new southern sky

ADS-B in New Zealand

Information for aircraft owners, operators, maintainers, and crew

CAA

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

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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 *out* by the aircraft's transponder. ADS-B IN refers to information received by the transponder.
ADS-B system	*A GNSS position source and a compatible Mode S extender squitter 1090Mhz ADS-B OUT transponder.*
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
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 VFR	General Aviation aircraft that operate under Visual Flight Rules
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.
NTC	Notice
NSS	New Southern Sky
OEM	Original Equipment Manufacturer
PBN	Performance Based Navigation
PSR	Primary surveillance radar. PSR is a *non-co-operative* surveillance system: 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. New Zealand is not currently covered by an SBAS service area.
SSR	Secondary surveillance radar, SSR is a *co-operative* surveillance system, meaning that it relies on a response from an aircraft transponder.
TIS	Traffic Information Service
TSO	Technical Service Order, issued by the FAA and provides the performance parameters for equipment certification.
UAT	Universal Access Transceiver
VOR	VHF Omni Directional Radio Range
WAAS	Wide area augmentation system – see SBAS.

Where can I get more information?

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

Questions regarding the policy and rule development, or other suggestions for the FSIWG to consider, 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.

CAR 91.253 provides for the period between the rule commencement on 20 July 2018, and the mandate on 31 December 2018.

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 30 - 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

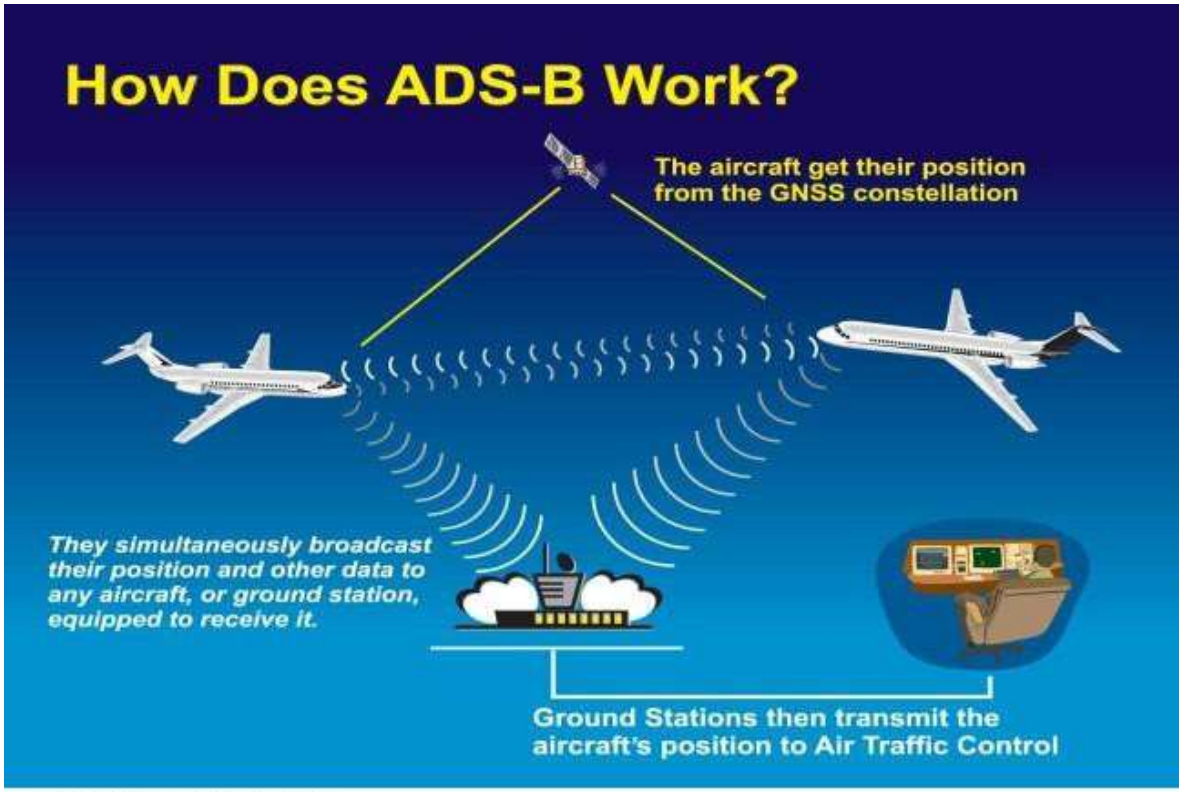
Advisory Circular AC91-24 Automatic Dependent Surveillance – Broadcast (ADS-B) Systems

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 hen broadcasts information, up to twice a second, on its identification, position, altitude, speed, and intention. The broadcast system is the ADS-B transponder.

The data received by ground stations are 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 is integrated for position information by radar.

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. Replacing the full radar system would be expensive in terms of its purchase and operating costs. It is also aging technology that does not make the most of the significant improvements offered by Global Navigation Surveillance System (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 have a more complete picture of an aircraft's whereabouts.

ADS-B also provides better 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, the existing primary and secondary radar system will be available to provide backup during the transition to ADS-B.

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

Airways New Zealand is considering the best way to provide contingency surveillance to cover the busiest parts of 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. Safety will dictate how many aircraft can be managed at any one time.

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 proposed level of service for the

contingency system is approximately half of the SSR existing capacity. 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 will be mandatory for aircraft operating in transponder mandatory controlled airspace above flight level 245 from 31 December 2018.
- CAA is proposing to mandate ADS-B OUT in all transponder mandatory controlled airspace from 31 December 2021.

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?

- Plan ahead.
- 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.
- 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 provides 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, depending on the transponder model.

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 will implement 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. *Extended squitter* 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 18,000 feet

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 after 31 December 2018, you will need to have an operational ADS-B OUT system.

NSS also propose 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.

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, as it's required there for aircraft separation.

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 ATC, especially if you get into trouble
- the option to enter controlled airspace without needingto seek permission from the controllers
- improved resale value of your aircraft.

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

As soon as possible. 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.

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

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

The CARs 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 extended squitter (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 will need 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 or TSO-C146, 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:

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?

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)?

The CAA is 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.

These considerations will be tested with the Future Surveillance Implementation Working Group (FSIWG) and will be included for comment in the policy discussion document when it is released. If you have any questions about the LPAT considerations, please contact ADSB@caa.govt.nz

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 extended squitter 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.

However, reception of certificated meteorological information in the cockpit by General Aviation (GA) VFR operations using devices such as an iPad or other tablet devices connected to a data/cellular network is acceptable to the CAA. The use of technology for this purpose is already widespread across the GA community.

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,

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 from a major reliance on ground-based navigation aids such as non-directional beacons (NDBs) and VHF Omni Directional Radio Range (VORs) toward satellite based navigation which utilizes GNSS (GPS).

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.
Currently, 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 or TSO-C146 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 OUT provides last known location to a much more accurate degree than radar, and over a larger area. However, this 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 20 July 2018

3.1 What equipment do aircraft need to enter controlled airspace above flight level 245 in the New Zealand FIR from 20 July 2018 to 31 December 2018?

Aircraft must have either:

> An operable Mode A and C, or Mode S transponder that meets Civil Aviation Rule 91.541 and operated in accordance with Civil Aviation Rule 91.247
>
> OR
>
> An operable ADS-B OUT system that meets the requirements of Civil Aviation rule 91.257

3.2 What transponder equipment is required to enter controlled airspace above flight level 245 in New Zealand after 31 December 2018?

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

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.

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

Aircraft operating below flight level 245 after 20 July must have either:

> An operable Mode A and C, or Mode S transponder the 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

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.

3.4 I already have ADS-B OUT installed. What requirements apply from 20 July 2018?

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

Between 20 July and 31 December 2018, aircraft with ADS-B OUT systems that are transmitting non-compliant ADS-B OUT data, may use a Mode A and C or Mode S transponder.
Operators must ensure that disabling ADS-B OUT transmissions does not negatively affect any other aircraft systems.

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

From 20 July 2018, 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.

3.6 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 2021 mandate.

If you don't fly above flight level 245, the rules coming 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.

3.7 Is New Zealand requiring ADS-B IN?

No

3.8 How many ADS-B OUT transponders does CAA NZ require?

There is no requirement for more than one Mode S ADS-B OUT transponder in the New Zealand FIR.

Overseas operators should ensure that their aircraft equipage meets the requirements of the State of Registry.

3.9 We have an aircraft that is not fitted with ADS-B OUT. It is scheduled for a major avionics overhaul in mid-2019, including ADS-B installation. Can we use that aircraft in the New Zealand FIR after 31 December 2018?

Operators with aircraft scheduled for ADS-B OUT installation after 31 December 2018 should contact the CAA.

Any aircraft entering the airspace must be able to be safely managed by ATS.

3.10 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.

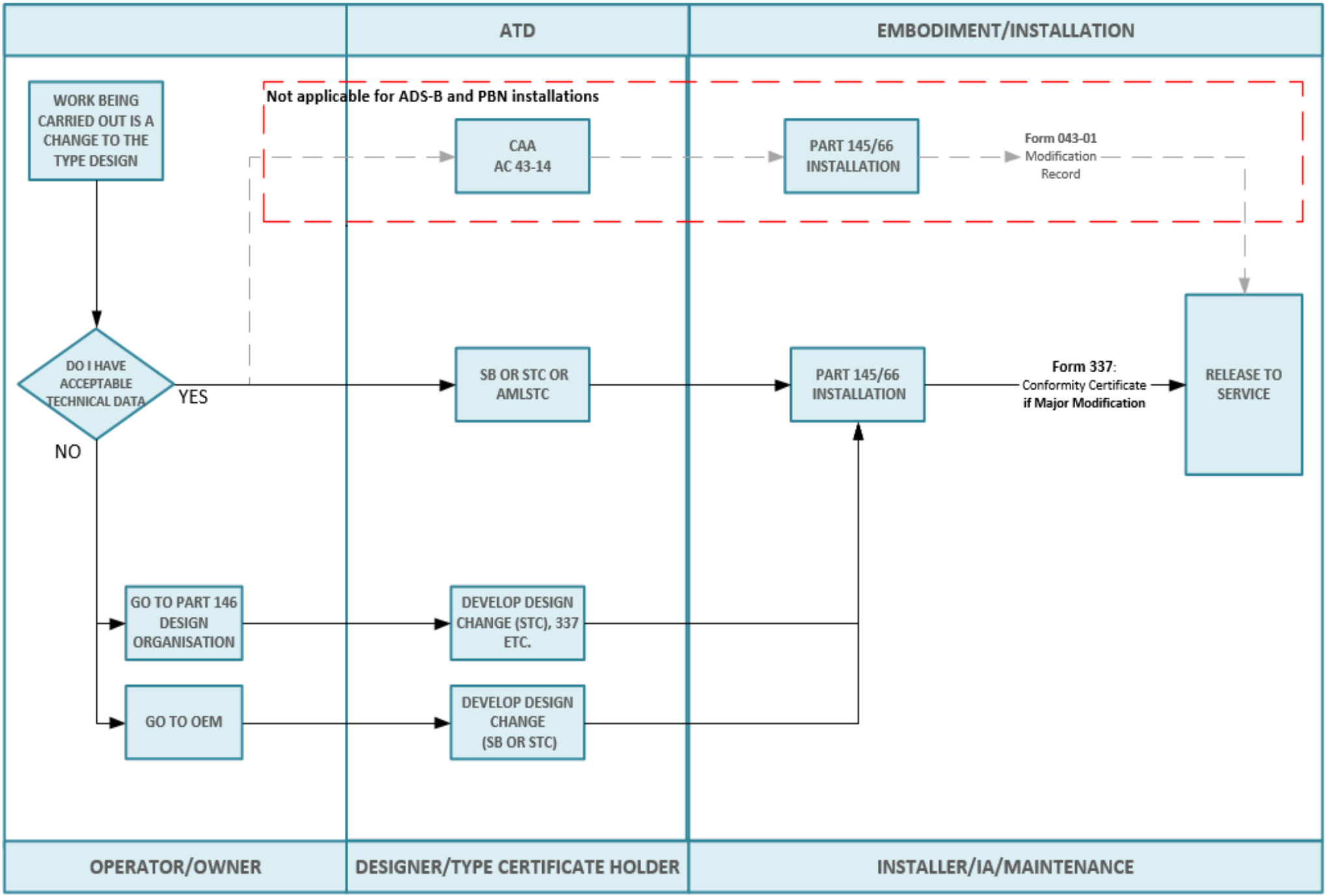
- Supplemental Type Certificate (STC):
  A STC is an approval of a major modification covering those areas or aspects of an aeronautical product that were modified, including updates to the Flight Manual, user guides/manuals and Instructions for Continuing Airworthiness.

- 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.

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 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.

If you don't file a flight plan, enter your aircraft registration without the ZK prefix.

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 Can aircraft without an ADS-B OUT transponder enter controlled airspace above flight level 245 in the New Zealand FIR after 20 July 2018 and before 31 December 2018?

Yes, provided the aircraft has an operable Mode A and C or Mode S transponder.

5.5 Can aircraft without an ADS-B OUT systems operate above flight level 245 in the New Zealand FIR after 31 December 2018?

No, unless the operator has specific permission to do so from CAA.

5.6 Does the mandate apply to the Auckland Oceanic Flight Information (NZZ0)?

No. Operators should note that Oceanic ATS may take ADS-B requirements into account for aircraft that will transition from the Auckland Oceanic FIR to the New Zealand FIR

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

Yes. 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 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.

Refer New Zealand Civil Aviation Rule 172.99

5.8 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.

5.9 After 31 December 2018, 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.

5.10 What is the process for getting clearance to operate in the New Zealand FIR above flight level 245 without ADS-B OUT after 31 December 2018?

If operators wish to operate an aircraft without ADS-B OUT above flight level 245 in the New Zealand FIR after 31 December 2018, they must discuss this with the CAA as soon as possible. Email ADSB@caa.govt.nz

5.11 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?

We're encouraging aircraft owners to use the time ahead of the proposed mandate to equip. This document gives you guidance on what to buy if you want to equip now. Other options may become available in time.

We suggest that the latest time to equip and be ready for the 2021/22 summer season would be in mid-2021.

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

The ADS-B system will extend coverage into uncontrolled airspace but coverage from the SSR contingency system will be reduced and focused on 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 airspaceonly).

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.

5.13 An aircraft in uncontrolled airspace can receive radar assistance today in the event of an emergency. How will this be provided after discontinuation of the SSR system if the aircraft does not have ADS-B equipment on board?

The New Southern Sky Working Group (NSSWG) is currently examining the requirement for contingency and recovery systems in case of ADS-B system failure.

In an emergency, aircraft without serviceable ADS-B transponders will need a serviceable Mode S (or Mode A/C) transponder and be within SSR coverage from the future contingency system, to receive surveillance services, including those flights within uncontrolled airspace.

However, the reduction in SSR system coverage after 2021 will limit the extent of assistance that Airways can provide to Mode S (or Mode A/C) equipped flights.

Voice communications will always be an option to assist in an emergency.

5.14 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