

new
southern
— sky —

ADS-B in New Zealand

Information for aircraft owners, operators,
maintainers, and crew
Version 2, January 2020



Contact details

Civil Aviation Authority of New Zealand (The CAA)

Level 15, 55 Featherston Street

P O Box 3555, Wellington, New Zealand.

T +64 4 560 9400

F +64 4 560 2024

E ADSB@caa.govt.nz

www.NSS@caa.govt.nz

Aviation Security Service (AVSEC)

Level 15, 55 Featherston Street

P O Box 2165, Wellington, New Zealand.

T +64 4 495 2430

F +64 4 495 2432

E reception@avsec.govt.nz

www.avsec.govt.nz

Cover Image

NASA/astronaut Ron Garan ISS027-E-012395 (13 April 2011)

CROWN COPYRIGHT ©

This work is licensed under the Creative Commons Attribution 3.0 New Zealand licence. In essence you are free to copy distribute and adapt the work as long as you attribute the work to the Crown and abide by the other licence terms.

To view a copy of this licence, visit <http://creativecommons.org/licenses/by/3.0/nz/>. Please note that no departmental or governmental emblem, logo or Coat of Arms may be used in any way which infringes any provision of the Flags, Emblems, and Names Protection Act 1981. Attribution to the Crown should be in written form and not by reproduction of any such emblem, logo or Coat of Arms

This material draws on information published by Airservices and AOPA Australia. We acknowledge their work in this publication.

Table of Contents

Table of Contents.....	3
Glossary.....	6
Where can I get more information?	9
Rules and notice	9
Advisory circular.....	10
1. What is ADS-B?	11
1.1 How does ADS-B work?	11
1.2 Why is New Zealand moving to ADS-B?	12
1.3 What other surveillance systems will be used alongside ADS-B?	12
1.4 When will ADS-B OUT be required?	13
1.5 What do I need to think about when planning for ADS-B?.....	13
1.6 What are the benefits of ADS-B OUT to me as an owner/operator?.....	13
1.7 What about ADS-B IN?	14
1.8 Which ADS-B system will be used in New Zealand?.....	14
1.9 What about the UAT system?	15
2. ADS-B OUT Equipment Requirements	16
2.1 Do I need to equip my aircraft with ADS-B OUT?.....	16
2.2 I never fly in controlled airspace, do I need to equip?.....	16
2.3 I want to equip with ADS-B OUT. When should I equip?	16
2.4 If I want to install ADS-B OUT now, what equipment will I need?	16
2.5 Performance standards	17
2.6 Can I use an ADS-B OUT transmitter in lieu of a transponder?.....	18
2.7 What about low power ADS-B transponders (LPAT)?	18
2.8 I've already got a Mode S transponder. Can I use that for ADS-B OUT?.....	18
2.9 Can I upgrade my Mode A/C transponder for ADS-B OUT?	19
2.10 Can I get weather updates through ADS-B?	19
2.11 What about the cheaper ADS-B systems available overseas?	19

2.12 What about the all-in-one ADS-B boxes?	19
2.13 What about the Performance Based Navigation (PBN) requirements?.....	20
2.14 I've got a TSO-C129 GNSS receiver. Can I use that for ADS-B OUT?	20
2.15 Will ADS-B OUT mean I don't have to carry an Emergency Locator Transmitter (ELT)?.....	20
3. Rule requirements from 1 January 2019.....	21
3.1 What transponder equipment is currently required to enter controlled airspace above flight level 245 in New Zealand?	21
3.2 What about aircraft operating in controlled airspace below flight level 245?	21
3.3 I already have ADS-B OUT installed. What requirements currently apply?	21
3.4 If I want to fit a new ADS-B OUT system or replace an existing one, what requirements apply?	22
3.5 I only fly below flight level 245. Do I have to install ADS-B OUT now?	22
3.6 Is New Zealand requiring ADS-B IN?.....	22
3.7 Aircraft fitted with a GNSS position source that is certified to TSO-C129 without FDE – will this comply with the rule?.....	22
4. ADS-B OUT Installation Requirements	23
4.1 What process do I need to follow to install ADS-B OUT?.....	23
Process Table - Process for use of ATD for ADS-B equipment installation	25
4.2 Can any licensed aviation maintenance engineer install my ADS-B OUT equipment?	26
4.3 How do I know my ADS-B OUT installation is working properly?	26
4.4 Do I need an approval to use ADS-B OUT?.....	26
5. Operational Requirements	27
5.1 What do I need to know to operate with ADS-B OUT?	27
5.2 What should I do if my equipment fails in-flight?	27
5.3 Will I need a rating to fly with ADS-B OUT?	27
5.4 Does the ADS-B mandate apply to the Auckland Oceanic Flight Information Region (NZZO)?	27
5.5 Is it necessary to advise ATC when dispatching an aircraft with ADS-B OUT inoperative?	27
5.6 What happens if an aircraft is transmitting data that does not meet the performance requirements in NTC91.258?	28
5.7 If an aircraft does not have ADS-B OUT capability or ADS-B OUT is inoperable, does the aircraft have to remain below flight level 245 in the New Zealand FIR?.....	29
5.8 What is the process for getting clearance to operate in the New Zealand FIR above flight level 245 without ADS-B OUT?	29
5.9 The 2021 proposed mandate point is right in the middle of a busy summer flying season. Why can't the mandate be delayed to the following winter?.....	29

5.10 If the current SSR system is being discontinued after 2021, what surveillance coverage will be provided to aircraft in uncontrolled airspace?.....	29
5.11 Websites such as FlightRadar24 are able to track me using ADS-B data. Is there any way that this can be stopped?	30
5.12 Can I make other suggestions for the CAA to consider?	30
6. ADS-B Grant Scheme	31
6.1 How much is the Grant for each aircraft?	31
6.2 What equipment can I install on my aircraft to ensure that I receive the grant?.....	31
6.3 Will the grant be retrospective?.....	31
6.4 Who can claim the grant?	32
6.5 If I am the financial or legal owner of an aircraft can I claim on behalf of the registered owner?.....	32
6.6 Can I claim if my aircraft is new to the NZ aircraft register but not yet airworthy? If it is just registered can I claim?.....	32
6.7 Can I claim if my aircraft is registered in New Zealand but operating abroad?.....	32
6.8 My recently purchased aircraft is ‘factory new’ and was built with a compliant ADS-B system already installed – am I eligible for the grant?.....	32
6.9 Is anyone not eligible to claim the grant?	33
6.10 How do I apply for the grant?.....	33
6.11 Must the ADS-B OUT and ADS-B IN grant be applied for at the same time or can these be applied for at different times?	33
6.12 Will the grant still be available after 31 December 2021?.....	33
6.13 What happens if I sell or change the possession (lease) my aircraft after I have ADS-B installed and I am not the registered owner at the time of claiming?	33
6.14 What happens if I am in the process of claiming and I change the possession of the aircraft (lease/sell) before the claim process is completed?	33
6.15 What happens if the registration mark of the aircraft has changed since the installation or while the claim is being processed?.....	34
6.16 Can I apply for, and receive, a grant before installing ADS-B?	34

Glossary

ACAS	Airborne Collision Avoidance System
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-B OUT and ADS-B-IN	ADS-B OUT refers to information being broadcast <i>out</i> by the aircraft's transponder. ADS-B IN refers to information received by the transponder.
ADS-B system	<i>A GNSS position source and a compatible Mode S extender squitter 1090Mhz ADS-B OUT transponder.</i>
AIP	Aeronautical Information Publication
AML STC	Approved Model List Supplemental Type Certificate, which allows a single STC to address several different type certificates. It provides a more efficient process compared to multiple approvals of, for example, installations that are largely similar or identical for several different aircraft models.
ATC	Air Traffic Control
ATM	Air Traffic Management
CAA	Civil Aviation Authority
CAR	Civil Aviation Rule
ES	Extended Squitter
FIR	Flight Information Region
FIS	Flight Information Service
Flight Level 245 (FL 245)	Flight Level 245 (24,500 feet) is the boundary between upper and lower airspace in the New Zealand domestic FIR.
FMS	Flight Management System
FSIWG	Future Surveillance Implementation Working Group
GA	General Aviation
GNSS	Global Navigation Satellite System, a general term referring to a navigation satellite system including the US GPS network, the Chinese BeiDou, Russian GLONASS and European Galileo systems.

GPS	Global Positioning System. One type of GNSS, owned and operated by the US Government. GPS is the only GNSS currently providing coverage to New Zealand.
IFR	Instrument Flight Rules
MLAT	Multilateration, a ground-based surveillance system. A network of ground stations interrogate and receive replies from aircraft SSR transponders.
Mode A/C transponder	Mode A/C refers to transponders currently mandated in parts of New Zealand airspace. Mode A provides an aircraft identity code; Mode C provides altitude in 100 ft increments.
Mode S transponder	Mode S(elect) transponders, are the next generation on from Mode A/C. Mode S provides a much larger number of identification codes, altitude in 25 ft increments, and a range of Downlink Airborne Parameters (DAPs) depending on the aircraft avionics and surveillance system characteristics.
NDB	Non-directional beacon
NTC	Notice
NSS	New Southern Sky
OEM	Original Equipment Manufacturer
PBN	Performance Based Navigation
PSR	Primary surveillance radar. PSR is a <i>non-co-operative</i> surveillance system which uses reflected radio signals: it does not rely on information from the aircraft.
RAIM	Receiver autonomous integrity monitoring. RAIM is a technology developed to assess the integrity of the global positioning system (GPS) signals in a GPS receiver system. It is of special importance in safety-critical GPS applications, such as in aviation or marine navigation.
SBAS	Satellite-based augmentation system. SBAS measures small variations in the GPS signals and provides regular corrections to aircraft receivers within the specific geographic service areas covered by the system's ground stations. A SBAS service in New Zealand is under development.
SSR	Secondary surveillance radar, SSR is a <i>co-operative</i> surveillance system, meaning that the radar transmits a pulse which is received by the transponder, when then sends back a reply. This response contains at

	least a code (mode A) and often combined with the level (mode C).
TSO	Technical Service Order, issued by the FAA and provides the performance parameters for equipment certification.
UAT	Universal Access Transceiver
VFR	Visual Flight Rules
VOR	Very High Frequency (VHF) Omni Directional Range
WAAS	Wide area augmentation system – see SBAS.

Where can I get more information?

Technical questions can be directed towards Airworthiness@caa.govt.nz

As a Notice of Proposed Rule Making is open for submissions, questions regarding the policy and rule development should be directed in accordance with the NRPM guidance.

NPRM 19-05 Part 91 Mandatory ADS-B below Flight Level 245 (Docket 20/CAR/1) is available on the CAA website:

<https://www.aviation.govt.nz/assets/rules/nprms-and-summaries/nprm-19-05-ads-b-below-fl245.pdf>

Submissions close 21 February 2021.

Any other questions relating to ADS-B can be directed to ADSB@caa.govt.nz

For further information on ADS-B, visit the New Southern Sky website: Website:

<https://www.nss.govt.nz/workstreams/surveillance/>

Rules and notice

Civil Aviation Rule (CAR) 91.255(a) establishes the requirement to use ADS-B OUT above flight level 245 in controlled airspace that is transponder mandatory.

NPRM 19-05 Part 91 Mandatory ADS-B below Flight Level 245 (Docket 20/CAR/1) is available on the CAA website. Submissions on the proposal close on 21 February 2020:

<https://www.aviation.govt.nz/assets/rules/nprms-and-summaries/nprm-19-05-ads-b-below-fl245.pdf>

[Part 1 Amendment 54 - Definitions and Abbreviations](#)

[Part 43 Amendment 15 - General Maintenance Rules](#)

[Part 66 Amendment 6 - Aircraft Maintenance Personnel Licensing](#)

[Part 91 Amendment 31 - General Operating and Flight Rules](#)

[Part 103 Amendment 8 - Microlight Aircraft – Operating Rules](#)

[Part 172 Amendment 13 - Air Traffic Service Organisations – Certification](#)

The Notice sets out the equipment and performance standards for ADS-B OUT systems. The Director can only implement or amend a notice after consultation and consideration of the effects of the proposed amendment (See CAR 91.258A).

Notices are legally binding. Non-compliance with a Notice is a breach of the Rule.

[NTC 91.258 Automatic Dependent Surveillance-Broadcast \(ADS-B\) systems - Notice of Requirement](#)

Advisory circular

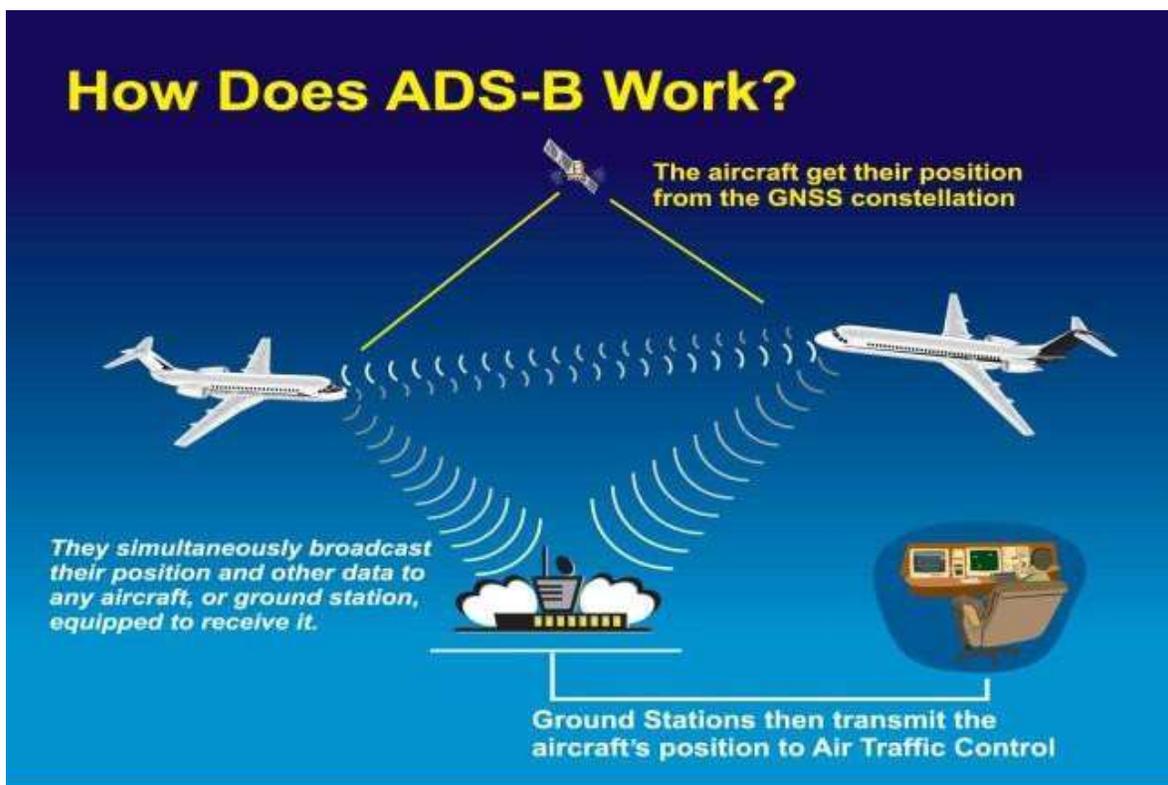
[Advisory Circular AC91-24 Automatic Dependent Surveillance – Broadcast \(ADS-B\) Systems](#)

1. What is ADS-B?

1.1 How does ADS-B work?

ADS-B is a surveillance system. The aircraft receives data from navigation satellites via a global navigation satellite system (GNSS) receiver. It then broadcasts information, up to twice a second, on its identification, position, altitude, speed, and intention. The broadcast system is the ADS-B transmitter.

The data received by ground stations is then transmitted to the air traffic management (ATM) system for display to air traffic controllers who use it to maintain aircraft separation in controlled airspace.



ADS-B Technologies Illustration

This is different from the existing surveillance system, in which the aircraft transponder is interrogated for position information by SSR.

1.2 Why is New Zealand moving to ADS-B?

Our current primary and secondary surveillance radar system will reach the end of its operational life in 2021. It is aging technology that does not make the most of the significant improvements offered by GNSS technology.

ADS-B has a number of benefits. It is more technologically advanced than the current surveillance system, providing more accurate data more often. This means that air traffic controllers will be provided with greater accuracy of an aircraft's position and trajectory.

The network of ADS-B ground stations that receive the aircraft ADS-B transmissions will provide increased surveillance coverage: 45 percent more of New Zealand's airspace will be visible when ADS-B is fully implemented. That includes surveillance to the ground at all controlled aerodromes.

1.3 What other surveillance systems will be used alongside ADS-B?

ADS-B is a satellite-dependent system. This means that if there's a GNSS equipment failure on board an aircraft, or if there is a GNSS system outage, ADS-B will not function. During the transition to ADS-B, the existing primary and secondary radar system will continue to be available to provide backup.

Proposed traffic recovery and contingency surveillance after 2021

The New Southern Sky (NSS) Programme provided evidence that shows New Zealand will require a non-GNSS dependent back-up system to ADS-B. This is to mitigate the risk of loss of the whole surveillance system in the event of loss of the GNSS signal, or on-board aircraft equipment failure.

There are two parts to this:

- Recovery: a system that will enable airborne aircraft to land safely; and
- Contingency: a system that will provide limited surveillance coverage during a longer-term outage.

Airways New Zealand are evaluating the contingency surveillance requirements and coverage in New Zealand airspace. This is to ensure that, in the event of a GNSS system outage, we are able to keep the air routes between Auckland, Wellington and Christchurch open, albeit at a reduced level of service.

Whilst the contingency system will be continuously operating so it can be used when needed, it won't be the primary source of surveillance data. The contingency system is not an alternative to ADS-B.

1.4 When will ADS-B OUT be required?

The mandates for ADS-B OUT are in two stages:

- ADS-B has been mandatory for aircraft operating in transponder mandatory controlled airspace above flight level 245 since 1 January 2019.
- CAA is proposing to mandate ADS-B OUT in all transponder mandatory controlled airspace from 31 December 2021. [See NPRM 19-05](#).

Note that rules for all existing and new ADS-B OUT systems apply from 20 July 2018.

See [Question 2.4](#) for more information.

1.5 What do I need to think about when planning for ADS-B?

- Firstly, take action now. Don't delay. You may be entitled to apply for an ADS-B grant. This is a 'first come, first served' scheme and the funding is bounded.
- Have a look at the NSS ADS-B website for all facets of the process of acquiring ADS-B capabilities.
- While ADS-B OUT is the primary requirement, think about the significant safety benefits of ADS-B IN. The more aircraft that equip with both systems will mean a safer system for all.
- Talk to your avionics shop, LAME and/or Part 145 before you buy. The cheapest solution on paper might not work out to be the cheapest and easiest for your aircraft and may not meet the Notice requirements.
- Check whether your aircraft is covered by a supplemental type certificate (STC).
- Ensure that the ADS-B OUT transponder operates on 1090MHz. The UAT system, which operates on 978 MHz will not work in New Zealand. UAT is often marketed as ADS-B, so always check the fine print for the frequency.
- If you're using a separate ADS-B OUT transponder paired with a GNSS receiver, you must make sure the two are compatible. Ask for advice on proven combinations, or look for an all-in-one ADS-B OUT system.

1.6 What are the benefits of ADS-B OUT to me as an owner/operator?

ADS-B provides better surveillance coverage and more accurate data, which improves safety and operating efficiency.

The main benefits of ADS-B OUT for the owner/operator are:

- You'll be visible to the new surveillance system for air traffic control purposes

within controlled airspace. The system is more accurate and safer than the current SSR system.

- ADS-B OUT means that ADS-B IN becomes an option for increased situational awareness.
- Outside controlled airspace, you'll be visible to ATC over a much greater area in the New Zealand Flight Information Region (FIR) because the coverage of ADS-B is greater: 45 percent more than the current radar network.
- In an emergency, ADS-B may provide precise information on the aircraft's position, potentially to a much lower altitude. This can assist in search and rescue operations.

1.7 What about ADS-B IN?

ADS-B IN systems provide aircraft with the ability to 'see' and receive information from other ADS-B OUT equipped aircraft in range. ADS-B systems that include a display may be able to show other ADS-B OUT equipped aircraft in the area.

There are no plans to require ADS-B IN within the New Zealand Domestic FIR. However, ADS-B IN can be a very useful tool for traffic awareness. Note, ADS-B IN will not be replacing airborne collision avoidance systems (ACAS). If your aircraft is subject to ACAS requirements, that won't change.

There are no plans to allow ADS-B IN to be used for self-separation in controlled airspace in New Zealand. It is not a replacement for ATC.

CAR 91.229 requirements to use 'see- and-avoid' will also remain. You will need to be aware of these if you're considering introducing ADS-B IN into your cockpit. Not all aircraft around you will be ADS-B equipped, particularly if you're flying outside controlled airspace. ADS-B IN will provide a useful but not necessarily complete picture of traffic in the area.

ADS-B IN only works well if the ADS-B OUT transmits robust information. This is why it is so important that your ADS-B system has been tested and is transmitting compliant data.

See [Question 2.4](#) and [Question 3.2](#) for more information.

1.8 Which ADS-B system will be used in New Zealand?

New Zealand is implementing the **1090 MHz extended squitter (ES)** ADS-B surveillance system. No other system is proposed to be approved for use in this country.

Squitter refers to the way data is transmitted by a Mode S transponder. *ES* refers to the extra data required to transmit the information required for ADS-B.

1.9 What about the UAT system?

The United States has implemented two systems – the 1090 MHz ES system and the Universal Access Transceiver (UAT) system, which operates on 978 MHz. **New Zealand will not be implementing the UAT system.**

UAT requires a dedicated ground infrastructure that is not compatible with the 1090 MHz system. The cost of implementing two systems would be prohibitive.

Be wary if you are buying an aircraft or any transponders from the US. They may be advertised as ADS-B capable; however, if the ADS-B system fitted is UAT, you will not be able to use it in New Zealand. CAR 91.257A prohibits UAT transmissions in the New Zealand FIR

How to identify a UAT transponder:

- Check the Technical standard order (TSO): UAT equipment will more than likely have a TSO –C154c
- Check the frequency: UAT is 978MHz, not 1090MHz (although dual 1090 MHz ES and 978 MHz transponders are available)
- Check the application: in the United States, UAT is used below 18,000feet

Dual band UAT

Some ADS-B transponders can provide data for UAT and 1090 ES systems. Anyone with a dual-band transponder will need to be able to disable the UAT function if they want to use it in New Zealand. Check with your avionics supplier before you buy.

2. ADS-B OUT Equipment Requirements

2.1 Do I need to equip my aircraft with ADS-B OUT?

If you want to fly in controlled airspace above flight level 245 you need to have an operational ADS-B OUT system.

It is also proposed that if you want to fly in controlled airspace at any altitude after 31 December 2021, you will also need to be ADS-B OUT equipped. [See NPRM 19-05](#).

2.2 I never fly in controlled airspace, do I need to equip?

The short answer is no. The ADS-B OUT mandates will only apply to controlled airspace. Transponder Mandatory airspace outside controlled airspace requirements remain.

Even if you don't fly in controlled airspace, there are benefits to equipping with ADS-B OUT that you should think about:

- visibility to other aircraft who have ADS-B IN
- visibility to FIS/ATC, especially if you get into trouble
- can request clearance from ATC to fly in controlled airspace
- improved resale value of your aircraft.

2.3 I want to equip with ADS-B OUT. When should I equip?

Now. If you act now, you're much more likely to get your aircraft fitted at a time that suits you. If everyone waits, there will be a very high demand for equipment and installers as the mandate comes closer. Remember that the grant scheme funding is finite. The scheme is 'first come, first served'.

Talk to your avionics supplier and maintenance provider now, and make a commitment to equip.

2.4 If I want to install ADS-B OUT now, what equipment will I need?

The Civil Aviation Rules, including NTC91.258, will set out the performance requirements for ADS-B transponders, and the GNSS units that provide the information to the transponder.

The rule refers to the "ADS-B system". The system comprises a 1090 MHz ES ADS-B OUT transponder and a compatible GNSS position source. It's important that your receiver and transponder are tested and certified as a compatible system rather than individual pieces of

equipment.

From **20 July 2018** all existing and new ADS-B OUT systems in aircraft being flown at any altitude has had to meet the rule requirements, including:

- Have an ADS-B OUT that operates on 1090MHz, and is certified to TSO-C166 initial or 166a for existing installations or TSO-C166b (or demonstrate equivalent performance) for all new installations.
- Have a GNSS position source that's certified to TSO-C145, TSO-C146, or TSO-C196 or demonstrate equivalent performance (e.g., TSO-C129 with FDE) and is compatible with the transponder.
- All new ADS-B OUT systems must be installed in accordance with acceptable technical data. If you don't have an STC, you'll need to go to a Part 146 design organisation.
- Before release to service, all new ADS-B OUT systems must be tested to demonstrate compliance with the system performance requirements set out in [NTC 91.258](#).
- Operators must not transmit ADS-B data that doesn't comply with the standards set in NTC 91.258.

If you have an aircraft that does not conform to these equipment standards, please contact airworthiness@caa.govt.nz, subject line **ADS-B equipment**.

For more information on compatible units, avionics requirements, and certification processes, email airworthiness@caa.govt.nz, subject line **ADS-B equipment**.

2.5 Performance standards

The performance requirements for ADS-B OUT systems are set for the data transmitted by the on-board ADS-B OUT system. The standards ensure that the ADS-B OUT data transmitted by aircraft can be used by the ATS.

The performance standards for ADS-B OUT systems are, as at 24 January 2020, as follows and included in Notice NTC 91.258. NTC91.258 will be reviewed and updated as required, to take account of any changes to ADS-B equipment requirements. The CAA intends to consult on minor amendments to the Notice in the first quarter of 2020.

TSO-C166	TSO-C166a and TSO-C166b
Must provide a NUCp of 4 or greater	NACp figure must be 5 or greater
	NACv figure must be 1 or greater
	NIC figure must be 5 or greater
	SDA must be 2 or greater

	For TSO-C166a, the SIL must be 2 or greater
	For TSO-C166b, the SIL must be 3 or greater

- Any changes in the NACp, NACv, SDA, and SIL must be broadcast within 10 seconds
- Changes in the NIC must be broadcast within 12 seconds
- ADS-B OUT transponders must transmit updates at least once a second

2.6 Can I use an ADS-B OUT transmitter in lieu of a transponder?

Some manufacturers are developing extremely lightweight devices that transmit ADS-B OUT only; that is, the data they transmit does not include Mode A, C, or S information.

These transmitters (as opposed to transponders) can't currently be used in an ADS-B surveillance environment. This is because they are not compatible with the co-operative surveillance systems that will comprise the recovery and contingency networks.

However, the CAA is considering the feasibility of different types of equipment – see question 2.7.

2.7 What about low power ADS-B transponders (LPAT)?

In 2017 the CAA/NSS Programme started investigating whether other types of ADS-B equipment, such as low power ADS-B transceivers and uncertified GNSS position source information, can be safely integrated into an ADS-B surveillance environment. In June 2019 a decision was made to suspend further investigation due to a number of reasons. The full announcement of these outcomes can be found [here](#).

2.8 I've already got a Mode S transponder. Can I use that for ADS-B OUT?

You'll need to check with your avionics shop. Not all Mode S transponders are ADS-B OUT capable. Some Mode S transponders can be upgraded to enable ES functionality.

If you are upgrading your Mode A/C transponder, we strongly suggest you buy an ES capable Mode S transponder, even if you don't currently fly in controlled airspace. You can buy a transponder first and add a GNSS position source later. Make sure that the transponder and the GNSS receiver are compatible.

2.9 Can I upgrade my Mode A/C transponder for ADS-B OUT?

No. Mode A/C transponders cannot be upgraded to transmit ADS-B OUT.

Note that not all Mode S transponders can be used for ADS-B OUT.

Another option is to install an all-in-one ADS-B OUT system that includes integrated GNSS position source.

If you have any upgrading questions, you can discuss this with your avionics supplier, or contact CAA via Airworthiness@caa.govt.nz

2.10 Can I get weather updates through ADS-B?

Weather information will not be available through ADS-B in New Zealand.

2.11 What about the cheaper ADS-B systems available overseas?

New technologies are becoming available, particularly in the area of GNSS receivers. However, please be aware of misleading information. Many of the cheaper alternatives coming out of the US are described as ADS-B but are the UAT version, and therefore not applicable for the New Zealand surveillance system.

As we consider options for the proposed mandate for ADS-B in all controlled airspace, we are considering whether and how we can provide for 1090 MHz ADS-B OUT systems that are cheaper and/or lighter (refer Question 2.6). Any new technologies will need to meet the performance standards set in the [NTC 91.258](#).

2.12 What about the all-in-one ADS-B boxes?

You can now buy ADS-B systems that include the transponder and receiver in a single unit. These are 'all-in-one-box' ADS-B systems. However, installing an all-in-one system still involves a modification. They can be cheaper than buying and installing the separate components, and you will have the assurance that the transponder and receiver are compatible. Some all-in-one systems include ADS-B IN and a touchscreen display.

The GNSS receiver on the all-in-one solutions cannot be used for Instrument Flight Rules (IFR) navigation.

You can discuss all-in-one ADS-B solutions with your avionics supplier.

2.13 What about the Performance Based Navigation (PBN) requirements?

As part of NSS navigation is shifting away from a major reliance on ground-based navigation aids such as NDBs, VORs, and DMEs (Distance Measuring Equipment) toward satellite based navigation which utilizes GNSS (GPS). ILS (Instrument Landing System)/DME are not affected.

The CAA is ensuring that the requirements for GNSS receivers for PBN operations align with ADS-B requirements to ensure there is no need to have different receivers for each function. However, some operators may choose to have separate equipment depending on their circumstances.

As at August 2018, only GPS is certified for IFR navigation by ICAO. This may change as more GNSS constellations come on stream.

For more information, see the New Southern Sky website at <https://www.nss.govt.nz/>

2.14 I've got a TSO-C129 GNSS receiver. Can I use that for ADS-B OUT?

NTC 91.258 states that a TSO-C129 GNSS receiver can only be used for ADS-B OUT if the equipment has a certified Fault Detection and Exclusion (FDE) functionality, with a certificate from the Original Equipment Manufacturer (OEM).

FDE means that the GNSS receiver can exclude GNSS signals that are degraded or otherwise problematic, and continue to provide a GNSS solution for navigation and/or ADS-B OUT purposes. Older GNSS receivers can detect a faulty GNSS signal, but will then stop providing any GNSS data. In an ADS-B environment, that means the ADS-B system would also stop producing ADS-B data and would not be visible to ATC.

If you are considering fitting or upgrading your GNSS receiver, we strongly recommend you purchase a TSO-C145, TSO-C146, or TSO-C196 receiver, or an all-in-one ADS-B and GNSS box that includes a GNSS receiver with FDE functionality. You can discuss this with your avionics supplier, or contact the CAA via airworthiness@caa.govt.nz

2.15 Will ADS-B OUT mean I don't have to carry an Emergency Locator Transmitter (ELT)?

No. ADS-B is a surveillance technology and an Emergency Locator Transmitter (ELT) is a distress location device. They have different functionalities. ADS-B information supplements rather than replaces an ELT.

Specifically, ADS-B does not include a homing function. Once an aircraft loses power, the ADS-B OUT system won't continue to transmit location information. ELTs continue to transmit location after the aircraft has come down.

3. Rule requirements from 1 January 2019

3.1 What transponder equipment is currently required to enter controlled airspace above flight level 245 in New Zealand?

An operable ADS-B OUT system that meets the requirements of Civil Aviation rule 91.257:

<https://www.aviation.govt.nz/rules/rule-part/show/91>

The system must produce data that complies with the performance requirements in the rule. Note that aircraft fitted with an operational ADS-B OUT system at any altitude must ensure that the system is transmitting data that meets the performance requirements of NTC91.258.

3.2 What about aircraft operating in controlled airspace below flight level 245?

Aircraft operating in controlled airspace below flight level 245 must have either:

An operable Mode A and C, or Mode S transponder that meets the requirements of Civil Aviation Rule 91.541

OR

An operable ADS-B OUT system that meets the requirements of Civil Aviation rule 91.257

<https://www.aviation.govt.nz/rules/rule-part/show/91>

The rule does not currently require fitting of ADS-B OUT systems to aircraft operating below flight level 245. However, if the aircraft is fitted with an ADS-B OUT system that is operational, then that system must transmit data that meets the performance requirements that are set out in NTC 91.258.

CAA New Zealand proposes mandating ADS-B OUT in all controlled airspace at all altitudes from 31 December 2021. A [Notice of Proposed Rule-Making](#) (NPRM) relating to the use of ADS-B OUT in all transponder mandatory controlled airspace was released on 19 December 2019.

3.3 I already have ADS-B OUT installed. What requirements currently apply?

Aircraft with an ADS-B OUT system already installed must transmit data that meets the performance requirements set out in [Notice 91.258](#).

3.4 If I want to fit a new ADS-B OUT system or replace an existing one, what requirements apply?

All new or replacement ADS-B OUT installations must meet the requirements of CAR 91.257 and NTC91.258. In summary, that means:

An ADS-B OUT transponder that operates on 1090MHz, and is certified to TSO-C166b (or demonstrate equivalent performance); and have a GNSS position source that's certified to TSO-C145 or TSO-C146, or demonstrate equivalent performance (e.g., TSO-C129 with FDE) and is compatible with the transponder

OR

An all-in-one ADS-B OUT system that includes transponder and GNSS position source components that meet the above requirements.

3.5 I only fly below flight level 245. Do I have to install ADS-B OUT now?

We strongly encourage you to plan to install ADS-B as soon as possible. Now that the rules are in place, you can select a system that you know will meet the rule requirements. Plan ahead to avoid the risk that your aircraft will not be fitted by the proposed 2021 mandate.

If you don't fly above flight level 245, the rules that came into effect on 20 July 2018 do not require you to fit ADS-B to enter controlled airspace until the mandate for below flight level 245, currently proposed for 31 December 2021.

When you fit an ADS-B OUT system, or if your aircraft is already equipped, you'll need to make sure it meets the rule requirements.

3.6 Is New Zealand requiring ADS-B IN?

No. However, ADS-B IN has significant safety benefits which you should seriously consider. Remember that there is a separate grant of up to \$500 plus GST to acquire ADS-B IN.

3.7 Aircraft fitted with a GNSS position source that is certified to TSO-C129 without FDE – will this comply with the rule?

If you have aircraft with a position source or sources that do not meet the requirements set out in NTC 91.258 by not having FDE capability, please contact the CAA at airworthiness@caa.govt.nz

4. ADS-B OUT Installation Requirements

4.1 What process do I need to follow to install ADS-B OUT?

The installation of ADS-B OUT equipment is considered a Design Change. Therefore, the installation of this equipment will require Acceptable Technical Data (ATD) and an approved installer.

ATD is defined at Civil Aviation Rule Part 21, Appendix D. ATD for the installation of ADS-B OUT equipment includes:

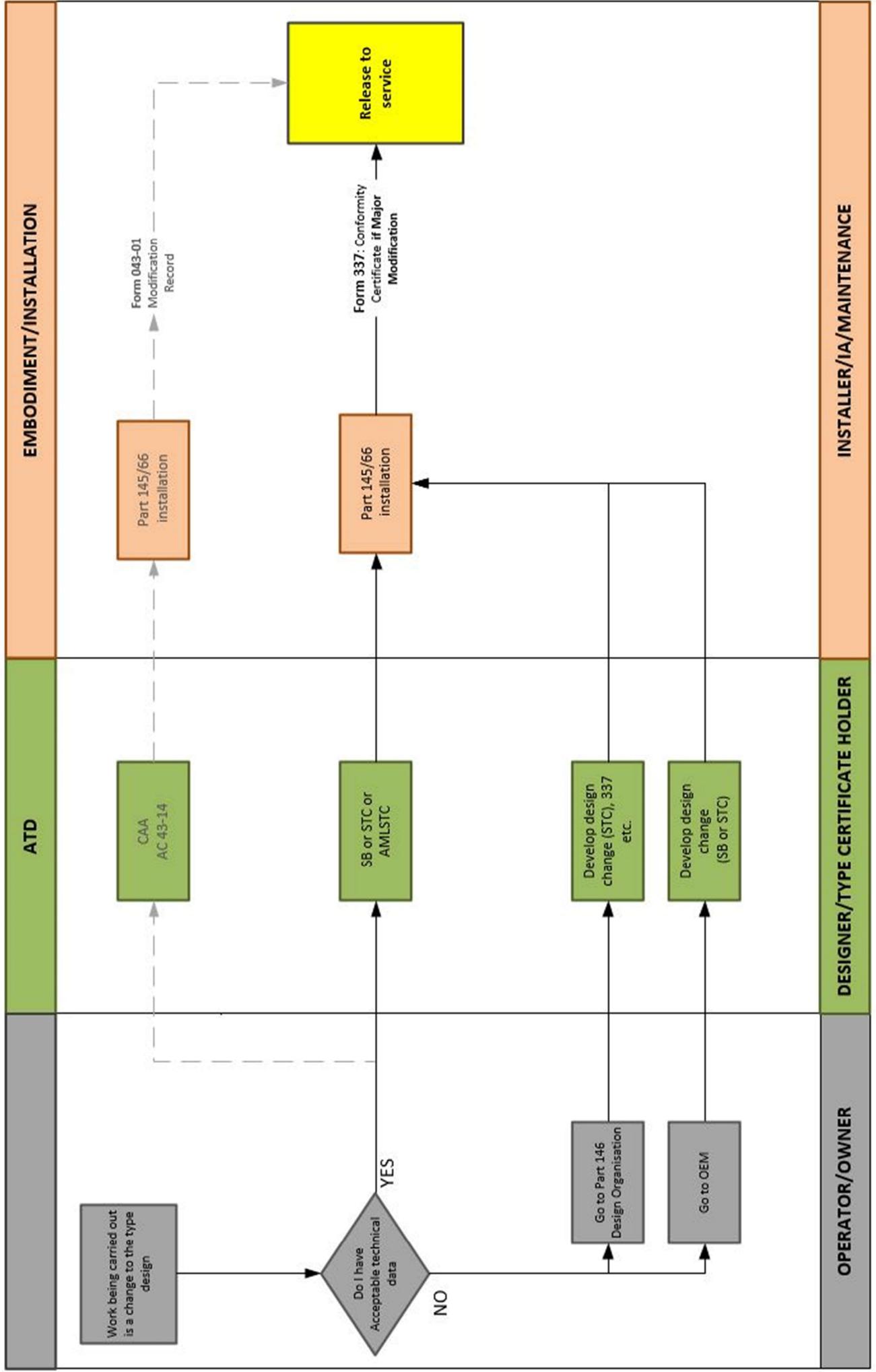
- **Service Bulletin (SB):**
A Service Bulletin is the document used by manufacturers of aircraft, their engines or their components to communicate details of modifications which can be embodied in aircraft. In some cases, these may be issued as a Mandatory SB (or MSB) in which case a corresponding Airworthiness Directive will be issued by the appropriate National Airworthiness Authority.
- **Supplemental Type Certificate (STC):**
A STC is an approval of a major modification covering those areas or aspects of an aeronautical product that were modified, including updates to the Flight Manual, user guides/manuals and Instructions for Continuing Airworthiness.
- **Approved Model List (AML) STC:**
An AML-STC is intended for installations that are identical or similar and that share baseline data between the models. This streamlines the certification effort by avoiding unnecessary testing and re-submittal of data that is common to more than one model aircraft. Note that your specific aircraft type and model must be listed in the AML-STC for it to be considered ATD.
- **Advisory Circular – AC43-14**
Appendix 13 of AC43-14 (Installation of Stand-alone ADS-B Systems) has been released to provide ATD when installing an ADS-B system compiling an FAA TSO-C166b transponder, with integral or dedicated external (“blind”) GNSS position source meeting FAA TSO-C145(); and a TSO-C88() altitude encoder. ADS-B systems to be installed under the AC are:
 - a) Covered by an approved model list-supplemental type certificate (AML-STC), where the model is not included in the AML or eligibility list of the STC
 - b) Where the AML-STC is for an aircraft of similar construction and type (e.g. normal category fixed-wing all-metal aircraft, or small composite rotorcraft)

The intention of Appendix 13 is to address installation of systems to aircraft not on the approved model list.

If an SB, STC, or AML-STC is available for your aircraft type, an approved installer can use this ATD to install ADS-B or PBN equipment into your aircraft as a modification. Depending on the complexity of the associated equipment installation and/or test requirements this modification may be classified as Major, this requires conformity on a 337 by an IA or 145 equivalent.

The next page includes the process for installing ADS-B OUT. If you have any questions, please contact the CAA via Airworthiness@caa.govt.nz

Process for use of ATD for ADS-B or PBN equipment installation



4.2 Can any licensed aviation maintenance engineer install my ADS-B OUT equipment?

ADS-B equipment needs to be installed by a licensed aviation maintenance engineer (LAME) with a group 3 license and group 2 for GNSS position source if you are fitting separate instruments.

The avionic engineer will need to ensure that the GNSS receiver and transponder are properly integrated by testing the installed equipment using specialist test equipment.

4.3 How do I know my ADS-B OUT installation is working properly?

ADS-B OUT systems need to be tested with specialist test equipment to ensure it is compliant so that it can be certified. Your avionics engineer will supply this information to the CAA.

Testing is important – it's the way you can prove that your system is transmitting the right information before you try to enter controlled airspace. It's also a courtesy to other airspace users. If you are using ADS-B IN, you'd expect that those transmitting ADS-B OUT to make sure that the information they're sending you is safe and accurate.

Airways will advise operators if their aircraft is transmitting non-compliant ADS-B information; however, don't rely on this. The purpose of the Airways system is to control aircraft, not test the quality of equipment installations.

CAR 91.257A prohibits the transmission of non-compliant ADS-B data. This applies to ADS-B OUT systems operating at any altitudes, from 20 July 2018.

4.4 Do I need an approval to use ADS-B OUT?

You will not need an operational approval from CAA to use ADS-B OUT. The system works like any other transponder – the pilot is responsible for ensuring that the transponder is on and operating during flight.

5. Operational Requirements

5.1 What do I need to know to operate with ADS-B OUT?

ADS-B is a simple system from the operator perspective. The crew must ensure that the transponder is switched on. Always enter your FLIGHT ID exactly as per your flight plan – this could be aircraft registration (including the ZK prefix, without spaces or punctuation), aircraft call sign (as recognized and assigned by CAA), or IFR flight plan ID

Please note that problems with the integrity or continuity of the GNSS signal will affect the information provided by the transponder to the ATM system. Be alert to any other indications that the GNSS receiver may be faulty or not receiving adequate information.

5.2 What should I do if my equipment fails in-flight?

The process for ADS-B OUT inoperable in flight will be the same as the loss of Mode A and C or Mode S during flight.

Advise ATC and apply the procedures outlined in your Operations Manual and the Aeronautical Information Publication (AIP) ENR page 1.6-11 para 3.5.1 Transponder failure/ special procedures.

After landing your aircraft, consider what repair or maintenance is required to correct the problem.

5.3 Will I need a rating to fly with ADS-B OUT?

No. You will not require any additional ratings to fly in an ADS-B OUT environment. However, you should be familiar with any change to procedures that might affect you, particularly in the event of loss of GNSS signal, or a transponder fault.

5.4 Does the ADS-B mandate apply to the Auckland Oceanic Flight Information Region (NZZO)?

No.

5.5 Is it necessary to advise ATC when dispatching an aircraft with ADS-B OUT inoperative?

Yes, see Rule 91.247(e). If an aircraft is capable of transmitting ADS-B, but the ADS-B OUT system is unserviceable, operators should file Surveillance type S and add RMKS/ADS-B Unserviceable to the flight plan. The flight plan must be acceptable to the relevant ATS unit(s).

Operators should advise Airways that the aircraft may be transmitting degraded data. Degraded data will generate alarms in the New Zealand ATC system, and direction from ATC will be given to the aircraft crew. This can be avoided with forward notice to Airways.

Note that this approach is intended to address one-off loss of capability. It is not acceptable on an ongoing basis.

Please note that changes to this rule are proposed in the [Notice of Proposed Rule-Making \(NPRM\)](#) released on 19 December 2019.

5.6 What happens if an aircraft is transmitting data that does not meet the performance requirements in NTC91.258?

If an aircraft is transmitting non-compliant data, ATC will inform the crew and provide advice on managing or fixing the issue. If an inflight fix isn't possible, ATC will manage the aircraft appropriately. Follow their instructions.

Airways reports instances of non-compliant data to CAA New Zealand. Transmission of non-compliant data is prohibited by CAR 91.257A

Once an operator is aware of a problem with an aircraft's ADS-B OUT transmissions, it is the operator's responsibility to fix the issue. Responses to continued non-compliance may include increased separation, exclusion from controlled airspace, and/or enforcement action.

5.7 If an aircraft does not have ADS-B OUT capability or ADS-B OUT is inoperable, does the aircraft have to remain below flight level 245 in the New Zealand FIR?

The mandate does not currently apply below flight level 245.

Operators should note that CAA proposes to mandate ADS-B for all controlled airspace in the New Zealand FIR from 31 December 2021.

5.8 What is the process for getting clearance to operate in the New Zealand FIR above flight level 245 without ADS-B OUT?

If operators wish to operate an aircraft without ADS-B OUT above flight level 245 in the New Zealand FIR, they must discuss this with the CAA as soon as possible. Email ADSB@caa.govt.nz

5.9 The 2021 proposed mandate point is right in the middle of a busy summer flying season. Why can't the mandate be delayed to the following winter?

The schedule for the proposed mandate has been notified since the launch of the NSS programme in June 2014. Over six years' notice is considered more than reasonable. Get your aircraft equipped this coming winter – don't wait. Don't risk missing out on the grant, if you are eligible. This document gives you guidance on what to buy if you want to equip now. Other options may become available in time.

5.10 If the current SSR system is being discontinued after 2021, what surveillance coverage will be provided to aircraft in uncontrolled airspace?

The current surveillance system using SSR does not provide 100 % coverage of New Zealand. When requiring assistance in an emergency, the availability of VHF communications remains unchanged.

The ADS-B system will provide improved surveillance coverage in New Zealand, including for all of controlled airspace and increased coverage of uncontrolled airspace. Coverage from the SSR contingency system will be reduced and focused on the requirements for recovery and contingency, primarily the air routes between Auckland, Wellington, and Christchurch.

There is a key difference between the **coverage** of the surveillance network and the area where Airways provides a **surveillance service** (i.e. controlled airspace only).

A surveillance service is not provided to aircraft operating in uncontrolled airspace (in normal circumstances) now and there are no plans to change this practice after 2021.

5.11 Websites such as FlightRadar24 are able to track me using ADS-B data. Is there any way that this can be stopped?

Websites such as FlightRadar24 have 'blocking' options, and aircraft operators can apply to have their aircraft details blocked from the website. Contact the applicable website for more information.

5.12 Can I make other suggestions for the CAA to consider?

If you have any suggestions that you would like the CAA to consider, please contact ADSB@caa.govt.nz

6. ADS-B Grant Scheme

On 4 October 2019 the Government announced that aircraft equipping with ADS-B may be eligible for financial support to assist with the costs associated. The [eligibility criteria for the grant](#) were announced on 8 November 2019, with the majority of New Zealand registered aircraft eligible for the grant, provided they equip with compliant equipment.

6.1 How much is the Grant for each aircraft?

The ADS-B OUT grant can only be used for the contribution of up to \$2500 plus GST for costs of enabling ADS-B OUT on the aircraft (e.g. hardware installation, software enablement.) This also includes cost of the equipment itself.

The ADS-B IN grant can be used for a contribution of up to \$500 plus GST to the costs of ADS-B IN. Again, this includes the cost of equipment, hardware installation, software enablement etc.

The amounts are 'up to' due to the potential for installation costs to be under the grant amount. Whilst this is highly unlikely in most cases, there is potential for some equipment/software enablement to cost less than the grant amounts. So, if the cost of installing ADS-B OUT is \$2500 or over, and the applicant can prove this, then they will be eligible in this respect for the full \$2500 grant amount.

6.2 What equipment can I install on my aircraft to ensure that I receive the grant?

Installed ADS-B OUT equipment must meet the Notice requirements (NTC 91.258) and also be installed in accordance with acceptable technical data. If acceptable technical data is not available for the equipment installed, then this will need to be obtained through channels such as a Part 146 Organisations.

ADS-B IN equipment does not need to meet certain standards, however if installed it must be installed in accordance with acceptable technical data. Handheld/Portable ADS-B IN receivers are eligible for the grant, however if they are required to be installed they must be installed in accordance with acceptable technical data. They cannot interact with the transponder or position source, and must not draw on aircraft power (other than from an existing USB power source).

A list of potentially acceptable equipment will be released in due course.

6.3 Will the grant be retrospective?

Yes – compliant ADS-B equipment installed from 14 June 2014 is eligible for a retrospective grant. This date was selected and is appropriate as it is the date that the NSS Programme was launched.

6.4 Who can claim the grant?

The owner on the current certificate of registration for the aircraft is eligible to apply for the grant. In the case of multiple owners (e.g. a company/syndicate etc.), only one person for that entity can apply for the grant. One aircraft = one grant for ADS-B OUT and one grant for ADS-B IN.

The aircraft must be on the New Zealand aircraft register at the time of application.

6.5 If I am the financial or legal owner of an aircraft can I claim on behalf of the registered owner?

Only the registered owner of the aircraft, as shown on the current certificate of registration, can claim the grant.

If a financial or legal owner believes that they should be due the grant funds, this should be discussed with the registered owner. The CAA does not keep records of financial or legal owners of aircraft.

6.6 Can I claim if my aircraft is new to the NZ aircraft register but not yet airworthy? If it is just registered can I claim?

Part of validating the installation will be to fly the aircraft allowing Airways Air Traffic Management system to receive the ADS-B data required under Notice of Requirements NTC91.258. Therefore, to claim a grant the aircraft must be airworthy and transmitting the correct data to the Air Traffic Management System.

6.7 Can I claim if my aircraft is registered in New Zealand but operating abroad?

Aircraft on the New Zealand register but operated abroad are unlikely to be able to claim the grant. The ADS-B OUT data will need to be validated by Airways as operating correctly within the NZ system. The grant is designed to support safety in the NZ aviation system, not to subsidise operations. No NZ aviation system safety benefit is delivered by aircraft operating abroad.

6.8 My recently purchased aircraft is 'factory new' and was built with a compliant ADS-B system already installed – am I eligible for the grant?

No. The grant cannot be used for installations that occur at the time of aircraft manufacture or prior to arrival in New Zealand.

However, amateur-built aircraft (or kit builds) may be eligible if a compliant ADS-B system has been chosen and installed as part of the build.

6.9 Is anyone not eligible to claim the grant?

Aircraft with a maximum certified take-off weight (MCTOW) of 7,500KG and over are not eligible for the grant. You must also meet all other eligibility criteria.

6.10 How do I apply for the grant?

We are currently in the process of developing the application process and administration system for the scheme, and further details will be announced early 2020.

6.11 Must the ADS-B OUT and ADS-B IN grant be applied for at the same time or can these be applied for at different times?

Grants can be applied for either at the same time or separately. However please remember that only one OUT and one IN grant is allowed per aircraft.

6.12 Will the grant still be available after 31 December 2021?

The grant scheme will continue until the funds have run out. If there are funds still available after 31 December 2021 then the grant scheme will continue. However, we encourage you to install ADS-B and claim a grant as soon as possible as grants are available on a first in-first served basis.

6.13 What happens if I sell or change the possession (lease) my aircraft after I have ADS-B installed and I am not the registered owner at the time of claiming?

Only the registered owner, as shown on the current certificate of registration, can receive the grant. If you have installed ADS-B equipment before selling, this may form part of the sale contract or lease.

6.14 What happens if I am in the process of claiming and I change the possession of the aircraft (lease/sell) before the claim process is completed?

Only the registered owner, as shown on the current certificate of registration, can receive the grant. If the registered owner of the aircraft changes after applying for a grant, you will need to cancel your application to allow the new owner to apply. You may wish to negotiate the sale contract/lease due to this.

6.15 What happens if the registration mark of the aircraft has changed since the installation or while the claim is being processed?

If the aircraft mark changes while a claim is in progress you will need to contact us to change your application. We will require evidence of the change.

Please provide evidence of the change of registration mark, such as the evidence of the aircraft serial number and correspondence from the CAA relating to the change. We will be able to verify the aircraft using our records.

Further information will be provided once the claim process is announced.

6.16 Can I apply for, and receive, a grant before installing ADS-B?

No. You cannot apply for a grant until ADS-B equipment has been installed, or installation has been booked with a workshop in the next 6 months. CAA will require evidence of successful installation and operation before grant funds are released.