

PROXIMA

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this star before
the end of the
century?**

Learn what it would take

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Air Force weighs sense and avoid options

The U.S. Air Force plans to start an analysis of alternatives later this year or early next to assess sense and avoid options for its remotely piloted aircraft, including Reapers and Global Hawks.

At the moment, the service prevents collisions by requiring unmanned aircraft to stay on predetermined courses within predetermined operational areas, so that airborne pilots will know where to expect unmanned planes.

That has made it hard for unmanned aircraft to team closely in combat with traditionally piloted planes or to fly from one location to another through civilian airspace. The FAA requires the Air Force to apply for special permission in the form of a

certificate waiver or authorization, when it wants to fly an unmanned plane through the national airspace.

To get ready for the analysis of alternatives, the Air Force issued a request for information in January to the industry detailing the capability it wants in a sense and avoid system that could be in production by 2020. The Air Force wants a device that will ensure unmanned aircraft miss other aircraft by a horizontal distance of at least 500 feet, and a vertical distance of at least 100 feet. To maintain safe separation from other aircraft, called due regard, the sense and avoid system should keep a distance of at least 450 feet vertically, with horizontal distance of 4,000 feet. But because of different flight speeds, the

aircraft must also stay 35 seconds apart.

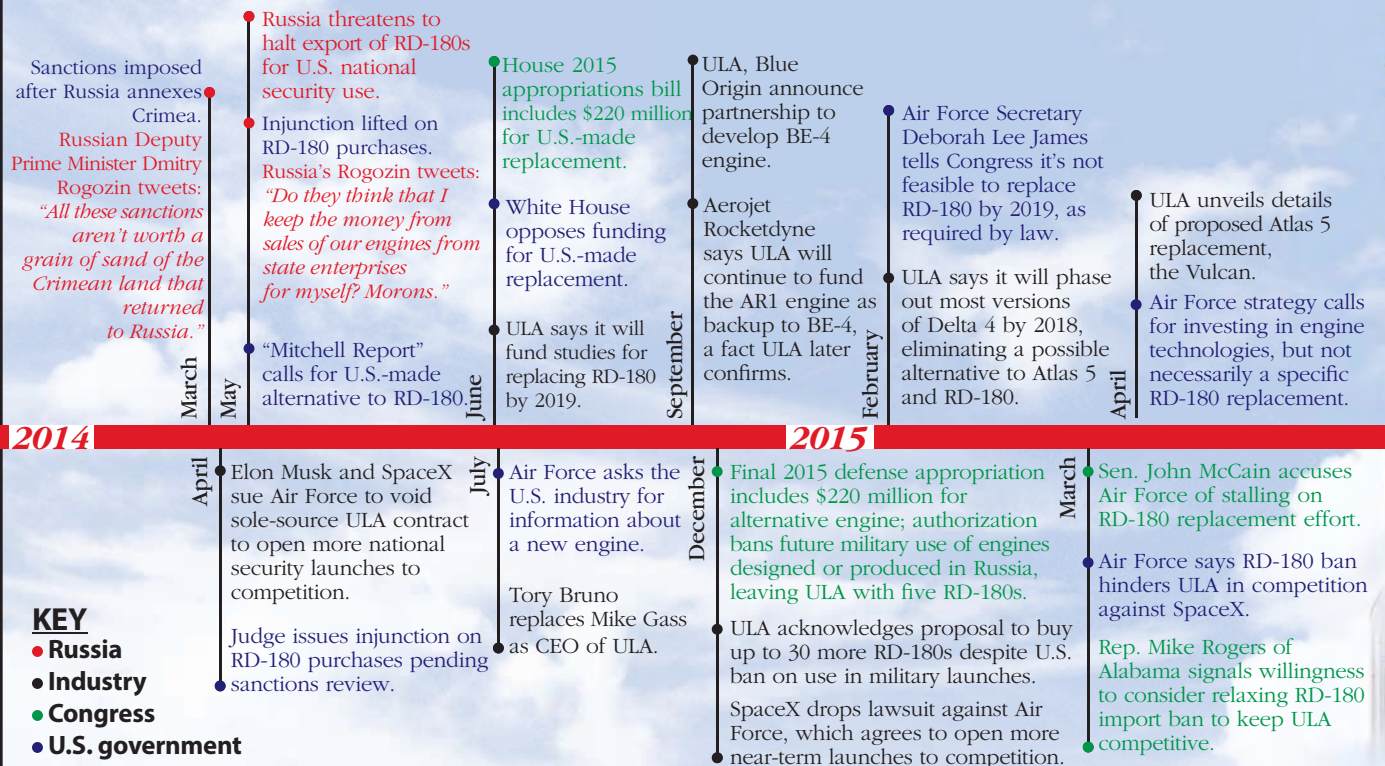
The equipment would be primarily designed for Group 4 and 5 remotely piloted aircraft, which are composed of larger unmanned aircraft such as the Predator, Reaper, Global Hawk and Sentinel.

Sense and avoid would make it easier for Air Force unmanned craft to fly in U.S. "national airspace, other nations' airspace, over international waters, and in military (combat) airspace," says Joe Schmidt, the Air Force Life Cycle Management Center's program manager for the Common Airborne Sense and Avoid program.

While the equipment will be designed for Air Force needs, it could be installed on other services' un-

Weaning the U.S. from Russia's RD-180 engines

A debate has raged in the U.S. about how to end the irony of the U.S. monitoring Russian actions in Ukraine and Syria with American satellites launched by Russian RD-180 rocket engines. RD-180s power the first stages of the United Launch Alliance Atlas 5 rockets. The debate is sure to heat up this year as Congress considers the U.S. Air Force's proposal to solve the problem by developing an entirely new rocket. This is a timeline capturing how we got here.





manned aircraft.

Schmidt cautions that even with sense and avoid, permission from the FAA might still be needed in some cases.

Sense and avoid could remove a barrier to unmanned military aircraft flying over international waters where airliners and other planes cruise. Under a Department of Defense instruction issued in June 2015, unmanned aircraft are restricted from flying over international waters unless they meet one of a number of due regard, or safety, conditions, such as operating in visual flying conditions, or being continuously monitored by, and in communication with, surface or airborne control facilities.

In the case of unmanned aircraft, due regard is also met if unmanned aircraft are “equipped with a Military Department-certified system that is sufficient to provide separation between them and other aircraft,” according to the Department of Defense directive. Schmidt says sense and avoid will make it much easier to meet that condition.

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The U.S. Air Force is asking commercial companies whether they could quickly develop technology that would enable unmanned aircraft such as the Global Hawk to automatically detect other aircraft and move out of the way. Such sense and avoid capability is critical for military drones to fly through national airspace without restrictions.

2016

<p style="text-align: center; font-weight: bold;">May</p> <ul style="list-style-type: none"> • ULA rejects inquiry from Aerojet Rocketdyne, others about obtaining Atlas 5 production rights. • White House favors a broad replacement strategy rather than direct replacement for RD-180, as mandated in House 2016 authorization bill. • ULA's Bruno warns that unless RD-180 ban is lifted, ULA will not be able to stay in the military launch market until new Vulcan is ready. 	<p style="text-align: center; font-weight: bold;">June</p> <ul style="list-style-type: none"> • Air Force issues request for proposals seeking propulsion technologies and concepts. • A SpaceX Falcon 9 explodes during ascent in a setback for Atlas 5's main competitor. 	<p style="text-align: center; font-weight: bold;">July</p> <ul style="list-style-type: none"> • Air Force says 22 more RD-180s will be needed to keep ULA competitive with SpaceX until ULA's Vulcan is ready. • House and Senate agree to authorize ULA to use four more RD-180s for military missions. President Obama vetoes bill over unrelated provisions. <p style="text-align: center; font-weight: bold;">September</p> <ul style="list-style-type: none"> • ULA assigns five RD-180s for civil launches; says it will be unable to bid for upcoming GPS launch absent relief from RD-180 ban. 	<p style="text-align: center; font-weight: bold;">October</p> <ul style="list-style-type: none"> • Air Force awards rocket research contracts to Aerojet Rocketdyne, Orbital ATK and Northrop Grumman. • Obama signs 2016 defense appropriations bill providing \$228 million for RD-180 replacement and overturning ban on use of RD-180s for military missions. • Sen. John McCain accuses ULA of “manufacturing a crisis” and says lifting ban on RD-180 imports “is the height of hypocrisy, especially for my colleagues who claim to care about the plight of Ukraine and the need to punish Russia for its aggression.” • ULA orders 20 more RD-180 engines. <p style="text-align: center; font-weight: bold;">December</p>	<p style="text-align: center; font-weight: bold;">January</p> <ul style="list-style-type: none"> • Orbital ATK and SpaceX receive Air Force rocket research contracts worth up to a combined \$241 million. • Sen. John McCain and House Majority Leader Kevin McCarthy introduce legislation to reinstate RD-180 ban. 	<p style="text-align: center; font-weight: bold;">February</p> <ul style="list-style-type: none"> • 2017 budget request seeks \$297 million toward a “next generation” launch system, rather than new engine for Atlas 5. • Rep. Rogers states: “The Air Force is planning a program that violates current law.” • Pentagon's Frank Kendall says Treasury Department has made a preliminary finding that RD-180 purchases do not violate sanctions, despite reorganization of Russian space sector. • Air Force announces a contract worth up to \$536 million to Aerojet Rocketdyne for development of AR1 engine and a contract worth up to \$202 million to ULA for development of Vulcan. 	<p style="text-align: center; font-weight: bold;">November</p> <ul style="list-style-type: none"> • Bidding deadline for GPS launch passes; ULA does not bid, citing RD-180 ban and other issues. • Obama signs 2016 defense authorization bill with provision making four more RD-180s available for Pentagon competitions.
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