



Safety Net

USING GNSS AS A VFR NAVIGATION TOOL

Ongoing improvement to the accuracy, affordability, and usability of GNSS and its flying-related applications means a growing number of pilots are adopting it as a navigation aid.

While GNSS can be used, there have been instances where over reliance, sole use, or other GNSS related issues were identified as primary contributory factors to safety occurrences.

This Safety Net aims to highlight some of the common issues that can affect VFR pilots when using GNSS to assist with navigation.

Use of GNSS to supplement visual navigation

AIP GEN 1.5 says that pilots operating under the VFR may use GNSS to supplement map reading and other visual navigation techniques. This means that the pilot in command must positively fix the aircraft's position by visual reference to features

shown on topographical charts at intervals not exceeding 30 minutes. The GNSS can be used to cross check this process.

Tolerances for avoiding controlled airspace

As stated in **AIP ENR 1.1**, to ensure that controlled airspace or restricted areas are not infringed, the following tolerances must be applied to the intended flight path of a powered aircraft conducting visual navigation:

- 0 -- 2,000 AGL ±1NM (±2NM by night)
- 2,001 -- 5,000 AGL ±2NM (±3NM by night)
- 5,001 -- 10,000 AGL ±4NM (±5NM by night).

Common issues related to use of GNSS for VFR flights

There have been safety incidents relating to the use and misuse of GNSS by VFR pilots. Some of the common issues and hints for how to avoid are outlined in the following section.

Issue	How to avoid
Airspace infringements	
<ul style="list-style-type: none"> ▪ Tolerances to remain outside of controlled airspace are not included in the planning or execution of flight 	<ul style="list-style-type: none"> ▪ Apply tolerances to remain clear of Controlled Airspace (AIP ENR 1.1-40 paragraph 19.12)
<ul style="list-style-type: none"> ▪ Pilot uses GNSS distance from location to remain outside of controlled airspace 	<ul style="list-style-type: none"> ▪ Controlled airspace steps may be based on various references including the aerodrome DME, the Aerodrome Reference Point (ARP) or runway threshold. On the VTC the steps will refer to the datum used (eg 30 DME, 7 NM ARP, 8 NM FM THR RWY 01)
<ul style="list-style-type: none"> ▪ Due to apparent accuracy of GNSS, the pilot believes they can fly closer to the boundary of controlled airspace 	<ul style="list-style-type: none"> ▪ In addition to the application of appropriate tolerances, consider whether or not you are capable of flying as accurately as the GNSS, particularly if trying to remain VMC
<ul style="list-style-type: none"> ▪ Pilot uses the 'GO TO' function rather than planning via established routes 	<ul style="list-style-type: none"> ▪ Unlike the airways route structure, the 'GO TO' function does not consider any restricted or controlled airspace, or minimum safe altitudes ▪ Consider what you would do and where you would be if the GNSS was to fail and/or you went IMC

Issue	How to avoid
GNSS usage and technical issues	
<ul style="list-style-type: none"> The pilot is not trained and competent in the use of the particular GNSS unit Incorrect/invalid information in the GNSS database The pilot makes errors inputting data into the GNSS (both in the air and on the ground) The pilot gets distracted by entering data into GNSS 	<ul style="list-style-type: none"> Ensure you are trained on the use of your GNSS and can confidently operate it whilst flying in all scenarios Ensure your GNSS subscriptions are up to date Always cross-check information with a current chart Always remember that you are a VFR flight and lookout is important
<ul style="list-style-type: none"> GNSS is not (correctly) installed as part of the aircraft and/or: <ul style="list-style-type: none"> battery goes flat antenna provides poor reception, is disconnected or subject to interference 	<ul style="list-style-type: none"> Where possible use a GNSS which has been installed correctly as part of the aircraft Ensure that the GNSS is only used to supplement visual navigation Plan and execute your flight so that if the GNSS fails, it does not affect your ability to safely continue

Issue	How to avoid
General	
<ul style="list-style-type: none"> Confusion and additional workload for pilots and air traffic control caused by the pilot only knowing their position relevant to GNSS data, rather than promulgated position or a navigational aid 	<ul style="list-style-type: none"> Air traffic control do not have reference to your GNSS information and will generally require your position or other information referenced to their particular location or a position identified on the VTC
<ul style="list-style-type: none"> Excessive reliance on GNSS leading to a loss of pilot visual navigation skills and a loss of capability when GNSS is not available 	<ul style="list-style-type: none"> The GNSS is a means of supplementing your visual navigation processes Plan and execute your flight so that if the GNSS fails, it does not affect your ability to safely continue

Conclusion

The use of a GNSS can significantly assist VFR pilots. However, it should only be used to supplement visual navigation techniques, not as a primary navigation source.

Remember to always plan as a visual navigation flight, including the appropriate tolerances for controlled and restricted airspace. Learn how to use your GNSS and be aware of its limitations. When flying always ensure you are in a position where if the GNSS failed, it would not put you in an unsafe or unwanted situation.

References

- AIP GEN 1.5 Para 8.5 - Global Navigation Satellite System
- AIP ENR 1.1 Para 19.2 – Flight under the VFR
- AIP ENR 1.1 Para 19.5 – Position Fixing
- AIP ENR 1.1 Para 19.12 - Avoiding Controlled Airspace

For more information

Safety Services

Email: safety.promotions@airservicesaustralia.com

Below: On the VTC, Avalon airspace boundaries are shown with reference to both the ARP and the DME.

