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NEW TECHNOLOGIES, NEW PROCEDURES

Making the Most of Modernization Options



Photo courtesy of Cirrus Aircraft

At a time when technology is advancing faster than your paycheck can keep up, it's hard to know when to buy that new gadget or gizmo for your aircraft. There is a modern replacement for almost every part of your panel. In fact, your entire set of "steam gauges" can now be completely replaced with glass backups and independent power supplies. It's a great time to be in the general aviation (GA) world, but the rapid pace of technological advances creates a conundrum for GA pilots. Given that few of us have unlimited funds to spend, we have to make smart decisions about whether, what, and when to upgrade.

It's Time

As you may already know, the FAA is engaged in the Next Generation Air Transportation System (NextGen), an ongoing and long-term project to transform the National Airspace System (NAS). At its most basic level, NextGen represents an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management. This evolution is vital to meeting future demand, and to avoiding gridlock in the sky and at our nation's airports. "NextGen is redefining our airspace so we can enable the growth and changes that we expect to see in aviation," noted FAA Administrator Michael Huerta in a September speech. "We all have a stake in NextGen — as an aviation community and as a nation. Now, it's incumbent upon all of us to rally around NextGen."

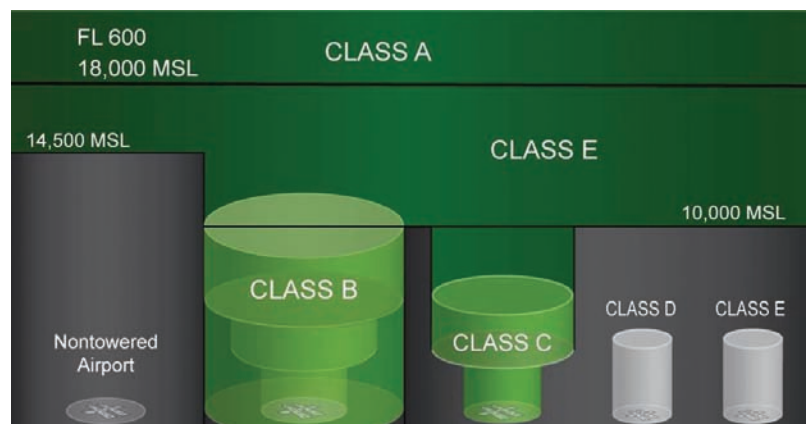
By integrating both new and existing technologies, NextGen is already providing air traffic managers and pilots with the tools to proactively identify and resolve weather and other hazards. In fact, you may already be familiar with some of the benefits NextGen offers right now. One is the Wide Area Augmentation System (WAAS), an FAA service that improves the availability, accuracy, and integrity of GPS signals to the aircraft through an onboard receiver. There is no fee to access WAAS, so if your aircraft does not already include WAAS-capable equipment, you may want to consider an upgrade. Because they are far less accurate and increasingly expensive to maintain, older ground-based technologies such as Non-Directional Beacons, or NDBs, are being phased out in favor of the growing number of WAAS-enabled navigation and approach procedures. To learn more about WAAS, see "WAAS Happening!" in the Sept./Oct. 2012 issue of FAA Safety Briefing.

The Outs and Ins of ADS-B

Among the biggest NextGen benefits to the GA community is the implementation of automatic

dependent surveillance-broadcast (ADS-B). You probably know that starting in 2020, the FAA will require ADS-B Out equipment for operation in certain types of airspace (see diagram). Specifically, ADS-B Out is required by 2020 for all aircraft that fly within:

- All Class A, B, and C airspace;
- Class E airspace at or above 10,000 ft. MSL over the continental United States but excluding airspace at or below 2,500 ft. above the surface;
- 30 nautical miles of certain identified airports, which are among the busiest in nation;
- The lateral boundaries and above the ceiling of Class B or C airspace; and
- Class E airspace over the Gulf of Mexico at and above 3,000 ft. MSL within 12 nautical miles of the coastline.



ADS-B Out is required in the airspace highlighted in green by 2020.

Since this rule will impact a number of GA pilots, you may be starting to explore your equipment options. So let's review some of the basic points of ADS-B.

ADS-B Out refers to a radio signal that is automatically broadcast on either 978 or 1090 megahertz (MHz). The broadcast can be on either frequency; however, if you are flying above 18,000 ft. or internationally, you must be equipped with 1090 MHz capability. Transmitter boxes do not currently operate on dual frequencies, so you must choose based on your own flying needs. However, most new ADS-B In receivers do pickup both frequencies.

As for what gets broadcast, the outgoing ADS-B signal includes the aircraft's GPS position, altitude, speed, track, and identification. As you can imagine, ADS-B Out provides faster information — updates once every second — rather than the 5-12 second blips on radar. So if it's time to replace that old transponder,

upgrading to a Mode S transponder with ADS-B Out capabilities might be a practical choice. (Note: If you are wondering whether squawk codes will be required in the ADS-B world, the answer is yes, for now. Even with ADS-B, you will still need to have either a Mode-S transponder, which is ADS-B Out capable, or your current Mode C transponder, which is not ADS-B Out capable. This is because the FAA will retain the radar surveillance system as an operational backup system for some years to come.)

Another consideration for ADS-B Out is the position source — a certified GPS receiver — that is connected to the ADS-B Out system. However, a certified WAAS GPS receiver is the best available position source. Each ADS-B Out system has a list of approved position sources that have been shown to be compatible with that specific system. When making a purchase decision, you should check the approved position source list, paying attention to model numbers, part numbers, and required software versions for the position sources compatible with the ADS-B Out system being considered.

ADS-B In refers to aircraft reception of the ADS-B broadcast on both 978 and 1090 MHz from the hundreds of ADS-B ground stations all around the U.S., and from air-to-air broadcasts received from all ADS-B Out equipped aircraft.


The typical piston engine aircraft pilot gets the most benefit from the universal access transceiver (UAT) broadcast on 978 MHz. Though not required by the regulation, ADS-B In UAT offers a whole new level of safety via situation awareness to GA pilots. For starters, ADS-B In UAT receives the flight information service-broadcast (FIS-B), which provides graphical weather based on ground-based weather radars. There are several weather services to view, and you should always be able to receive at least the regional radar picture. In

addition, FIS-B provides notices to airmen (NOTAM), aviation routine weather reports (METAR), terminal aerodrome forecasts (TAF), special use airspace (SUA) status, airmen’s meteorological information (AIRMET), significant meteorological information (SIGMET), and pilot report (PIREP) information direct to the cockpit.

Through either a cockpit mounted display panel or mobile device (in airplane mode and connected to a wired, Wi-Fi, or Bluetooth transceiver), ADS-B In also allows you to receive the traffic information service-broadcast (TIS-B), which provides the altitude, track angle, speed, and distance of aircraft flying within a 15 nautical mile radius +/- 3,500 ft. altitude of your aircraft. TIS-B traffic is based on secondary surveillance radar tracks of transponder equipped aircraft, which is the same data provided to air traffic control.

It is extremely important, though, to be aware of the current traffic depiction limitations of using an ADS-B In receiver either connected to your tablet computer or panel display. If the aircraft you are piloting is not equipped with ADS-B Out, you will not get a complete traffic picture because the TIS-B signal is sent in response to your own ADS-B Out transmission. Without the ADS-B Out system, you will receive only the air-to-air transmissions from other aircraft in range. Also, if that traffic or you are outside of FAA radar coverage, TIS-B information will not be sent.

Don’t Play the Waiting Game

Although 2020 may sound like the distant future, it really isn’t that far away. Just six years from now, ADS-B Out will be required, and avionics manufacturers are already providing a wide range of options — everything from devices offering bare-bones compliance with ADS-B Out requirements, to top-of-the-line boxes that provide everything a pilot could possibly want for situation awareness. Because last minute upgrades may cause a backlog at repair stations if everyone waits until 2019, now is a good time to start thinking seriously about your options for ADS-B. Regardless of how you choose to equip, you’ll find that ADS-B services will dramatically increase the information available to both you and ATC, leading to an ever-safer system for everyone. 

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Learn More

ADS-B Informational Video

<http://1.usa.gov/Zsql0Q>

ADS-B Automatic Dependent Surveillance-Broadcast			
OUT		IN	
UAT 978 MHz	1090ES 1090 MHz	UAT 978 MHz	1090ES 1090 MHz

This is a visual of basic terminology geared to the GA pilot. An ADS-B Out universal access transceiver (UAT), shown in green, is the basic requirement needed by 2020, which is typically anywhere that a Mode C transponder is required today. ADS-B Out 1090ES, shown in yellow, may be required if certain conditions are met. ADS-B on either link provides surveillance for separation services and supports air-to-air applications. ADS-B In receives and provides traffic on both frequencies, but aeronautical information is only on UAT.