

Updated July 26, 2022

Replacing the E-3 Airborne Warning and Control System (AWACS)

The U.S. Air Force recently expressed its interest to replace the E-3 Airborne Warning and Control System (AWACS) fleet. Over the summer and fall of 2021, several senior Air Force officials, including Air Force Secretary Frank Kendall and Commander of Pacific Air Forces General Kenneth Wilsbach, discussed plans to replace the E-3 AWACS. The officials stated that the Air Force needs to replace its fleet of E-3 AWACS aircraft due to their age, low mission capable rates, and the inability to procure parts to maintain 40-year-old aircraft. The Air Force released a request for information on February 8, 2022, seeking to replace the AWACS beginning in FY2023. The FY2023 budget request seeks \$227 million in research development, test, and evaluation to begin E-3 AWACS recapitalization while retiring 15 of 31 E-3 AWACS.

What Is the E-3 AWACS?

Since the 1970s, the United States has operated E-3 AWACS aircraft, with air movement tracking indicator (AMTI) technologies that give commanders the ability to see vast areas of airspace, including both friendly and hostile aircraft, and manage the battle in that space. The E-3 is a modified Boeing 707 aircraft with a 30-foot radar dome held above the aircraft's fuselage (**Figure 1**). AWACS have been sold to the North Atlantic Treaty Organization (NATO), France, the United Kingdom, and Saudi Arabia.

Figure 1. E-3 AWACS



Source: U.S. Department of Defense, at <https://media.defense.gov/2021/Sep/29/2002864360/-1/-1/0/200204-F-XO631-9049.JPG>.

Over the years, the E-3 AWACS fleet received a number of upgrades to its radars and AMTI module in order to improve its command and control capabilities. From 1987 through 2001, the Air Force upgraded these systems through the Block 30/35 program, which included increased computer processing power, improved datalinks to communicate with more aircraft, defensive electronic

countermeasures, and integration of Global Positioning System (GPS) navigation devices. Starting in 2003, through the Block 40/45 program, the Air Force upgraded the systems again, to include improvements to electronic support measures and datalink/spectrum management, new battle management computer systems, and enhanced satellite-based internet chat capabilities. These upgrades are anticipated to reach full operational capability in May 2024.

Previous Replacement Initiatives

In 2003, the Department of Defense awarded Northrop Grumman a contract to develop the E-10 Multi-sensor Command and Control Aircraft (MC2A). The intent of this program, as originally stated by the Air Force, was to combine the E-3 AWACS with the E-8 Joint Surveillance Target Attack Radar System (JSTARS), equipped with ground movement tracking indicator (GMTI) capabilities, and the RC-135 Rivet Joint, a signals intelligence aircraft. Due to technical challenges, however, the Air Force decided to remove the GMTI requirement from the program in 2006. The E-10 program was completely cancelled in 2010.

In 2017, the Air Force again proposed replacing the E-3 AWACS with a new program called the Advanced Battle Management System (ABMS). Following release of the 2018 National Defense Strategy, the Air Force reevaluated its requirements for ABMS. According to a 2020 Government Accountability Office report, the Air Force “concluded that no single platform, such as an aircraft, would be the right solution to providing command and control capabilities across multiple domains.” Air Force officials testified in April 2019 regarding a new vision for ABMS, which aims to provide a family of command and control systems in air, space, and cyberspace.

The U.S. Space Force has disclosed that it intends to develop a low earth orbit satellite constellation to provide GMTI and AMTI capabilities in the future. The Air Force has also stated it intends to eventually transition airborne battle management aircraft to a space-based capability. It remains unclear when this space-based radar constellation would be operational.

AWACS Replacement Program

The Air Force is obtaining the E-7 aircraft to, in part, replace the capabilities of the AWACS. In April 2022, the Air Force announced it would award a sole source contract to Boeing for its E-7, also known as Wedgetail. The Wedgetail utilizes a multirole electronically scanned area radar that provides 360 degrees of surveillance coverage, with a reported radar range in excess of 174 nautical miles (200 miles, or 322 kilometers). The E-7 Wedgetail also is capable of being refueled in-flight. Boeing currently

projects E-7 Wedgetail operating costs to be 66% lower with higher mission capable rates (i.e., more aircraft available for use) when compared to E-3 AWACS. According to the defense press, three companies initially responded to a request for information for potential AWACS replacement aircraft. However, the Air Force determined only the Boeing E-7 Wedgetail met all of its requirements—the other two aircraft did not provide aerial refueling capabilities or 360-degree radar coverage.

The E-7, developed by the Royal Australian Air Force and produced by Boeing in Renton and Tukwila, WA, is based on a 737 airliner airframe (**Figure 2**). Australia contracted with Boeing to develop and acquire six Wedgetail aircraft in 2002, with initial delivery completed in 2009 and full operational capability achieved in 2015. The United Kingdom subsequently contracted Boeing to produce five Wedgetails in 2019, with delivery of the final aircraft expected in 2023. Turkey and South Korea also operate the aircraft.

Figure 2. E-7 Wedgetail



Source: Breaking Defense, at <https://breakingdefense.com/2021/09/brown-air-force-serious-about-e-7-wedgetail/>.

According to defense press sources, the Air Force intends to purchase two aircraft as prototypes—one aircraft purchased in FY2023 and the other aircraft in FY2024—and 20 additional aircraft. This acquisition strategy would result in a total fleet of 22 aircraft. Initial Operating Capability is anticipated to be in FY2030. To meet this development cycle, the Air Force is using middle tier acquisition authorities for rapid prototyping.

Some Members of Congress have expressed interest in potentially accelerating the E-7 Wedgetail procurement. Andrew Hunter, the Air Force’s Service Acquisition Executive, in July 2022 stated there are limited options in accelerating procurement. Mr. Hunter noted the E-7 Wedgetail requires substantial modifications from a normal 737 and requires software development. Another potential

issue that could prevent an accelerated E-7 Wedgetail procurement is receiving certification from the Federal Aviation Administration (FAA). FAA certification has delayed other Air Force programs in the past.

Congressional Action

The House-passed version of the FY2023 National Defense Authorization Act (NDAA) (H.R. 7900) discusses the AWACS Replacement program. Section 132 would limit the number of E-3s that may be retired in one fiscal year. This section would also require the Secretary of the Air Force to provide a report comparing the E-3 and E-7 capabilities. Similarly, Section 141 of the Senate FY2023 NDAA (S. 4543) would also limit the number of E-3s that can be retired until receiving a report from the Air Force’s Service Acquisition Executive. The Senate would, in addition, add \$301 million to procure an additional E-7 prototype aircraft.

The House Appropriations Committee report (H.Rept. 117-388) accompanying the House-version of the FY2023 Defense Appropriations Act, 2023 (H.R. 8236), would reduce funding for the AWACS Replacement Program from \$226.7 million to \$206.7 million (a \$20 million reduction).

Potential Questions for Congress

- What are the tradeoffs of pursuing a space-based command and control architecture compared with a traditional air-based system? When does the Space Force anticipate having a space-based GMTI and AMTI capability ready to replace aircraft?
- How effective will the E-7 Wedgetail be in the presence of advanced air defense and adversary fighter aircraft? Do improved sensor capabilities and ranges address increased risks posed by adversaries?
- The E-7 Wedgetail is a crewed aircraft. Could uncrewed systems perform similar command and control missions? How much additional development would an uncrewed solution require, and would it offer operational advantages?
- With ABMS linking sensors together across the service, the Air Force considers every aircraft to be a sensor platform. Does a potential E-3 replacement bring enough unique capability to warrant deploying a dedicated fleet of aircraft?

Jeremiah “JJ” Gertler, former Specialist in Military Aviation, originally co-authored this report.

John R. Hoehn, Analyst in Military Capabilities and Programs

IFI 2045

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