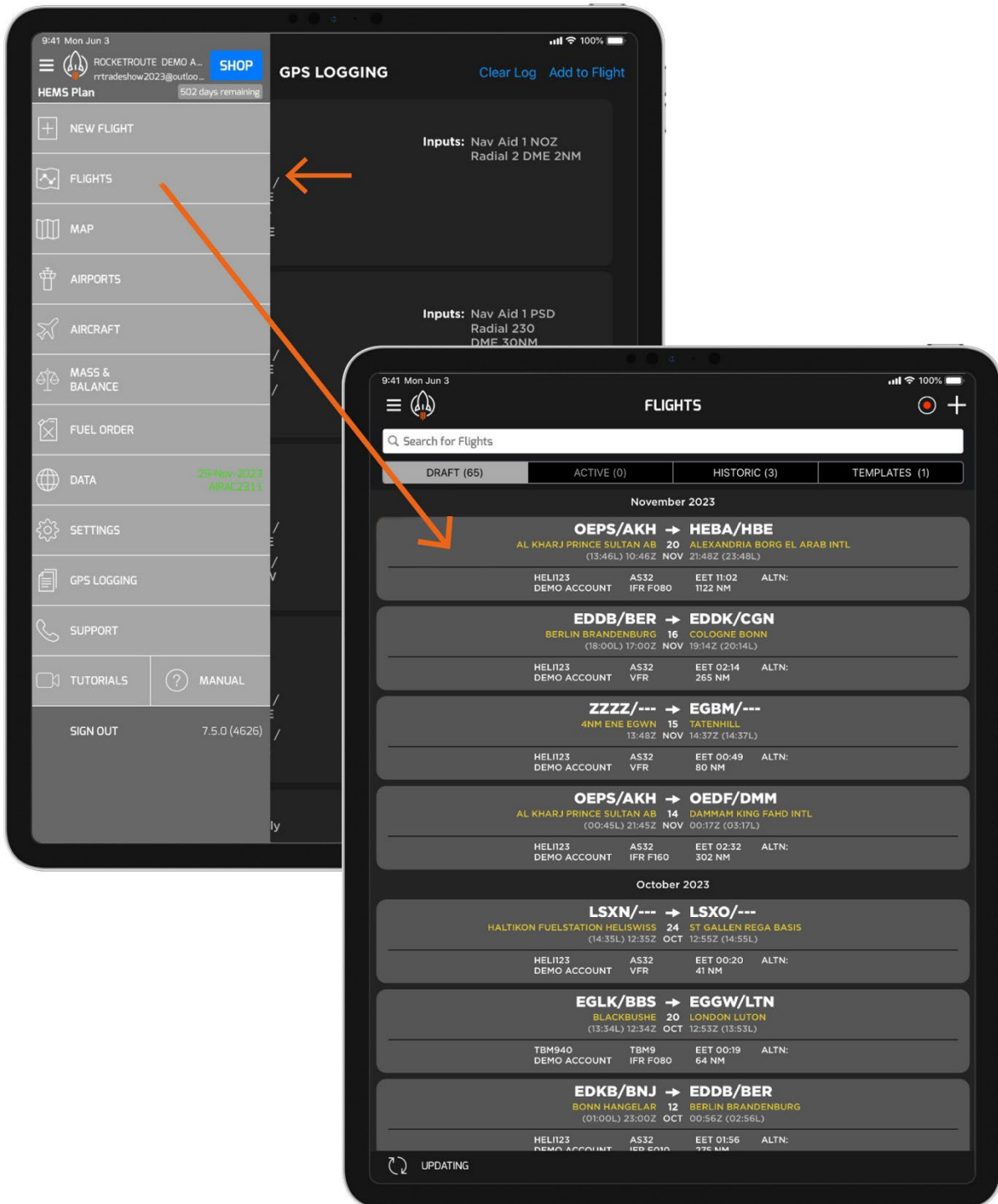
Flight Assigning

- 1) When you tap Add to Flight you can then select the flight from the flight list
- 2) Once you have added it to a flight then the log will be added to your briefing pack. This will be available both on mobile and the web



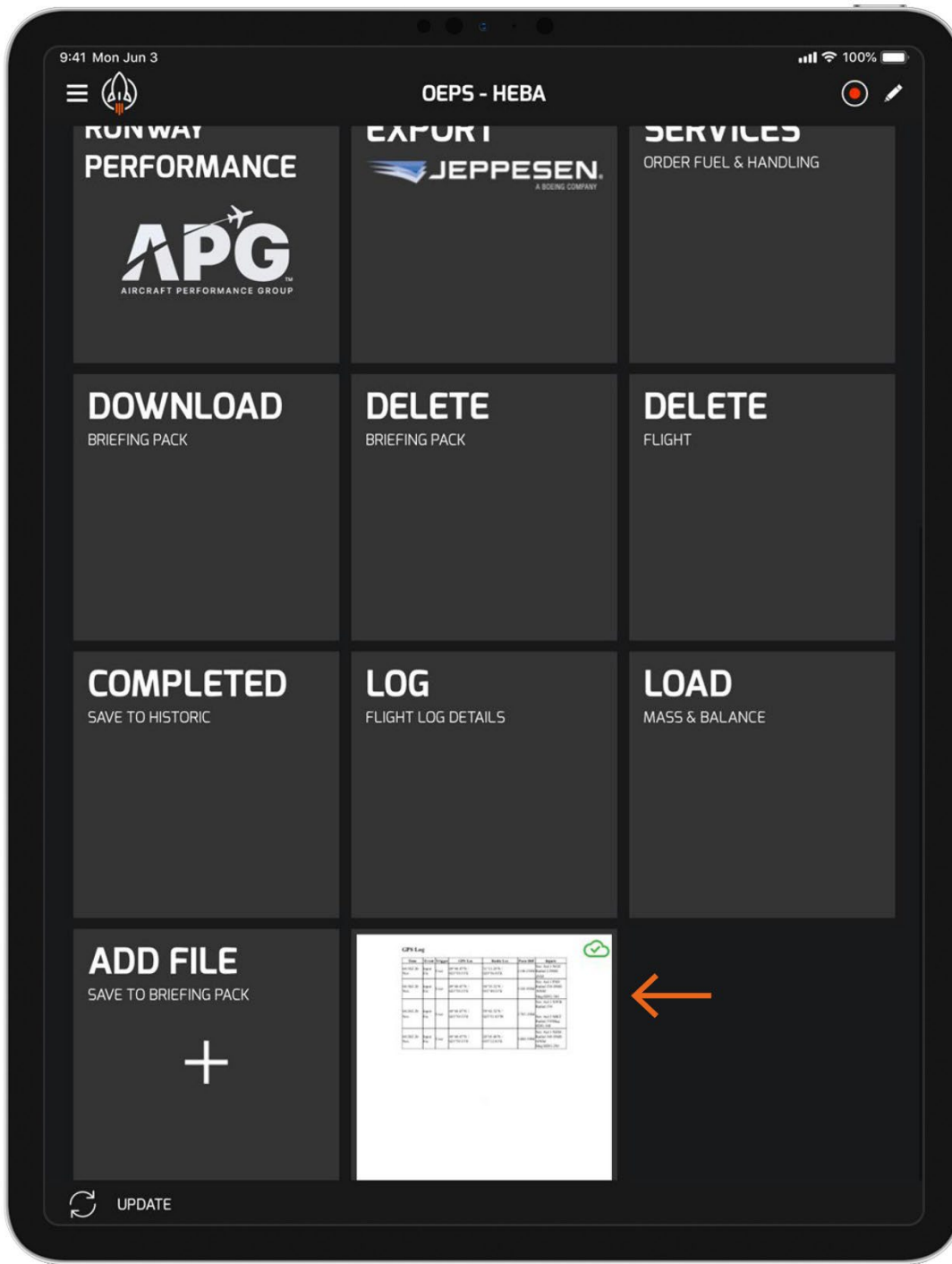
Flights

- 1) Go to Menu -> FLIGHTS and then select the relevant flight.



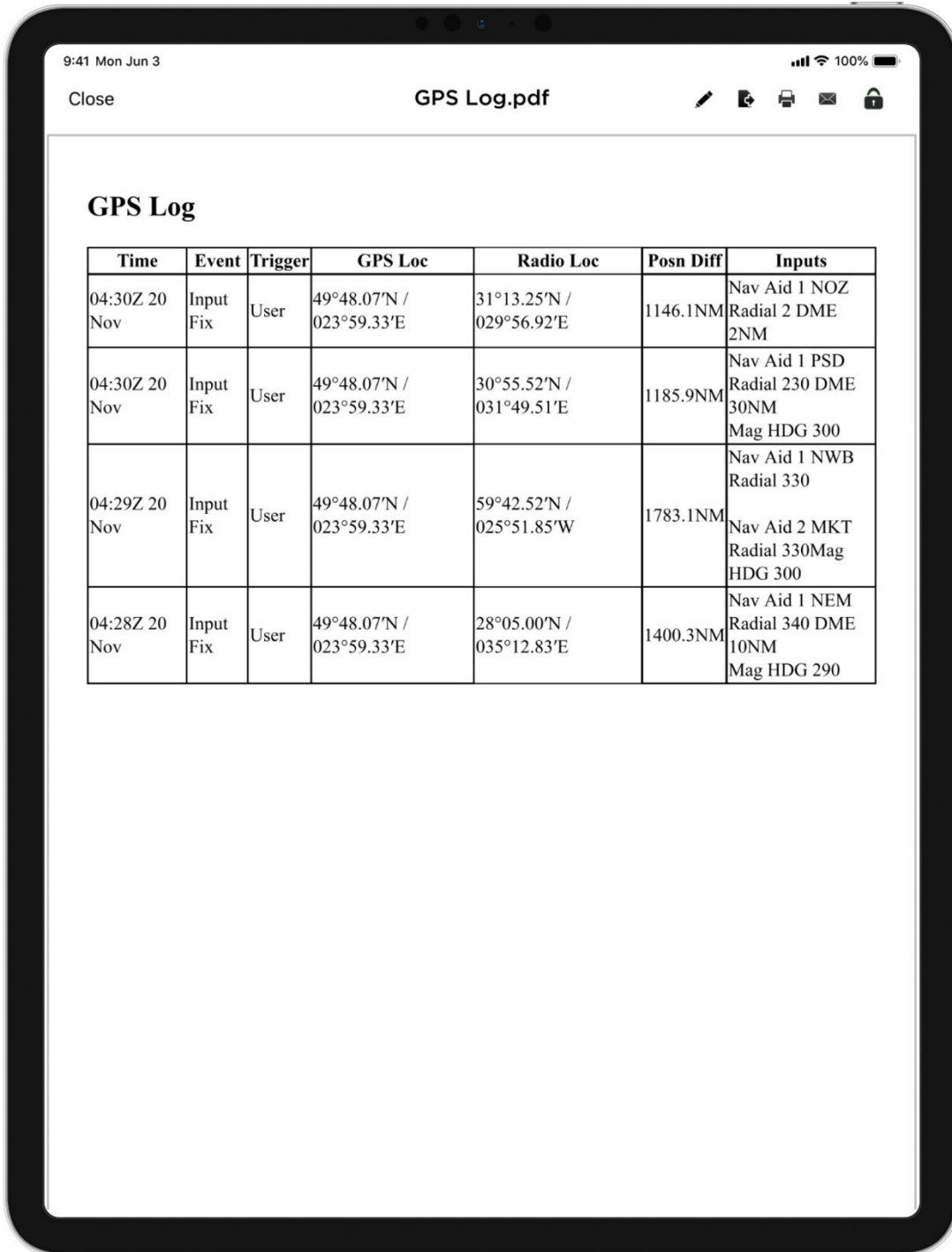
Briefing Pack

- 1) Scroll to the bottom of the tiles and you will find the GPS log available.



Briefing Pack

- 1) Your GPS Log is now available in Briefing Pack, and available both on mobile and web.



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GPS Log

Time	Event	Trigger	GPS Loc	Radio Loc	Posn Diff	Inputs
04:30Z 20 Nov	Input Fix	User	49°48.07'N / 023°59.33'E	31°13.25'N / 029°56.92'E	1146.1NM	Nav Aid 1 NOZ Radial 2 DME 2NM
04:30Z 20 Nov	Input Fix	User	49°48.07'N / 023°59.33'E	30°55.52'N / 031°49.51'E	1185.9NM	Nav Aid 1 PSD Radial 230 DME 30NM Mag HDG 300
04:29Z 20 Nov	Input Fix	User	49°48.07'N / 023°59.33'E	59°42.52'N / 025°51.85'W	1783.1NM	Nav Aid 1 NWB Radial 330 Nav Aid 2 MKT Radial 330Mag HDG 300
04:28Z 20 Nov	Input Fix	User	49°48.07'N / 023°59.33'E	28°05.00'N / 035°12.83'E	1400.3NM	Nav Aid 1 NEM Radial 340 DME 10NM Mag HDG 290