



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
- Anomaly Detection Parameters
- NaviGuard Feature





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 cab be described as follows:

- 1. Sudden variation in <u>reported</u> 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
 - 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

i.

- a. Sudden directional change (Backwards) 160 200 degrees turn between <u>two</u> <u>subsequent</u> 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 <u>calculated</u> 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

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->	₩ \$63	SETTINGS		AIRAC2311		
		GPS LOGGING				- 300
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		TUTORIALS	? 1	MANUAL		500
		SIGN OUT		7.5.0 (4626)		





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

	9:41 Mon Jun 3	anti	중 100% 🔲
	$\equiv \langle \! () \! \rangle$	SETTINGS)
	SNAP TO RADIUS		
	2NM 0.1		10
_	DEFAULT STAY TIME		
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	FILE CUSTOM WAYPOINT AS		
	Bearing-Distance (WPT/dddDDD)		
	AUTOMATIC CREW INTEGRATION		
_	PIC NAME		
	Demo Account		
_	MOBILE NUMBER		
_	+448176883796		
	PASS CODE		
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_	SUPPORT LINE	E SMS DUES NUT ARRIVE IN 30 SECONDS, PLEASE CALL OUR	
_	TRACKING		
	SPEED TO START/STOP RECORDING & GPS MONITORING		
$1 \rightarrow$	25 kts 5		
- 1	MAX. HOVER TIME		
_	15 min 1		
_			
			100
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_		,	
$2 \rightarrow$	GPS ANOMALY ALERTS		
_ 11			
3>	RADIO NAV 10 MIN WARNING		
- 1			





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







1) Enable NaviGuard







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







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







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







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







- 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!

9:41 Mon Jun 3		III 🗢 100% 🔲
$\equiv \langle \! \langle \! \rangle \! \rangle$	GPS LOGGING	Clear Log Add to Flight
04:30Z 20 Nov		
Event	Input Fix	Inputs: Nav A d 1 NOZ
Trigger	User	2 3
GPS Loc	49°48.07'N7 023°59.33'E	
Radio Loc	31°13.25′N /	
Posn Diff	1146.1NM	
04:30Z 20 Nov		
Event	Input Fix	Inputs: Nav Aid 1 PSD Radial 230
Trigger	User	DME 30NM
GPS Loc	023°59.33′E	Mag HDG 300
Radio Loc	30°55.52′N / 031°49 51′F	
Posn Diff	1185.9NM	
04:29Z 20 Nov		
Event	Input Fix	Inputs: Nav Aid 1 NWB
Trigger	User	Radial 330
GPS Loc	49°48.07′N / 023°59.33′E	Nav Aid 2 MKT Radial 330Mag
Radio Loc	59°42.52′N / 025°51.85′W	HDG 300
Posn Diff	1783.1NM	
04:28Z 20 Nov		
Event	Input Fix	Inputs: Nav Aid 1 NEM
Trigger	User	DME 10NM
GPS Loc	49°48.07′N / 023°59.33′E	Mag HDG 290
Radio Loc	28°05.00'N / 035°12.83'E	
Posn Diff	1400.3NM	
04:27Z 20 Nov Event	GPS Anomaly	
Event		





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

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	GPS LOGGING	imes Select a Flight
04:30Z 20 Nov		Q Search 😣
Event Trigger	Input Fix User	OEPS/AKH → HEBA/HBE
GPS Loc	49°48.07′N / 023°59.33′E	(13:46L) 10:46Z NOV 21:48Z (23:48L) HEL1123 AS32 EET
Radio Loc	31°13.25′N / 029°56.92′E	ALTN:
Posn Diff	1146.1NM	EDDB/BER → EDDK/CGN BERLIN BRANDENBUF 16 COLOGNE BONN (19:001) 17:007 NOV (19:147 (20:141)
04:30Z 20 Nov Event	Input Fix	HEL1123 AS32 EET DEMO ACC VFR 265
Trigger	User	
GPS Loc	49°48.0/ N / 023°59.33′E 20°55 52/N /	4NM ENE EGWN 15 TATENHILL 13:48Z NOV 14:37Z (14:37L)
Radio Loc Posn Diff	031°49.51′E 1185 9NM	HELI123 AS32 EET DEMO ACC VFR 80 NM ALTN:
04:29Z 20 Nov	inosistan	OEPS/AKH → OEDF/DMM
Event	Input Fix	AL KHARJ PRINCE SUI 14 DAMMAM KING FAHD (00:45L) 21:45Z NOV 00:17Z (03:17L)
Trigger	User	HELI123 AS32 EET
GPS Loc	49°48.07′N / 023°59.33′E	DEMO ACC IFR F160 302 ALTN:
Radio Loc	59°42.52′N / 025°51.85′W	LSXN/→ LSXO/ HALTIKON FUELSTATIK 24 ST GALLEN REGA BAS (14:35L) 12:35Z OCT 12:55Z (14:55L)
Posn Diff	1783.1NM	HELI123 AS32 EET DEMO ACC VFR 41 NM
04:28Z 20 Nov		ALIN:
Event	Input Fix	EGLK/BBS → EGGW/LTN
Trigger	User	(13:34L) 12:34Z OCT 12:53Z (13:53L)
GPS Loc	49°48.07'N / 023°59.33'E	TBM940 TBM9 EET DEMO ACC IFR F080 64 NM ALTN:
Radio Loc Posn Diff	035°12.83′E	ZZZZ/ → ZZZZ/
		5NM SE EGNM 18 RECORDING IN PROGF 07:23Z OCT 09:23Z
04:27Z 20 Nov Event	GPS Anomaly	TBM940 TBM9 EET DEMO ACC VFR 0 NM ALTN:





Flights

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

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9:41 Mon Jun 3 = A ROCKETROUTE		111 🗢 100% 📼)
HEMS Plan	3@outloo GPS LOGGIN 502 days remaining	G Clear Log Add to Flight
		Inputs: Nav Aid 1 NOZ Radial 2 DME 2NM
		Inputs: Nav Aid 1 PSD
		Radial 230 DME 30NM
MASS & BALANCE		ু 9:41 Mon Jun 3 •••• ••• ••••
W-		
		Q. Search for Flights
DATA	29-Kos-2023 ARAC2311	DRAFT (65) ACTIVE (0) HISTORIC (3) TEMPLATES (1)
	,	
SOS SETTINGS		AL KHARJ PRINCE SULTAN A& 20 ALEXANDRIA BORG EL ARAB INTL (13:46L) 10:46Z NOV 21:48Z (23:48L)
GPS LOGGING	Ý	HELI123 AS32 EET 11:02 ALTN: DEMO ACCOUNT IFR F080 1122 NM
		(18:00L) 17:00Z NOV 19:142 (20:14L) HEL1123 AS32 EET 02:14 ALTN:
	(?) MANUAL	DEMO ACCOUNT VFR 265 NM
SIGN OUT	7.5.0 (4626)	4NM ENE EGWN 15 TATENHILL 13/482 NOV 14/372 (14/37L)
		HELII23 AS32 EET 00:49 ALTN: DEMO ACCOUNT VFR 80 NM
	ly	(00-45L) 21-452 NOV 00-172 (05:17L) HELI123 A532 EET 02:32 ALTN:
		DEMO ACCOUNT IFR F160 302 NM
		LSXN/ → LSXO/
		HALTIKON FUELSTATION HELISWISS 24 ST GALLEN REGA BASIS (14:35L) 12:35Z OCT 12:35Z (14:55L)
		HELI23 AS32 EET 00:20 ALTN: DEMO ACCOUNT VFR 41 NM
		EGLK/BBS -> EGGW/LTN BLACKBUSHE 20 LONDON LUTON
		(13:34L) 12:34Z OCT 12:53Z (13:53L) TBM940 TBM9 EET00:19 ALTN:
		BONN HANGELAR 12 BERLIN BRANDENBURG (01:00L) 23:00Z OCT 00:56Z (02:56L)
		HELI123 AS32 EET 01:56 ALTN: DEMO ACCOLINIT EED ECID 276 NM
		C2 UPDATING





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 Lo	g					
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

