

The 7^{key} questions

every pilot should now be asking about the FAA's rules on ADS-B:



In May of 2010, after years of field tests, rulemaking proposals and public comment, the FAA finalized and published its mandate for ADS-B compliance. ADS-B stands for "Automatic Dependent Surveillance – Broadcast" and it forms the backbone of the FAA's emerging NextGen air traffic management system. The "dependent" part of ADS-B means that those of us operating in the ATC environment will ultimately depend on other aircraft in the surrounding airspace to make their identity, position, track, airspeed, etc. known – by broadcasting these parameters via ADS-B "Out" technology. With this interactive surveillance capability, NextGen air navigation will transition from a ground-based radar system to a space-based, satellite-derived aircraft tracking system. The FAA says the system will enhance safety and pilot situational awareness – while reducing congestion, noise, emissions and fuel consumption through more efficient routing and resource management. Implementing ADS-B will take time and money. In fact, the FAA has estimated that the total cost to equip the GA fleet could run as high as \$4.5 billion. While there may yet be rule changes, it's clear that this technology is on its way in some form. And at some point over the next nine years, every pilot will need some answers about ADS-B compliance. That's why Garmin and EAA Sport Aviation have teamed up to bring you the first of a series of briefings on what the FAA rules require – and what hardware solutions currently exist. We suggest you start with the following 7 key questions:

1. Why?

Why is ADS-B considered better than radar? For one thing, it's a far more accurate surveillance system. And it updates much faster. Today, most long-range radar dishes take 12 seconds to rotate. So, ATC controllers must wait 12 seconds for aircraft positions to update. (Near airports, with faster-turning radars, the updates are every 5 seconds.) To compensate for this time lag, controllers must maintain wider separation between aircraft. However, with ADS-B, controllers' displays can be updated approximately once every second, so there's less lag – and more capacity – built into the system. With the addition of ADS-B "In" technology, pilots can see "the big picture" and monitor the same traffic targets that ground controllers are tracking on their displays. Thus, pilots are better able to anticipate traffic flow decisions and help maintain their own spacing – with fewer directives from ATC.

2. Who?

Who will need ADS-B? The short answer: Most of us who use ATC services – that is, pilots who now must have a Mode C transponder to fly in the airspace they use. Even if you don't fly IFR, your ability to obtain VFR traffic advisories and transition through most ATC radar-controlled airspace will require that you have ADS-B "Out" capability onboard. However, pilots who do not need a transponder now (because of where they fly, or the type of airplane they fly) will not need ADS-B under the new rules.

3. When?

When will ADS-B compliance be required? According to FAR 91.225, the rule that currently sets the ADS-B requirement, all aircraft operating in designated U.S. airspace must be equipped with ADS-B "Out" functionality by January 1, 2020. A similar notice of proposed rulemaking for Europe carries an earlier compliance deadline of 2015.

4. Where?

Where will you need ADS-B? As noted earlier, operators will be required to have ADS-B "Out" capability installed in order to fly in most regulated U.S. airspace, including:

- Class A, B and C airspace
- All Class E airspace at or above 10,000 feet over the continental U.S. (excluding airspace at and below 2,500 feet above the surface)
- Within 30 nautical miles of certain designated "busy" airports, from the surface up to 10,000 feet MSL
- All Class E airspace over the Gulf of Mexico, at and above 3,000 feet MSL within 12 nautical miles of the coastline of the United States.

5. What?

What equipment will you need? The lowest cost option to meet FAR 91.225 is a Mode S "extended squitter" transponder and an approved GPS navigation source (likely WAAS GPS) to provide the required position, vector, altitude and velocity data. Every pilot who needs a transponder now will continue to be required to have a fully functioning transponder in addition to the ADS-B "Out" capability. An "extended squitter" transponder will satisfy both requirements.

6. Which?

Which datalink option offers the most reasonable path to compliance? The FAA has given U.S. aircraft operators two options for satisfying the ADS-B "Out" requirement. The first option, as mentioned earlier, is the 1090 MHz "extended squitter" or ES broadcast link available on certain Mode S transponders. The second option is the dedicated 978 MHz universal access transceiver, or UAT. If your aircraft flies at or above Flight Level 180 (18,000 feet MSL), the FAA will require it to have the 1090 MHz ES link. However, aircraft flying below FL 180 (typically GA piston airplanes and rotorcraft) may opt to use either the 1090 MHz ES or the UAT broadcast link. Both options will meet the ADS-B "Out" requirement, and when equipped with an ADS-B receiver as well as a transmitter, both systems can also provide ADS-B "In" for display of traffic data in the cockpit. However, only UAT equipment has the ability to offer FIS-B service for datalink weather and other flight information (such as TFRs and NOTAMs). The 1090 MHz ES system does not have the capacity for FIS-B datalink support.

7. How?

How is all this going to work? And how much is it going to cost? How will the future of General Aviation be impacted? All of these "how" questions – and many more – are destined to be part of the ADS-B discussion for years to come. What it will ultimately cost to equip GA airplanes with the minimum required equipment is impossible to predict, because the FARs only specify performance, not exact types of equipment. Having a navigation system with the required precision to report aircraft position and velocity with extreme accuracy once per second is probably the most costly element of a certifiable ADS-B "Out" system. EAA and other GA advocacy groups are urging avionics companies and regulators to develop the most cost-effective possible solution for light airplanes.

The rules requiring ADS-B are in the books, but many questions on how to best meet the FAA mandate remain. In future reports, we'll be updating you on other aspects of the vast NextGen conversion that will be revolutionizing our ATC system for the future. We hope our ongoing dialogue will help smooth your transition to this new world of interactive airspace.

To learn more, visit www.eaa.org/govt/briefingNextGen.pdf – or www.adsb.gov or www.garmin.com/adsb