



Summary of Public Submissions Received on

**Draft Notice NTC 91.258 — Automatic Dependent
Surveillance – Broadcast (ADS-B) System (Revision 2)**

13 November 2020

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General

Draft CAA Notice NTC 91.258 – Automatic Dependent Surveillance – Broadcast (ADS-B) System Revision 2 (the proposal) was published on the CAA website for public consultation on 8 June 2020, and submissions closed on 3 August 2020. Industry was notified by automatic email alerts. The purpose of the proposal was to:

- allow other suitable position sources for ADS-B which do not meet, nor are equivalent to, position sources currently specified for the GPS TSOs;
- reflect that ADS-B will be mandated for below FL 245 controlled airspace;
- clarify what the power requirements are; and
- make editorial corrections to certain inconsistencies in tables 1 and 2 of the current CAA Notice NTC 91.258 Revision 1.

Summary of Submissions

A total of 10 submissions was received on the draft CAA Notice NTC 91.258 Revision 2 (the proposal). Of the 10 submissions, 4 were from organisations and 6 from individuals. The breakdown of the submissions received are as follows:

- 3 found the proposal acceptable without change;
- 4 found the proposal acceptable but could be improved, if changes proposed by them were made; and
- 3 found the proposal not acceptable, but would be acceptable if changes proposed by them were made.

Areas of concerns raised in the submissions are set out in the headings below:

Large number of aircraft installations to meet ADS-B mandate deadline

A submitter welcomed the proposal and pointed out that given the large number of aircraft installations effected by the revision, it would be necessary to implement the revision as soon as possible. This would allow time for installations to be completed in time to meet the ADS-B mandate deadline.

CAA response

The CAA advises that the new position sources specified in the proposal which the Director may approve for use, is not the actual approval in itself that allows for the installation of these position sources. An aircraft owner who wishes to install one of these position sources will be required to seek the Director's approval first before installing the position source. This is to ensure that the resulting ADS-B system, meets the performance and reliability expectations for a surveillance system. The performance and reliability do not only affect the aircraft with the system fitted, but also those who rely on the information it provides to ATC.

It seems to be implied in the submission that allowing for the new position sources in the updated CAA Notice means automatic approval to use the position sources. To avoid doubt, the CAA clarifies that this is not the case. The Director's prior approval will be required.

Mandatory use of ADS-B for all aircraft to broadcast position in all airspace

A submitter proposed that it should be mandatory for all aircraft, including UAV and RPAS, to broadcast their position using ADS-B in *all* airspace including class G airspace. It noted that class G airspace is conventionally not transponder-mandatory airspace. As a concession to reduce costs, the submitter also proposed that vehicles not operating in controlled airspace may use ADS-B equipment that conforms to a lesser standard. In particular, smaller drones could be used which may need miniaturised low cost equipment. Such class G equipment could potentially lower transmit power for short range to limit the data burden on the ADS-B system, whilst still being useful for collision avoidance between aircraft in class G airspace.

The submitter further noted that consideration of the proposed changes is likely to require more work and time which would stall the progress of finalising the proposal. If this is the case, then the CAA should proceed with finalising the proposal without accommodating the change, but consider the proposed changes in a future amendment.

CAA Response

The CAA advises that UAV and RPAS are currently outside the scope of ADS-B, therefore the proposed changes will not be incorporated into the proposal. However, there are separate projects underway to look into their integration.

The use of ADS-B will be unlikely for most UAV and RPAS as ADS-B requires a 24 Bit Mode S address to be assigned. These addresses are finite in number and ICAO assigned a limited number of these addressed to New Zealand.

On the suggestion to use other equipment outside controlled airspace, the CAA advises that this also falls outside the scope of this proposal, and therefore the CAA is not in a position to comment on this point.

Class 2 transponder to be used for certain GA aircraft

A submitter proposed that a class 2 transponder with a ceiling of FL 240 should be installed in aircraft operating in general aviation airspace. The submitter contended that most aircraft operating in general aviation airspace are restricted to FL150 with no benefit gained in using a class 1 transponder.

CAA Response

The CAA agrees with the submitter with regards to class 1 and class 2 transponders producing different minimum output power. The classes are defined in RTCA DO-180 which provides the minimum operating performance standard for TSO-C112() Mode S transponders. An extract of the minimum output power is included in the TSO. The altitude/airspeed limitation on the use of classes of transponders is linked to the surveillance system limitations. Flying above FL150 with a transponder of less than 125W

(Class 2) may result in not being visible to the surveillance system, and thus potentially poses a safety risk. The correct use of class of transponder is covered in Appendix A.22 of Part 91. Although these transponder requirements were implemented well before the introduction of ADS-B, the requirements remain fit for purpose and apply to ADS-B systems, as the system is based on use of Mode S Extended Squitter transponders.

Therefore the CAA advises that the proposed change will not be incorporated into the Notice NTC 91.258 (revision 2).

Becker 6401 class 2 Mode S certificated to ETSO c112(a) - whether it is TSO-C166b compliant

A submitter queried whether a Becker 6401 class 2 mode S transponder which is certificated to ETSO c112(a) is TSO c112 compliant, if it is attached to TSO c145 position source. In addition, whether being attached to TSO c145 position source means that the transponder is TSO-C166b compliant to meet the requirements of Notice NTC 91.258.

Background to the submission:

The Becker 6401 class 2 mode S transponder was purchased in 2011 and installed in the submitter's aircraft in 2014. The aircraft has yet to be released to service as other restoration work is still in progress. To the submitter's knowledge, the transponder has always been portrayed as a 1090 ES ADS-B compliant transponder and includes installation instructions for connection with a TSO c145 position source, specifically the Freilight systems 1201. With the advent of TSO c166b, in 2016 Becker amended the installation documentation of the 6401 series transponders to state that the device was not certificated according to TSO c166b.

As the submitter understands it, the ADS-B system standards specified in the notice under clause 2(f) provide that the transponder must satisfy TSO c166, 166(a) or 166(b) or demonstrate performance equivalent to that standard and meet the performance requirements set out in clause 2(d). However, it is unclear to the submitter as to how those requirements are deemed to have been met, given that section 4(a) states Director's approval for an ADS-B system is not required if an ADS-B system meets the performance requirements of clause 2(d) and satisfies five criteria. One of those criteria is that the GNSS position source is approved by the Director for use in combination with a TSO-C112() transponder to produce a TSO-C166b compliant ADS-B system.

As the submitter's transponder is TSO c112 compliant, if it is attached to TSO c145 position source, does this make the transponder a TSO-C166b compliant ADS-B system?

There is no guidance in the notice about the product combinations that would make a TSO-C166b compliant ADS-B system. The submitter contends that the notice as published does not provide an answer, but raises more questions. For example, 4(a)(i) and 4(a)(2)(ii) seem to be inconsistent in that 4(a)(i) states the transponder must be TSO c166 and satisfy 4(a)(2), yet 4(a)(2)(ii) states the transponder can be TSO c112 if attached to an approved position source to produce a TSO-c166b compliant ADS-B system.

The submitter is of the view that some acceptable means of compliance that specifies compatible equipment combinations satisfying the required standards are necessary. Without this the submitter, and in their view many others, will continue to be uncertain as

to what steps to take in relation to their complying with the ADS-B mandate. At present, the standard as structured appears to mean the submitter throwing away a perfectly serviceable brand new unused 1090 ES mode s transponder worth \$3500, which is an unacceptable outcome.

CAA Response

The CAA advises that the Becker Avionics 6401 series transponder is not TSO-C166() certified.

The submitter suggested that given the transponder performance requirements are met, the transponder should be considered as equivalent to the TSO –c166(). The CAA advises that the submitter’s view is not correct as the TSO is more encompassing than only the performance requirements specified in section 2 of the current notice NTC 91.258. Although the transponder appears to be ‘equivalent’, without further investigation by the CAA or evidence provided by the submitter, the CAA does not accept this as a fact.

In response to the view that the notice as published “*does not provide an answer, it just raises more questions*”. Upon reflection, the CAA accepts that the proposed wording of draft clause 4(2)(ii) could be interpreted in two ways. One possible interpretation is provided by the submitter – “*for example, 4(a)(i) and 4(a)(2)(ii) seem to be inconsistent in that 4(a)(i) states the transponder must be TSO c166 and satisfy 4(a)(2), yet 4(a)(2)(ii) states the transponder can be TSO c112 if attached to an approved position source to produce a TSO-c166b compliant ADS-B system.*”

The second possible interpretation, which the CAA supports as the correct interpretation, is that the transponder will still need to be TSO-C166 certified. What this means is that if the system meets the RTCA DO-260 requirements, then it can also be certified via type certificate or supplementary type certificate if installed in a standard or restricted category aircraft. This would then provide an alternative certification standard to the TSO.

Therefore if the transponder has a position source but it does not transmit position, and therefore does not comply with the prescribed performance standards of the ADS-B system, it is only a TSO-c112 transponder. TSO-C166 is an expansion of Extended Squitter of Mode S Transponders (TSO-C112). Extended Squitter is optional for Mode S, and not all TSO-C112 transponders offer this. So, although TSO-C112 is required to become TSO-C166 compliant, it is not guaranteed that all TSO-C112 transponders can provide TSO-C166 compliance. The CAA believes that the current wording is fit for purpose and does not need to be amended.

The CAA regrets the unfortunate outcome faced by the submitter, with regards to the Becker transponder not being certificated as meeting the TSO-c166 standard. However, the performance standards for ADS-B as set out in the updated CAA Notice are designed to achieve the desirable level of surveillance integrity. Allowing for lesser standards would increase safety risks which could potentially result in an accident. For any operator who has yet to install an ADS-B equipment and is unsure whether the equipment meets the prescribed performance standards, do not hesitate to contact the CAA at the earliest opportunity for advice.

Altitude and speed limitation on class 2 transponders

A submitter contended that removing the altitude and speed limitation on class 2 transponders in the notice, and instead allowing their use within the applicable ADS-B surveillance system coverage area is not contrary to aviation safety, nor in conflict with the reasons for the operational limitations for class 2 transponders in TSO-C112() or ICAO Annex 10 appendix IV.

CAA response

The CAA disagrees with the submission.

The CAA is of the view that the minimum altitude and speed limits set out in ICAO Annex 10 Volume IV, chapter 3, paragraph 3.1.2.10.2 needs to be adhered to, as follows:

3.1.2.10.2 Transponder peak pulse power. The peak power of each pulse shall:

- a) not be less than 18.5 dBW for aircraft not capable of operating at altitudes exceeding 4 570 m (15 000 ft):*
- b) not be less than 21.0 dBW for aircraft capable of operating above 4 570 m (15 000 ft):*
- c) not be less than 21.0 dBW for aircraft with maximum cruising speed exceeding 324 km/h 9175 kt); and*
- d) not exceed 27.0 dBW.*

Authorised person by gliding organisation/Part 149 certificate holder to provide maintenance on ADS-B system

A submitter noted that Notice NTC 91.258 paragraph (4)(b) requires ADS-B transponders to be installed by a Group 3 suitably rated LAME holding a Radio category Group 3. The submitter contended that this requirement is unnecessary for gliders because the submitter has proven procedures established under its Part 149 certificate to carry out such installations to an equivalent level of safety. In support, the submitter points out the following factors –

- (a) rule 43.51(d)(1) provides for persons authorised by a gliding organisation to perform maintenance on a glider or component;
- (b) rule 43.101(b) provides for persons to certify a glider or glider component for release-to-service after maintenance if that person is authorised by a gliding organisation to certify such a glider or glider component for release-to-service;
- (c) the definition of “maintenance” in Part 1 includes “all modifications”;
- (d) the submitter is a gliding organisation as defined in Part 1;
- (e) pursuant to Part 43, the submitter has authorised certain persons to perform maintenance on a glider or glider component and to certify a glider or glider component for release to service conditional upon those persons exercising the associated privileges in accordance with the submitter’s Manual of Approved

Procedures (MOAP), as referenced in the submitter’s Part 149 approval specification issued by the CAA;

- (f) the MOAP provides for authorised persons with a Radio rating to install or replace radios, transponders, altitude encoders and fixed ELTs in accordance with approved technical data; and
- (g) authorised persons referred to in paragraph (f) have been carrying out such installations for many years, including Mode S transponders.

The submitter further contended that the authorised persons should be allowed to carry out radio modifications on gliders rather than a licensed maintenance aircraft engineer (LAME), as the former is more appropriately experienced to carry out such modifications. The authorised person would have gained appropriate experience in the following ways –

- (a) by handling gliders during maintenance, particularly in a derigged state;
- (b) by choosing antenna locations having regard to glider structure (e.g. carbon fibre) and aerodynamic performance;
- (c) familiarity with other electronic equipment commonly fitted to gliders; and
- (d) established connections with OEMs for gliders and glider components.

CAA response

The requirement that ADS-B transponders be installed by a Radio category Group 3 suitably rated LAME holding is required by Part 66, Appendix B.1(f) Group 3: “*Airborne surveillance systems including weather radar, doppler, radio altimeter, DME, transponder, ADS-B systems and TCAS:*”

Group 3 was specifically amended to include *ADS-B systems* when the ADS-B rules for above FL 245 came into force in July 2018.

At the time of finalising the ADS-B above FL 245 rules, the CAA considered then that the ADS-B system is a distinct system in its own right, and therefore should be treated as a separate category from the generic ‘transponder’ category under Group 3. However, the CAA was mindful that some of the Group 3 ratings were issued many years ago, and the holders of those ratings have not had the relevant recurrent training to keep themselves updated with developments in technology, such as ADS-B systems. As the CAA does not have the capacity to provide recurrent training, holders of Group 3 ratings were expected to get the required knowledge on maintenance of ADS-B systems from the original equipment manufacturer. This was on the basis that the original equipment manufacturer would provide the supplemental type certificates for installation of ADS-B equipment. The holders of group 3 rating would maintain proof of this upgrade training and submit proof to the CAA, if requested by the CAA to do so.

Hence, the rule intent is that the maintenance of ADS-B systems (regardless of aircraft type) will be carried out by a LAME who has demonstrated competence in the maintenance of ADS-B systems.

In view of the rationale behind the specific inclusion of ADS-B systems under Group 3, the CAA advises that the maintenance of ADS-B systems on aircraft including gliders, are to be performed by a LAME. However, it is expected that a LAME would liaise with the owner of the glider to ensure that the antenna location and any other specifics meet the owner's needs. Having ADS-B maintenance 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.

Requirement to use ADS-B in transponder mandatory controlled airspace

Airways has asked the CAA to consider the impact of the mandatory requirement of using ADS-B to apply to aircraft operating in transponder mandatory *controlled* airspace, and not all transponder mandatory airspace. The reason behind this is that with ADS-B becoming more vital for surveillance data as other technologies are withdrawn, this would affect any air traffic services relying on surveillance data outside of controlled airspace. For example, situation awareness for an AFIS being provided in an MBZ, or future area flight information services with a surveillance component that may be introduced.

In a similar vein, another submitter proposed that clause 1 (Application) of Notice NTC 91.258 (revision 2) should be revised to read “transponder mandatory *or* controlled airspace”, instead of “transponder mandatory controlled airspace” as the phrase currently stands. The submission contended that not all transponder mandatory airspace is controlled.

CAA response

The CAA agrees with the Airways submission in that the requirement to use ADS-B systems is mandated for transponder mandatory *controlled* airspace. It is optional to use ADS-B in transponder mandatory airspace, if the aircraft is equipped with ADS-B. It is expected that Modes A, C and S transponders will continue to be used in transponder mandatory airspace.

The CAA advises that the ADS-B systems used by Airways will need to be able to detect all TSO-C166() compliant systems.

The CAA disagrees with the proposed change in reference from *transponder mandatory controlled airspace* to *transponder mandatory or controlled airspace*. The main reason for retaining the current reference is because ADS-B is only required in transponder mandatory *and* controlled airspace, where it will provide the primary source of surveillance data for safe separation between aircraft.

The CAA therefore advises that the current reference to *transponder mandatory controlled airspace* will be retained.

Power requirements

Airways has asked the CAA to review the New Southern Sky work to date regarding low power ADS-B transponders (LPAT) and traffic awareness beacon system (TABS). Airways also reminded the CAA that its current ADS-B network coverage has been designed with 125 NW minimum transponder output in mind. If 70W transponders are to be allowed, coverage may be affected to some degree, especially on the outskirts, thus new

coverage diagrams may need to be generated. Airways has recognised that the LPAT are likely to be used by aircraft operating in general aviation airspace and that 70W should be adequate for the routes and altitudes they would fly.

CAA Response

The CAA advises that the 70W powered transponder is not a LPAT, as the transponder is fully compliant with TSO-C112(), and in combination with a position source becomes fully compliant with TSO-C166B. Assurances were requested from Airways that the New Zealand ADS-B system would work with TSO-C166() ADS-B transceivers. The CAA also advises that the TSO-C166() has a minimum power requirement of 70W at the antenna output.

Minimum broadcast message element set for ADS-B OUT

Airways advised that it does not currently use all of the mandatory messages listed, and has asked whether there is a CAA expectation on Airways to use all of the messages that are being output (e.g. use of GEO ALT for RVSM monitoring, or width of aircraft for Surface Movements). If so, when would Airways be expected to implement any new functionality which makes use of this data into their ATM system?

CAA response

The CAA advises that the required message set has not significantly changed in this revision. An editorial misalignment has been removed and inconsistencies addressed where they existed. These changes are not expected to change the current requirements of Airways on how it uses the data provided. The CAA recommends that Airways use the relevant messages in the set for the services they provide as listed in their Parts 171 and 172 expositions.

Proposed change to wording of clause 3

A submitter suggested changes to clause 3, bullets (b)(1) and (b)(2), to remove unintended ambiguity. To clarify, the submitter advised that the 175 knot TAS threshold is identified in the standards as “normal cruising speed”, and the altitude restriction is specified as “normal operating altitude”. The submitter recommended that bullets (b)(1) and (2) be revised as follows:

- 1) *Output power is not to be less than 18.5 dBW (70 W) for aircraft that operate at altitudes below 15,000 feet and have a normal cruising speed less than 175 kts (TAS).*
- 2) *Output power is not to be less than 21.0 dBW (125 W) for aircraft that operate at altitudes above 15,000 feet or have a normal cruising speed greater than 175 kts (TAS).*

CAA response

The CAA agrees with the proposed amendments to clause 3, as they clarify intent. However, with regards to the other proposed amendments to the message set elements, the CAA advises that the current wording is fit for purpose and does not need to be amended.

With regards to the proposed amendments to section 5 and the tables, the CAA advises that with the exception to the correction with the reference to 'squawk code', the rest of the proposed amendments have not been incorporated into Notice NTC 91.258 (revision 2).

The CAA appreciates that the submitter views the requirements from the perspective of an original equipment manufacturer, and thus has clear knowledge of the RTCA standard involved. The submitter's comments relate to terminology and wording in the message set elements and duplicate of information, such as long/lat and position.

The CAA advises that the origins of this table is in FAA AC 20-165B and the wording is broadly consistent with the wording in the FAA AC, including the duplicate wording suggested by the submitter. Although the duplicate wording may seem redundant to the submitter, they are necessary to clarify intent for the target audience – pilots, operators and installers.

Ability to use non-TSO GPS position sources (Trig TN 72)

A submitter expressed support for the Director being able to accept non-TSO'd GPS position sources for an ADS-B system that do not currently meet the rule requirements. In particular, the use of Trig TN 72 non-TSO GPS receiver versus the TN 70 unit. The submitter advised that the family operates four private aircraft which fly into controlled airspace very infrequently. The installation of ADS-B in these aircraft would be best suited to the Trig units due to panel space.

The additional cost of the approved TSO units will be a factor whether the submitter installs new transponders or simply removes the soon-to-be redundant Mode A/C units and avoids controlled airspace. To illustrate the costs, a Trig TT21 transponder plus a TN 72 GPS source approximately costs NZ\$4190 (incl GST) plus installation, whereas a TT22 transponder plus TN 70 GPS source costs approximately NZ \$7115 (incl GST) plus installation. This is a difference of almost \$3,000.

The submitter fully supported the safety considerations of using ADS-B, but having the ability to install cheaper non-TSO units would certainly influence the submitter's choice to install the capability in the aircraft.

CAA Response

The CAA wishes to clarify that the notice in itself is not automatic approval to use non-TSO equipment. An aircraft owner who wishes to install one of these position sources will be required to seek the Director's approval first before installing the position source. This is to ensure that the resulting ADS-B system meets the performance and reliability expectations for a surveillance system. The performance and reliability not only affect the aircraft with the system fitted, but also those who rely on the information it provides to ATC. The Director's prior approval will be required.

The CAA acknowledges the financial costs incurred by operators in order to comply with the ADS-B equipage requirements. In addition, that the cost of ADS-B systems is not small for some operators, and vary significantly depending on the type of aircraft requiring the ADS-B OUT system and the specific ADS-B system to be installed.

To help alleviate some of the costs, an ADS-B grant scheme is available to operators. The CAA advises that the submitter is entitled to apply for an ADS-B grant, if the submitter has not already done so.