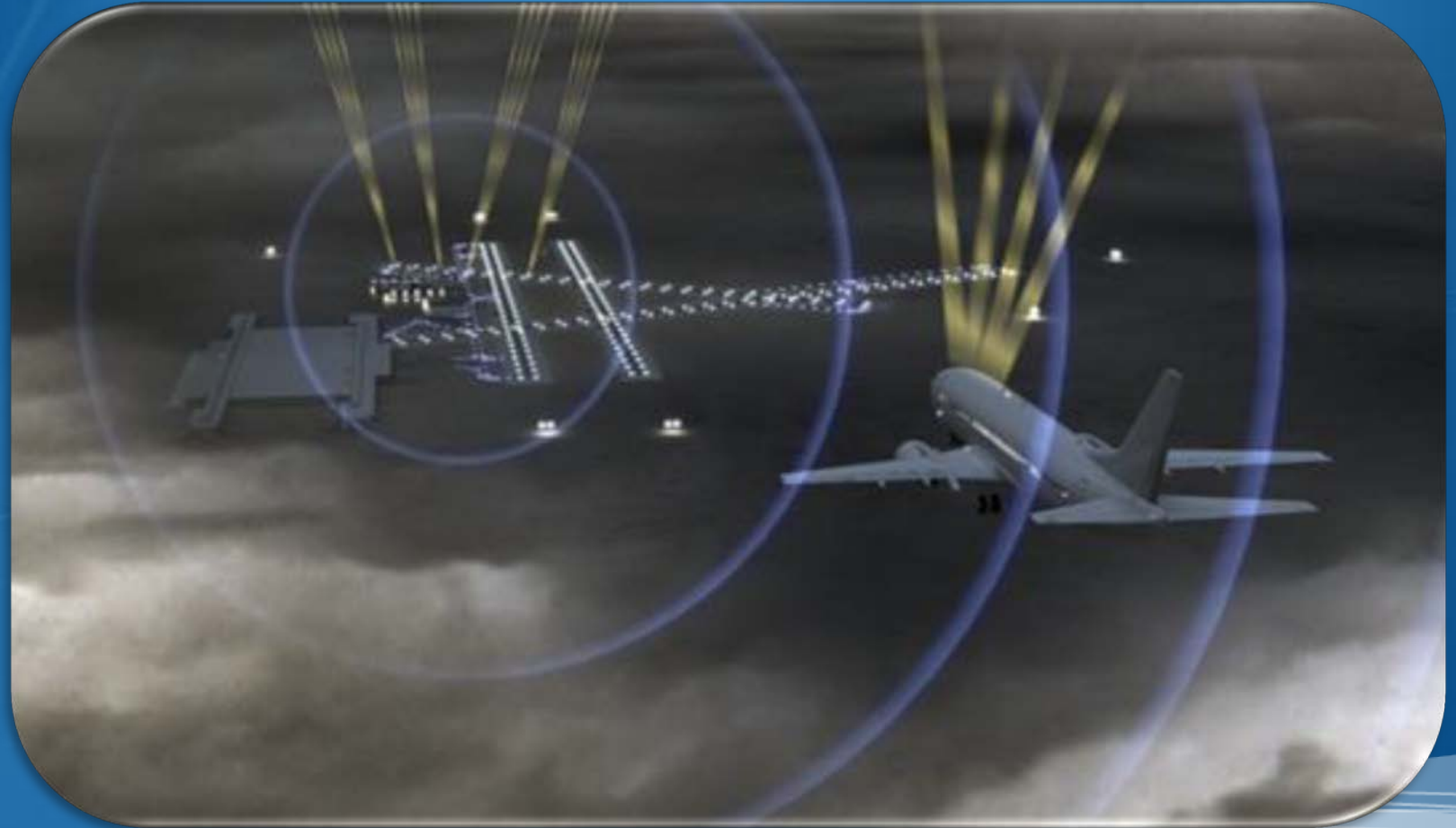


ADS-B

Is Your General Aviation Aircraft Ready for 2020?

Do You Know The FACTS?



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Will You Be Ready In Time?

What is ADS-B?

Automatic Dependent Surveillance – Broadcast

- **“ADS-B Out”** - Surveillance technology that transmits GPS based position and other aircraft or vehicle information
 - Identification
 - GPS position
 - Altitude (Baro & Geometric)
 - Velocity
 - Quality and Integrity data, etc.
- **“ADS-B In”** - Transmitted signals can be received by other aircraft as well as ground stations
 - Traffic Situation can be depicted on Aircraft Display but with much more information than what TCAS provides
 - Allows new features based on ADS-B data
 - Spacing & Merging
 - Airport Surface Management
 - In-Trail Procedures
 - VFR like separation in all weather conditions



ATC Providers and Regulators are Interested because

- Potentially allows them to decommission expensive SSR Radars
- Provides much better “quality” surveillance
 - Position Accuracy
 - Aircraft State and Intent information
- Ultimately will allow more aircraft to use existing airspace with equivalent or better safety and efficiency

General Aviation - How will you meet the mandate?

1090ES XPDR?

- Requires certified WAAS receiver
- Provides ADS-B Out ONLY
- Requires an annunciation for “No ADS-B” in the pilots field of view
- Allows aircraft in all airspace including Class A (above FL180)
- Most systems require specific interface partners
- AML STCs largely available for Part 23 aircraft



UAT?

- Optional built in WAAS receiver
- Provides ADS-B Out and IN (most systems)
- Requires an annunciation for “No ADS-B” in the pilots field of view
- Only for aircraft flying under FL180
- Mainly all in one systems
- AML STCs largely available for Part 23 aircraft

ADS-B Receiver/Transmitter Options

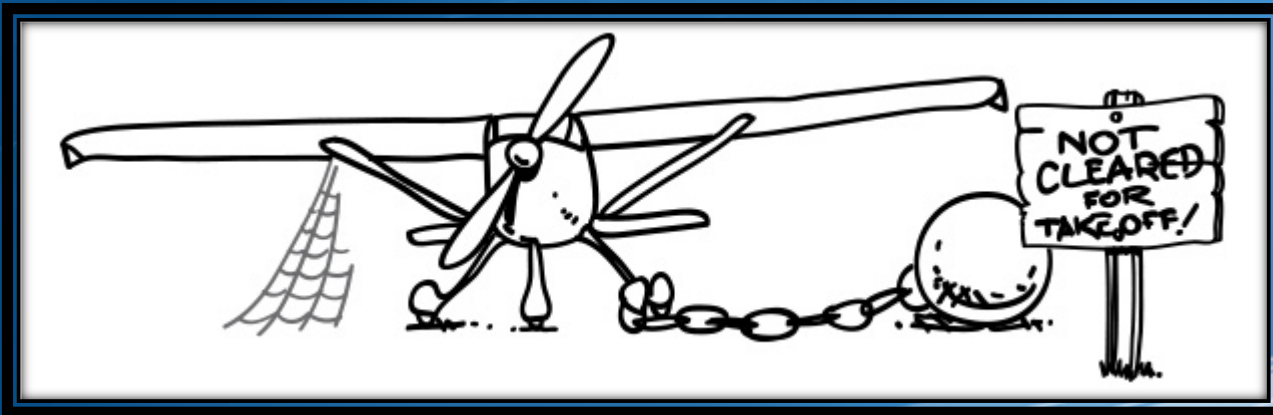
- FreeFlight Systems XPLOER System
- FreeFlight Systems RANGR-TX System
- FreeFlight Systems RANGR XVR System
- Garmin GDL 88
- Garmin GTX 33/330 with ES
- Trig Avionics TT31
- Trig Avionics TT22
- Bendix/King KT 74
- Avidyne AXP340
- Avidyne TAS605A
- Collins TDR-94/94D
- Apex
- Primus
- Epic



UAT Options:

Most options have the ability to be displayed on iPads or the manufacturers' designated displays.

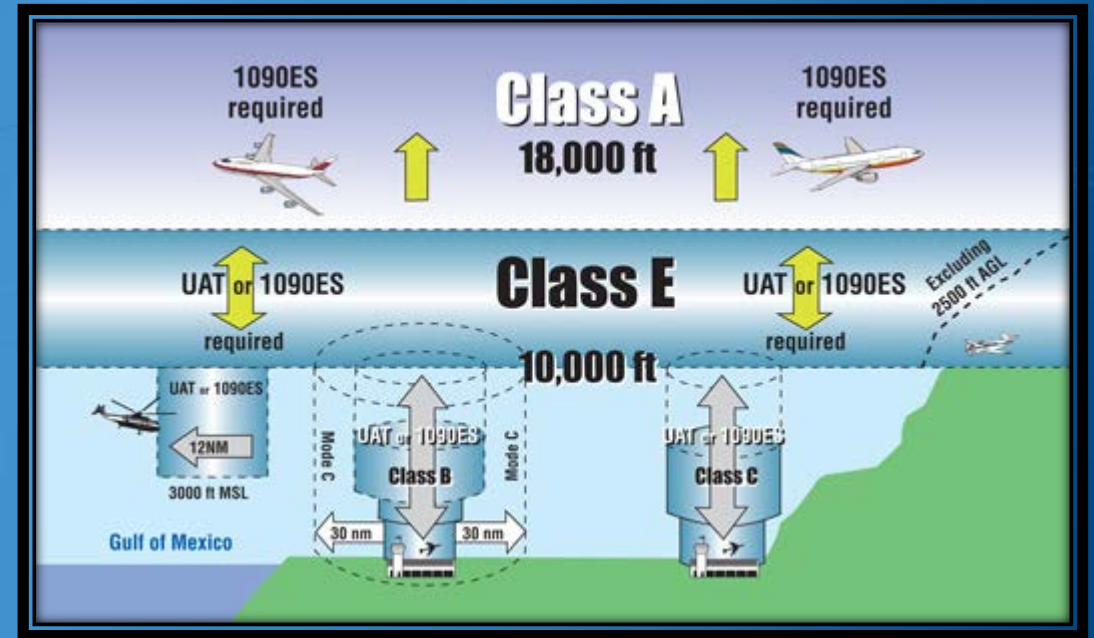
The UAT options are viewed as the least expensive solution for aircraft not flying above FL180. Aircraft that do not already have a certified & capable WAAS/GPS receiver can install one of the many options provided by vendors such as Garmin, FreeFlight Systems, Avidyne, L-3, and Bendix/King. These systems are usually installed as standalone, with a simple interface to the altitude source to connect to the existing XPDR. Depending on the existing equipment in the aircraft, the only additional equipment required to be compliant is a control source, annunciation in the pilots field of view, and a source to activate the system. In this installation, the aircraft can be ADS-B compliant for the 2020 Mandate and legally fly in all airspaces below FL180. Display of the ADS-B In will vary from aircraft to aircraft, but for cost effectiveness most aircraft will use an iPad for display.



1090 ES Option:

For simplicity, removing or upgrading the existing XPDR to a certified ADS-B Out 1090(ES) XPDR will be the fastest option.

Aircraft that have been previously modified and already have a compliant & certified WAAS/GPS - upgrading to an ADS-B Out 1090(ES) XPDR will be the fastest and most affordable solution. Some options have been made available for the replacement XPDR to be a simple slide-in with minor wiring changes, or an easy removal of the existing unit to be sent out for an upgrade with minor wiring changes. The majority of these XPDRs will only provide ADS-B Out, with the addition of TIS Traffic In where applicable. Currently the only unit on the market with both ADS-B In/Out and built-in WAAS/GPS, is the L-3 NGT-9000 series.



How Much?????

Let's face the facts. If the aircraft does not already have a capable & certified display for ADS-B In, no matter how much the ADS-B compliance upgrade costs, the pilot gets nothing extra for the money spent. So what is the basic rundown on pricing?

A) Have a certified Garmin WAAS/GPS and a GTX 330? You should be at no more than \$2,000* out the door installed, with an upgrade of the GTX to (ES), and a minor wiring mod. Estimated installation timeline: 5-7 days

B) Have a certified WAAS/GPS receiver (GNS 530W, GTN 650, IFD540, KSN 770, etc.) but an old analog KT 76A/C? Depending on the avionics shop, you're going to be around \$4,500* out the door installed, based on a TT31, KT 74, or APX340. Estimated installation timeline: 2-4 days

C) In need of an all-in-one solution? Still flying the full Narco stack? Got the old King package? L-3 covered that need with the Lynx NGT-9000. ADS-B In & Out with a touchscreen display for TIS-B /FIS-B with a strong Mode S XPDR, all in one unit with built in WAAS/GPS receiver. All in one yes, but you're paying a premium at about \$9,500* installed with no added flight capability, like LPV. Estimated installation timeline: 5-7 days



*Prices listed are informational estimates only and are not intended for quoting purposes. Contact SEA for more information and to receive an accurate quote for your specific project needs and equipment.

What About the UATs?

A) How about a the Garmin GDL 84/88 series units? As long as you have an existing Garmin XPDR or GNS/GTN unit, you're set. Depending on configuration, you should be able to cover the ADS-B In & Out for around \$6,750* installed and be ready to see the beauty of ADS-B In.

B) No Garmins? No Problem! Avidyne, Aspen, Bendix/King, and FreeFlight all have a version of the Rangr 978-XVR which comes with its own internal GPS/WAAS sensor and provides ADS-B In & Out capability. The price of the unit alone is very attractive, however once you add the control unit (in most cases required), Wi-Fi module for the iPad, air/ground switch, and installation, you will save over the Garmin but not by much. These systems are being installed at around \$5,500*.

C) Want another option? Well L-3 gave you the NGT-2000/2500. Similar to the Rangr, it can do full ADS-B In & Out features but give you the option of using a control head or annunciator and switches in the cockpit. However, the price point is not any different. Depending on options selected, you will be priced somewhere between the Garmin and the Rangr unit.

Bottom Line: There are no cheap options if the aircraft has not been previously modified.



Time to Make the Tough Decisions



ADS-B Out will increase safety in the sky. The advanced and highly accurate data being provided to our Air Traffic Controllers will be an amazing advancement for the industry.

The cost to upgrade aircraft from a Cessna 172, Bell 407, King Air, Gulfstream, or even a Boeing 737 is not a fun situation. Those that think \$5500 for a UAT unit in a Piper Arrow is too much should not get too upset in comparison to the Gulfstream III which is around \$100k+ for their modification. Regardless of large or small, the cost is going to only increase due to supply and demand issues, as shops begin to overflow with ADS-B installs.

According to the FAA, there are over 150,000 aircraft that must upgrade before January 1st 2020, or be grounded. What does that mean? Let's use simple math. As of December 31st 2014, there were 5 years until the mandate - meaning 30,000 aircraft per year, or 2500 per month, about 575 aircraft per week need to be modified. Out of all the shops in the USA, how many are there that can install the system correctly, as well as test and return the aircraft to service?

Don't wait too long. The equipment price may not change, and might even drop before 2020. However it is unlikely that shops will drop their install rates as they get busier.

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