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## Aerial Targets

Congress has required the U.S. Department of Defense (DOD) to conduct realistic testing of certain weapon systems. The U.S. Air Force, Army, and Navy have acquired a portfolio of subscale and full-scale “aerial targets” in part to meet this requirement. Aerial targets simulate real world aerial threats, such as crewed fixed- and rotary-wing aircraft, missiles, and uncrewed aircraft systems (UAS). Congress could consider whether or not to require DOD to continue modernizing its existing portfolio of aerial targets or to invest in new aerial target systems. Congress could assess whether DOD-proposed systems are sufficiently realistic to represent the range of current and future aerial threats.

The origins of the U.S. military’s aerial targets are intertwined with those of uncrewed aerial systems, sometimes referred to as “drones.” In the 1930s, the U.S. Navy launched a program to use drones to evaluate the effectiveness of anti-aircraft weapons on ships. According to one analysis of this program, the use of target drones exposed weaknesses in the Navy’s defenses and gunnery training and convinced the Navy to make several improvements to the anti-aircraft weapons on ships. Beginning in the early 1960s and continuing through the Vietnam War, the U.S. Air Force used modified target drones to gather intelligence. These operations constituted the first large-scale use of drones in combat operations and contributed to a broader adoption of uncrewed aircraft.

In Section 2366 of the National Defense Authorization Act for Fiscal Year 1987 (P.L. 99-661), Congress required that DOD evaluate the survivability of certain systems and the lethality of certain munitions before proceeding beyond low-rate initial production. This requirement is codified as Title 10, *United States Code*, Section 4172. Consequently, the U.S. Air Force, Army, and Navy are developing, acquiring, and deploying aerial targets for survivability and lethality testing—and for training military personnel—that are designed to represent a variety of aerial threats, ranging from UAS to sea-skimming anti-ship cruise missiles.

### Air Force Programs

The Air Force Life Cycle Management Center’s Aerial Targets Program Office manages the Air Force’s aerial targets programs, the BQM-167A and QF-16. Additionally, the 82<sup>nd</sup> Aerial Targets Squadron operates the Air Force’s aerial targets for Air Force units, as well as for those used by the Army and Navy. Congress appropriated approximately \$41.4 million in FY2024 procurement and research, development, test and evaluation (RDT&E) funding for the Air Force’s aerial target programs.

- **BQM-167A Air Force Subscale Aerial Target (AFSAT).** The BQM-167A (see **Figure 1**) is a recoverable subsonic aerial target designed primarily to

simulate an air-to-air engagement. Composites Engineering Inc. (today Kratos Defense & Security Solutions) began developing the BQM-167A in 2000 for the Air Force’s AFSAT program, which sought to replace the Cold War-era MQM-107 and BQM-34 target drones. Composites Engineering conducted the maiden flight of the BQM-167A in 2001, and the Air Force selected the aircraft for the AFSAT program the following year. The BQM-167A achieved initial operational capability in 2008.

- **QF-16 Full-Scale Aerial Target (FSAT).** The QF-16, a converted Boeing F-16 Viper Block 15 fighter aircraft, is a remotely operated, recoverable, supersonic-capable aerial target designed to mimic fourth-generation fighter aircraft for air-to-air pilot training and missile development. The QF-16 program began in 2010, when the Air Force awarded Boeing a contract to convert the Vipers into target drones. The QF-16 replaced the previous FSAT, the QF-4, which was a converted F-4 Phantom. The Air Force declared in 2016 that the QF-16 had met initial operational capability; Boeing completed production of the aircraft in 2022.

**Figure 1. BQM-167A**



**Source:** Photo by Sara L. Vidoni/U.S. Air Force.

### Army Programs

The Program Executive Office for Simulation, Training, and Instrumentation’s Threat Systems Management Office (TSMO) is responsible for providing aerial, surface, and virtual targets to the Army. Congress appropriated approximately \$46.6 million in FY2024 procurement and RDT&E funding for the Army’s aerial target programs.

- **MQM-170 Outlaw.** The MQM-170 serves as the Army’s Remotely Piloted Vehicle Target (RPVT). It is a

recoverable aerial target designed to simulate threats posed by small UAS for the purposes of live-fire air defense artillery training and weapons development. In 2003, the Army selected the MQM-170 to replace the Continental RPVs MQM-143. The latest variant of the Outlaw is the MQM-170C Outlaw G2. In addition to air defense artillery training, the Army uses the RPVT for Apache attack helicopter live-fire training.

- **MQM-171 Broadsword.** The MQM-171 is a recoverable aerial target designed to simulate threats posed by medium tactical UAS. The Army completed a critical design review of Griffon Aerospace's MQM-171 in October 2004.
- **MQM-186 RedWing.** The MQM-186 is a recoverable aerial target designed to simulate threats posed by small-to-midsized UAS.

## Navy Programs

The Naval Air Systems Command's (NAVAIR's) Aerial Targets program office (PMA-208) is responsible for delivering aerial targets to the Navy. Congress appropriated approximately \$188.4 million in FY2024 procurement and RDT&E funding for the Navy's aerial target programs.

- **BQM-34S.** The Northrop Grumman BQM-34S is a recoverable subsonic aerial target. First developed by Teledyne Ryan in the 1950s, in the mid-2000s, the Navy contracted Northrop Grumman to retrofit some of its BQM-34S aircraft with modernized electronics. Since then, the Navy has continued to modernize the BQM-34, with the latest upgrades integrating a miniaturized payload designed to simulate an electronic attack.
- **BQM-177A Subsonic Aerial Target (SSAT).** The BQM-177A is a recoverable subsonic aerial target designed to mimic an anti-ship cruise missile (ASCM). The Navy uses the BQM-177A to evaluate ship air and missile defense systems, such as the AEGIS command-and-control system and the SM-6 and SM-2 missiles. In 2011, NAVAIR awarded Composite Engineering Inc. (now Kratos) a contract to develop a next-generation SSAT based on the BQM-167X variant of the Air Force's BQM-167A. The BQM-177A achieved full operational capability in 2022.
- **GQM-163A Coyote.** The GQM-163A Coyote (see **Figure 2**) is a nonrecoverable supersonic sea skimming target (SSST) aerial target designed to improve ship defense systems by simulating supersonic anti-ship cruise missiles (ASCMs). In July 2000, the Navy awarded Orbital Sciences Corp. (now Northrop Grumman) a contract for the SSST program. Orbital conducted the first launch of the GQM-163A in 2003 and completed developmental flight tests of the aerial target in 2005. As of 2022, Northrop reported delivering 145 GQM-163A targets to the Navy. In early 2024, the Navy announced its intention to award Northrop a contract to study the possibility of increasing "the performance envelope" of the GQM-163A to improve tests of its ship defense systems.

**Figure 2. GQM-163A Coyote**



Source: Photo by Latasha Ball/Naval Surface Warfare Center.

## Other Aerial Target Programs

- **Next Generation Aerial Target (NGAT) and the Fifth Generation Aerial Target (5GAT).** DOD has two programs to develop an aerial target to represent fifth-generation fighter aircraft and to replace the Air Force's QF-16, which is designed to mimic fourth-generation fighter aircraft. First, DOD's Director of Operational Test and Evaluation (DOT&E), in collaboration with the Army and other DOD offices, has led the development of the 5GAT, an uncrewed aircraft designed by Sierra Technical Services (now Kratos). Separately, the Air Force's Aerial Targets Program Office is evaluating an acquisition strategy for an NGAT to replace the QF-16. The Air Force's performance and payload requirements for an NGAT are somewhat different from the Army's and DOT&E's 5GAT system, although the Air Force has indicated that it is following the latter's progress.

## Potential Considerations for Congress

- **System Specifications.** In its FY2023 annual report, DOT&E highlighted a need for modern aerial targets that would allow DOT&E to evaluate realistically the capabilities of U.S. weapon systems. Congress could consider whether or not to direct DOD to detail the performance characteristics of existing aerial targets and identify any potential aerial threats for which the current portfolio of aerial targets are not practicable solutions.
- **Technological Maturity.** The U.S. military has long relied on using modified versions of existing aircraft as full-scale aerial targets, the latest being the QF-16. There do not appear to be any fifth-generation fighter aircraft that are available to serve as full-scale aerial targets. Congress could consider whether future proposals for full-scale aerial targets sufficiently represent the threats posed by fifth-generation fighters.

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