



Safety

Matters

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The aviation industry has over the last few years become increasingly dependent on Global Navigation Satellite Systems (GNSS) replacing the traditional radio navigation and other air-to-ground based and inertial navigation systems as more operators take advantage of advanced PBN procedures and satellite-based navigation technologies being deployed by ANSPs throughout the world.

Recent figures show that the number of GPS signal disruption events continue to increase. GPS Jamming (intentional or unintentional) is now becoming a growing threat to the aviation industry. As aircraft systems are increasingly becoming reliant on GPS for primary navigation this can result in complete loss of GPS reception, which will result in the loss of GPS position, velocity and time (PVT) or alternatively partial GPS signal degradation which will impact on the positional accuracy of the aircraft, although this may be highlighted by a warning from the RAIM feature of the GPS unit(s). There is a range of further potential impacts to aircraft systems that can occur due to GPS interference although because of the range of difference systems on board the many types of aircraft, these impacts will not necessarily be the same for each aircraft type.

GPS space based signals are low power and unencrypted making them more susceptible to intentional and unintentional interference.

Causes could come from Personal Privacy Device(s) (PPD) including vehicle GPS jammers (a fleet management tracking system to scramble the signal of an employer GPS-based vehicle tracking system technology); these can emit radio signals that overpower or drown out much weaker signals such as GPS.

Another cause of a GPS outage can be from strong solar flares which create a blast of energy and send tiny charged particles streaming in to space which could potentially cause GPS receivers to fail. The link below from Sky library provides further detail on the impact of Space Weather on Aviation.

https://www.skybrary.aero/index.php/Impact_of_Space_Weather_on_Aviation

GPS Jamming



GPS Jamming may result in a GPS dormant failure which could impact the GPWS. There have been examples where the GPWS position input is being taken from GPS, rather than actual position from other sources. This failure mode would place the GPWS warnings under question, but you might not see any indication as such of this performance reduction.

When a GPS outage occurs, there is typically nothing to indicate it is a result of jamming, only that the GPS signal is no longer there.



Eurocontrol has for some time been collating data from all the main stakeholders, Air Operators and their associations and ANSPs.

The information has been shared with the whole aviation society including EASA and ICAO. The last update was published as part of the **EVAIR Safety Bulletin**, the latest issue no 19 can be accessed here.

[Eurocontrol EVAIR Safety Bulletin No 19](#)

During the period Jan to Sept 2018 the number of GPS outages reported to Eurocontrol increased drastically, up to 1000 reports, primarily due to the escalation of the conflict within Syria as well as Eurocontrol encouraging air operators to provide them with their GPS outage reports.

For 'M' registered aircraft, all such outages must be reported on a [Form 30 Occurrence Report](#) and submitted to the IOMAR and these reports will be forwarded on to Eurocontrol.

Operators will have safety operational procedures in place to deal with a GPS outage but good practice would be to have a process in place to monitor the procedures on a regular basis in conjunction with their SMS.

The following are some but not all of the potential issues that a disruption of aircraft GPS could cause in certain circumstances:

- Loss of GPS based navigation during enroute/terminal/approach NAV;
- Larger than normal GPS position errors prior to loss of GPS during enroute/terminal NAV;
- Loss of ADS-B Out over wide area;
- Loss of TAWS during enroute/terminal NAV;
- Loss of GPS to PFD/MFD during all flight phases;
- GPS/SBAS Nav/GPS measurements;
- Loss of runway alerting during approach/taxi/take-off.
- Spurious GPWS positional information

The Registry welcome your feedback, and should you wish to contact us regarding this, or any other topic you feel worthy of a 'Safety Matters' issue, please contact us at:

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