



Safety Information Bulletin

CAAS SIB No.	2022-01 R1
Issued	13 May 2022
Subject	Global Navigation Satellite System (GNSS) outages or disturbances due to the on-going conflict in Ukraine.
Ref. Publication(s)	1) EASA SIB 2022-02 dated 17 March 2022, Global Navigation Satellite System Outage Leading to Navigation / Surveillance Degradation
Purpose	<p>This SIB advises AOC holders on the possible GNSS outages or disturbances near Ukraine conflict zone and the surrounding areas resulting in possible disruption to aircraft and navigation systems.</p> <p>This SIB is revised to update the reporting requirements for AOC holders and operating crew.</p>
Applicability	All Singapore AOC holders operating to destinations, or overflying airspace near the Ukraine conflict zone and the surrounding areas.
Cancellation	This SIB supersedes the previous SIB dated 23 March 2022 on this subject.
Description	<p>Due to the current on-going conflict in Ukraine, the issue of Global Navigation Satellite Systems (GNSS) outages and disturbances caused by jamming and/or possible spoofing has intensified in geographical areas surrounding the conflict zone and other areas.</p> <p>Eurocontrol, Network of Analysts and open-source data reports analysed by EASA indicate that since 24 February 2022, there are four key geographical areas where GNSS spoofing and/or jamming has intensified, namely:</p> <ul style="list-style-type: none"> ▪ Kaliningrad region, surrounding Baltic sea and neighbouring States; ▪ Eastern Finland; ▪ The Black Sea; and ▪ The Eastern Mediterranean area near Cyprus, Turkey, Lebanon, Syria and Israel, as well as Northern Iraq.

The effects of GNSS jamming and/or possible spoofing were observed by aircraft in various phases of their flights, in certain cases leading to re-routing or even to change the destination due to the inability to perform a safe landing procedure.

While it is not possible to predict the effects from any GNSS outages or disturbances, the following are potential issues that could arise:

- a) Loss of ability to use GNSS for waypoint navigation;
- b) Loss of area navigation (RNAV) approach capability;
- c) Inability to conduct or maintain Required Navigation Performance (RNP) operations, including RNP and RNP (Authorization Required) approaches;
- d) Triggering of terrain warnings, possibly with pull up commands;
- e) Inconsistent aircraft position on the navigation display;
- f) Loss of automatic dependent surveillance-broadcast (ADS-B), wind shear, terrain and surface functionalities;
- g) Failure or degradation of ATM/ANS/CNS and aircraft systems which use GNSS as a time reference;
- h) Potential airspace infringements and/or route deviations due to GNSS degradation.

Recommendation

To address the potential issues resulting from the outage or disturbances of GNSS signals, the AOC holders should consider the following measures:

- a) Ensure that all operating crew are aware of the possibility of GNSS outages and disturbances from jamming and/or possible spoofing and the possible impact on aircraft and navigation systems that rely on GNSS signal integrity;
- b) That operating crew are provided with the latest information on navigation aids and systems critical to the operation for the intended route and approach. In addition, information relating to the status of non-GNSS based navigation aids, such as such as Distance Measuring Equipment (DME) and Very High Frequency omnidirectional range (VOR)), and other essential conventional navigation infrastructure, particularly Instrument Landing System, are made available.
- c) Assess operational risks and limitations linked to the loss of on-board GNSS capability, including other on-board systems requiring inputs from reliable GNSS signal;
- d) Review and determine if it is acceptable to dispatch aircraft with inoperative systems in accordance with Minimum Equipment List (MEL) to geographical areas affected by GNSS signals outages and disturbances caused by jamming and/or possible spoofing;

- e) Review and consider if additional fuel should be carried for flights to destinations near the Ukraine conflict zone;
- f) Remind operating crew to always verify the aircraft position by means of conventional navigation aids when flights are operated in proximity of the conflict zone and the surrounding areas;
- g) Remind operating crew to remain vigilant for any indications of GNSS signal outage and disturbances, and be prepared to revert to a conventional non-GNSS arrival procedure where appropriate. During the approach, crew should not hesitate to discontinue their approach, or execute a go-around if continued safe approach and landing cannot be assured.

AOC Holders should consider the above recommended mitigation measures and take additional precautions deemed appropriate to further enhance safety.

AOC Holders must report immediately to CAAS if any of the following events occur:

- a) An aircraft experiences loss of any system function, due to GNSS interference, that does not self-recover;
- b) An aircraft experiences any GNSS spoofing, i.e. false GNSS signals resulting the aircraft's calculated position differing from the actual aircraft position;
- c) An aircraft experiences GNSS interference in a location other than Ankara (LTAA) and Tehran (OIIX) Flight Information Regions (FIRs);
- d) The actual navigation performance of an aircraft does not meet the required navigation performance of the given airspace/procedure, as a result of GNSS interference;
- e) Spurious triggering of surveillance systems as a result of GNSS interference including, but not limited to, Ground Proximity Warning Systems (GPWS), Traffic Collision Avoidance Systems (TCAS), and windshear prediction or detection systems; and
- f) Any deviation from or inability to comply with the assigned Air Traffic Control (ATC) clearance as a result of GNSS interference.

These reports must include full details of the event including time, date, FIR, location of the start and end of occurrence and, a detailed narrative of the GNSS interference. Operating crew should also promptly report any observed interruption, degradation or anomalous GNSS performance (jamming and/or spoofing) to ATC, regardless of the location and impact on system performance.

Contact(s)

For further information, contact respective POIs or at 6595 6764 or CAAS_Infocenter@caas.gov.sg