

Explanatory notes for Draft CAA Notice NTC 91.258 Revision 3

Background:

The CAA Notice of Requirement NTC 91.258 (the Notice) relating to Automatic Dependent Surveillance – Broadcast (ADS-B) systems was first issued on 20 July 2018. The Notice brought into full effect the ADS-B Civil Aviation Rules for flight levels above 245 within transponder mandatory controlled airspace.

The purpose of the Notice is to specify certain requirements determined by the Director, regarding equipage of aircraft with ADS-B systems, the performance standards of those systems, the minimum message set elements, and the testing and power output, amongst other matters.

The first amendment to the Notice (known as NTC 91.258 Revision 2) came into effect in November 2020. The primary change noted in Revision 2 was to allow for the use of non-TSO position sources, which are generally cheaper than TSO position sources. It was envisaged that allowing for the use of non-TSO position sources would increase ADS-B uptake especially in the general aviation sector.

The proposed Revision 3 to the Notice seeks to allow authorised persons designated under a Part 149 gliding organisation to install ADS-B transponders on gliders.

The proposed Revision 3 originally arose from a petition for exemption, as briefly set out below.

Exemption petition

On 10 February 2021, the CAA received a petition for exemption from the requirements of rule 21.503 (acceptable technical data) to the Director. The purpose of the exemption petition was to allow the petitioner to use their proposed technical data when installing ADS-B transponder on gliders. The petition was based on the petitioner's understanding that the proposed technical data has not been outlined as acceptable in Appendix D of Part 21. Rule 21.503(a) states that technical data shall only be used if it is approved or is acceptable to the Director.

The CAA reviewed the proposed exemption petition and advises that there are processes currently in place to approve or accept technical data that is not listed in Appendix D. The CAA also advises that acceptable data is published on the website which can be accessed via this link – <https://www.aviation.govt.nz/aircraft/airworthiness/>

On reviewing the exemption petition, the CAA considers that granting an exemption from rule 21.503 is not required nor appropriate in this instance.

Proposed amendment to CAA Notice NTC 91.258

Instead of going through the exemption process, the CAA proposes to amend CAA Notice NTC 91.258 Revision 2 to allow authorised persons under a Part 149 gliding organisation to install ADS-B transponders on gliders.

Currently, CAA Notice NTC 91.258 Revision 2 requires an ADS-B transponder to be installed only by a suitably rated licensed aircraft maintenance engineer holding a Radio category Group 3, or an equivalent authorised person in a maintenance organisation under Part 145.

Before amending the Notice, the Director will need to follow and be satisfied with the process specified in rule 91.258A, as set out in italics below:

Process for amending a notice under rule 91.258A

Before issuing or amending a notice to specify the requirements referred to in rule 91.258, the Director must -

- (1) conduct a review to assess the risk to aviation safety of the matter giving rise to particular safety concerns by taking into account –*
 - (i) the requirements of the ATC system:*
 - (ii) the compatibility of equipment, performance standards and procedures for an ADS-B system required under rule 91.257:*
 - (iii) how ICAO or other ICAO Contracting States are dealing with the risk:*
 - (iv) the practicability of the proposed requirements:*
 - (v) any other information that the Director considers may be relevant; and*

Assessment of risk to aviation safety

The proposal to allow authorised persons under a Part 149 gliding organisation to install ADS-B systems on gliders was previously raised when draft Notice Revision 2 was published for consultation last year.

Initial view – installation of ADS-B on gliders be limited to LAMEs with Group 3 radio rating:

The CAA was of the view then that the installation of ADS-B transponders on gliders should be limited to licensed aircraft maintenance engineers with a Group 3 Radio rating only. This view was influenced by the thinking at the time that an ADS-B system is a distinct system in its own right, therefore should be treated as a separate category from the generic ‘transponder’ category under Group 3 of Appendix B.1(f), Part 66.

In support of this view, Group 3 was specifically amended to include ‘ADS-B systems’ when the ADS-B rules for FL above 245 came into force in July 2018. However, when carrying out ADS-B installations on gliders, it was expected that a LAME would liaise with the owner of the glider to ensure that antenna location and any other specifics meet the owner’s needs. Having ADS-B work carried out by a LAME would also ensure that transponders installed in gliders conform to the standards prescribed in Appendix A.22 of Part 91.

As a result of the exemption petition, the CAA has revisited its thinking on this issue. Although its earlier view is correct and has merit, the CAA now takes a holistic approach and considers the ADS-B system to be a surveillance system. Given that the ADS-B system is relatively new, a logical conclusion would be that its components are also new, therefore

glider maintenance engineers would not be familiar with installing or repairing these components.

However, with the benefit of hindsight, the passage of time (3 years since the ADS-B mandate for above FL 245 was implemented) and maturing of processes for maintaining and installing ADS-B transponders, the CAA considers the risk to be minimal. In addition, the CAA is not aware of any incidents involving the installation of ADS-B equipment on gliders.

The earlier view suggested that ADS-B system manufacturers would provide training to those Radio Group 3 LAMEs who did not have exposure to ADS-B systems. Although avionics manufacturers provide continuation training to dealers and installers. As ADS-B is essentially a transponder connected to a position source, ADS-B training from manufacturers relates to equipment specific functions relating to operation and or software upgrades.

Persons authorised by the petitioner are experienced in installing avionics equipment meeting the applicable rules under Parts 91 and 43 per installations instructions and acceptable technical data.

Interconnections between the GNSS position source and transponder use data connections common to other avionics systems (RS-232, Arinc-429, CAN, etc) which consist of a wire pair interconnect between the two units. The acceptable technical data used for an installation should provide sufficient guidance on this installation. Any unique features to glider installations as in the composite airframe needing sufficient antenna ground plane are common to other avionics systems being installed.

Updated view – persons authorised under a Part 149 gliding organisation may install ADS-B equipment on gliders only:

In view of the above factors, the CAA considers that there may be installers authorised by the petitioner who are equally competent as Radio Group 3 LAMEs to install ADS-B transponders on gliders. Especially noting that GNSS systems on their own require a Radio Group 2 LAME. Standalone transponders require a Radio Group 3 LAME, under Appendix B.1(f) of Part 66.

As Radio Group 2 rating is not a prerequisite to obtain a Radio Group 3 rating, the addition of position source is an equivalent extension of privileges of the group rating as it would be to allow a person authorised by the petitioner to do avionics installations, to include ADS-B transponders. As the petitioner can authorise individuals to do avionic installations, which has been the situation for some time, and aviation safety has not been compromised by this arrangement.

The CAA considers that allowing an authorised glider maintenance engineers by the petitioner to install ADS-B transponders on gliders would not have a negative impact on aviation safety in terms of the glider's safety or the operation of the glider.

Requirements of ADS-B system, compatibility of systems, performance standards, etc:

The ADS-B system must meet the performance standards set out in the Civil Aviation Rules and the current CAA notice NTC 91.258 Revision 2. Whether an ADS-B system meets the performance standards is ascertained by the test equipment that is used and knowing how

to apply the test results to the requirements of rule 91.257. Noting that a pass/fail indication on the test equipment is not sufficient as the ultimate result depends on the programming of pass/fail criteria in the test equipment. The person carrying out the test should be able to verify by the test data of the tested parameters whether the system passes the requirements.

Given that the required test equipment needs to be bought therefore an investment, it is reasonable to assume that an individual or organisation making this investment would have the operator of the equipment suitably trained in operating, and assessing the data produced by the test equipment.

ADS-B is required in controlled airspace. This means that gliders operating within controlled airspace need to be equipped with ADS-B OUT. An added benefit of ADS-B OUT is that an aircraft is visible to other aircraft equipped with ADS-B IN, in both controlled and uncontrolled airspace.

Gliders which have ADS-B transponders installed would be visible to aircraft that have ADS-B IN facility, for situational awareness. The ADS-B IN facility increases the overall aviation safety inside and outside of controlled airspace.

Alternatively, gliders already have their own situational awareness system known as FLARM. FLARM is the traffic awareness and collision avoidance technology which alerts gliders with both traffic and imminent collisions with other aircraft.

There is a risk that ADS-B transponders installed under the provisions of a Part 149 authorisation will not meet the performance requirements set out in rule 91.257, thereby being non-compliant with the surveillance system in controlled airspace (“the risk”).

In the CAA’s view, the risk would be mitigated by proper testing of the system by a person familiar with the requirements and the test equipment used. The test results would be captured in the aircraft records, including the test equipment used and the person signing off the test.

In addition, an aircraft equipped with an ADS-B transponder that is not performing to the specified standards and transmitting non-compliant data would still be visible to the surveillance system. ATC will advise the pilot of the non-performance and may provide instructions for safe separation between aircraft, if necessary. ATC and the pilot would be required to submit an incident report to the CAA if a non-performance occurred. The lessons learnt from the incident will better inform the CAA and aviation participants on what needs to be done to prevent the incident from happening again.

Having taken into account the factors mentioned above, the CAA considers that having suitably trained and experienced glider engineers authorised by the petitioner to install ADS-B transponders on gliders is equally effective as a LAME group 3 carrying out the installation work.

How ICAO or other ICAO Contracting States are dealing with the risk:

Gliders are not within the scope of ICAO Annexes, so there is no comparison to be made in this instance.

There is no data available on how other ICAO Contracting States are dealing with the risk. Despite the lack of data, the CAA is of the view that in the New Zealand context, the risk is being mitigated and appropriately managed. Worth noting is that part of managing the risk is that such authorised persons under a Part 149 authorisation will be restricted to installing ADS-B transponders on gliders only.

The practicability of the proposed requirements:

Allowing persons authorised under a Part 149 gliding organisation to install ADS-B transponders on gliders makes practical sense, as such persons are familiar with gliders and how they work. This means that LAMEs can focus on performing maintenance and installation work on other aircraft types.

Any other information that the Director considers relevant:

It is envisaged that allowing persons authorised under a Part 149 gliding organisation to install ADS-B transponders on gliders should relieve some of the ADS-B installation backlog faced by LAMEs. In addition, this will most likely increase the overall ADS-B equipage of gliders and other aircraft types and help achieve the projected 100% compliance rate by the mandated date of 31 December 2022.

Allowing LAMEs who have very little or no experience with gliders to install ADS-B transponders on gliders can potentially introduce other risks regarding workmanship or competency.

Proposed amendments to CAA Notice NTC 91.258 Revision 2

A new paragraph (ba) is inserted in clause 4 to allow a glider maintenance engineer authorised under Part 149 by a gliding organisation to install ADS-B transponders on gliders only.

This new paragraph provides an exception to the current requirement that an ADS-B transponder must be installed by a suitably rated LAME holding a Radio category Group 3, or an equivalent authorised person in a maintenance organisation under Part 145.