Reaper Drone General Atomics MQ-9

From Wikipedia, the free encyclopedia

|  |
| --- |
| **MQ-9 Reaper / Predator B** |
|  |
| U.S. Customs and Border Protection's Predator B |
| **Role** | [Unmanned combat aerial vehicle](https://en.wikipedia.org/wiki/Unmanned_combat_aerial_vehicle) |
| **National origin** | United States |
| **Manufacturer** | [General Atomics Aeronautical Systems](https://en.wikipedia.org/wiki/General_Atomics_Aeronautical_Systems) |
| **First flight** | 2 February 2001 |
| **Introduction** | 1 May 2007 |
| **Status** | In service |
| **Primary users** | [United States Air Force](https://en.wikipedia.org/wiki/United_States_Air_Force)* [U.S. Customs and Border Protection](https://en.wikipedia.org/wiki/U.S._Customs_and_Border_Protection)
* [Royal Air Force](https://en.wikipedia.org/wiki/Royal_Air_Force)
* [Italian Air Force](https://en.wikipedia.org/wiki/Italian_Air_Force)
 |
| **Number built** | 163 as of 2014 |
| **Program cost** | [US$](https://en.wikipedia.org/wiki/United_States_dollar)11.8 billion |
| **Unit cost** | US$16.9 million ([flyaway cost](https://en.wikipedia.org/wiki/Flyaway_cost), 2013)  |
| **Developed from** | [General Atomics MQ-1 Predator](https://en.wikipedia.org/wiki/General_Atomics_MQ-1_Predator) |
| **Developed into** | [General Atomics Avenger](https://en.wikipedia.org/wiki/General_Atomics_Avenger) |

The **General Atomics MQ-9 Reaper** (sometimes called **Predator B**) is an [unmanned aerial vehicle](https://en.wikipedia.org/wiki/Unmanned_aerial_vehicle) (UAV) capable of [remotely controlled](https://en.wikipedia.org/wiki/Remotely_controlled) or [autonomous flight](https://en.wikipedia.org/wiki/Autonomous_flight)operations, developed by [General Atomics Aeronautical Systems](https://en.wikipedia.org/wiki/General_Atomics_Aeronautical_Systems) (GA-ASI) primarily for the [United States Air Force](https://en.wikipedia.org/wiki/United_States_Air_Force) (USAF). The MQ-9 and other UAVs are referred to as Remotely Piloted Vehicles/Aircraft (RPV/RPA) by the USAF to indicate their human ground controllers. The MQ-9 is the first [hunter-killer](https://en.wikipedia.org/wiki/USAF_Hunter-Killer) UAV designed for long-endurance, [high-altitude](https://en.wikipedia.org/wiki/High-altitude_platform) [surveillance](https://en.wikipedia.org/wiki/Surveillance_aircraft). In 2006, the then–[Chief of Staff of the United States Air Force](https://en.wikipedia.org/wiki/Chief_of_Staff_of_the_United_States_Air_Force) General [T. Michael Moseley](https://en.wikipedia.org/wiki/T._Michael_Moseley) said: "We've moved from using UAVs primarily in intelligence, surveillance, and reconnaissance roles before Operation Iraqi Freedom, to a true hunter-killer role with the Reaper."

The MQ-9 is a larger, heavier, and more capable aircraft than the earlier [General Atomics MQ-1 Predator](https://en.wikipedia.org/wiki/General_Atomics_MQ-1_Predator); it can be controlled by the same ground systems used to control MQ-1s. The Reaper has a 950-[shaft-horsepower](https://en.wikipedia.org/wiki/Shaft_horsepower%22%20%5Co%20%22Shaft%20horsepower) (712 kW) [turboprop](https://en.wikipedia.org/wiki/Turboprop) engine (compared to the Predator's 115 hp (86 kW) piston engine). The greater power allows the Reaper to carry 15 times more [ordnance](https://en.wikipedia.org/wiki/Aircraft_ordnance) payload and cruise at about three times the speed of the MQ-1. The aircraft is monitored and controlled by aircrew in the Ground Control Station (GCS), including weapons employment.

In 2008, the [New York Air National Guard](https://en.wikipedia.org/wiki/New_York_Air_National_Guard) [174th Attack Wing](https://en.wikipedia.org/wiki/174th_Attack_Wing) began the transition from [F-16](https://en.wikipedia.org/wiki/General_Dynamics_F-16_Fighting_Falcon) piloted fighters to MQ-9 Reapers, becoming the first fighter unit to convert entirely to [unmanned combat aerial vehicle](https://en.wikipedia.org/wiki/Unmanned_combat_aerial_vehicle) (UCAV) use. In March 2011, the U.S. Air Force was training more pilots for advanced unmanned aerial vehicles than for any other single weapons system. The Reaper is also used by the [United States Navy](https://en.wikipedia.org/wiki/United_States_Navy), the [CIA](https://en.wikipedia.org/wiki/Central_Intelligence_Agency), [U.S. Customs and Border Protection](https://en.wikipedia.org/wiki/U.S._Customs_and_Border_Protection), [NASA](https://en.wikipedia.org/wiki/NASA), and the militaries of several other countries. The USAF plans to keep the MQ-9 in service into the 2030s.

Development

**Origins**

Satellite antenna and sensors of a NOAA-NASA flight demonstrator, 2005

General Atomics began development with the "Predator B-001", a proof-of-concept aircraft, which first flew on 2 February 2001. [Abraham Karem](https://en.wikipedia.org/wiki/Abraham_Karem) is the designer of the Predator. The B-001 was powered by an [AlliedSignal](https://en.wikipedia.org/wiki/AlliedSignal) [Garrett TPE331](https://en.wikipedia.org/wiki/Garrett_TPE331)-10T turboprop engine with 950 shaft horsepower (710 kW). It had an airframe that was based on the standard Predator airframe, except with an enlarged fuselage and wings lengthened from 48 feet (15 m) to 66 feet (20 m). The B-001 had a speed of 220 knots (410 km/h; 250 mph) and could carry a payload of 750 pounds (340 kg) to an altitude of 50,000 feet (15,000 m) with an endurance of 30 hours.

The company refined the design, taking it in two separate directions. The first was a jet-powered version; "Predator B-002" was fitted with a [Williams FJ44](https://en.wikipedia.org/wiki/Williams_FJ44)-2A [turbofan](https://en.wikipedia.org/wiki/Turbofan) engine with 10.2 [kilonewtons](https://en.wikipedia.org/wiki/Newton_%28unit%29) (2,300 [lbf](https://en.wikipedia.org/wiki/Pound-force%22%20%5Co%20%22Pound-force); 1,040 [kgf](https://en.wikipedia.org/wiki/Kilogram-force%22%20%5Co%20%22Kilogram-force)) thrust. It had payload capacity of 475 pounds (215 kg), a ceiling of 60,000 feet (18 km) and endurance of 12 hours. The USAF ordered two airframes for evaluation, delivered in 2007. The first two airframes delivered with prototypes B-001 and B-002 (now in the [USAF museum](https://en.wikipedia.org/wiki/National_Museum_of_the_United_States_Air_Force) at Wright-Patterson AFB). B-002 was originally equipped with the FJ-44 engine but it was removed and a TPE-331-10T was installed so that the USAF could take delivery of two aircraft in the same configuration.

The second direction the design took was the "Predator B-003", referred to by GA as the "Altair", which has a new airframe with an 84-foot (26 m) wingspan and a takeoff weight of about 7,000 pounds (3,200 kg). Like the Predator B-001, it is powered by a TPE-331-10YGD turboprop. This variant has a payload capacity of 3,000 pounds (1,400 kg), a maximum ceiling of 52,000 feet (16 km), and an endurance of 36 hours.

In October 2001, the USAF signed a contract for an initial pair of Predator Bs (001 and 002) for evaluation. Designated YMQ-9s due to their prototype role, they were delivered in 2002. The USAF referred to it as "Predator B" until it was renamed "Reaper". The USAF aimed for the Predator B to provide an improved "deadly persistence" capability, flying over a combat area night-and-day waiting for a target to present itself, complementing piloted [attack aircraft](https://en.wikipedia.org/wiki/Attack_aircraft), typically used to drop larger quantities of ordnance on a target, while a cheaper RPV can operate almost continuously using ground controllers working in shifts, but carrying less ordnance.

**Operation**

Operators, stationed at bases such as [Creech Air Force Base](https://en.wikipedia.org/wiki/Creech_Air_Force_Base), near [Las Vegas](https://en.wikipedia.org/wiki/Las_Vegas%2C_Nevada), can hunt for targets and observe terrain using multiple sensors, including a [thermographic camera](https://en.wikipedia.org/wiki/Thermographic_camera). One claim was that the on-board camera is able to read a license plate from two miles (3.2 km) away. An operator's command takes 1.2 seconds to reach the drone via a [satellite](https://en.wikipedia.org/wiki/Satellite) link. The MQ-9 is fitted with six stores pylons; the inner stores pylons can carry a maximum of 1,500 pounds (680 kg) each and allow carriage of external fuel tanks. The mid-wing stores pylons can carry a maximum of 600 pounds (270 kg) each, while the outer stores pylons can carry a maximum of 200 pounds (91 kg) each. An MQ-9 with two 1,000 pounds (450 kg) external fuel tanks and one thousand pounds of munitions has an endurance of 42 hours. The Reaper has an endurance of 14 hours when fully loaded with munitions. The MQ-9 carries a variety of weapons including the [GBU-12 Paveway II](https://en.wikipedia.org/wiki/GBU-12_Paveway_II) laser-guided bomb, the [AGM-114 Hellfire II](https://en.wikipedia.org/wiki/AGM-114_Hellfire) air-to-ground missiles, the [AIM-9 Sidewinder](https://en.wikipedia.org/wiki/AIM-9_Sidewinder), and the [GBU-38 JDAM](https://en.wikipedia.org/wiki/GBU-38) (Joint Direct Attack Munition). Tests are underway to allow for the addition of the [AIM-92 Stinger](https://en.wikipedia.org/wiki/AIM-92_Stinger) air-to-air missile.

By October 2007, the USAF owned nine Reapers, and by December 2010 had 57 with plans to buy another 272, for a total of 329 Reapers. Critics have stated that the USAF's insistence on qualified pilots flying RPVs is a bottleneck to expanding deployment. USAF Major General William Rew stated on 5 August 2008, "For the way we fly them right now"—fully integrated into air operations and often flying missions alongside manned aircraft—"we want pilots to fly them." This reportedly has exacerbated losses of USAF aircraft in comparison with US Army operations. In March 2011, U.S. Department of Defense Secretary Robert Gates stated that, while manned aircraft are needed, the USAF must recognize "the enormous strategic and cultural implications of the vast expansion in remotely piloted vehicles..." and stated that as the service buys manned fighters and bombers, it must give equal weight to unmanned drones and "the service's important role in the cyber and space domains."

In 2013, the [Air Force Special Operations Command](https://en.wikipedia.org/wiki/Air_Force_Special_Operations_Command) (AFSOC) sought the ability to pack up an MQ-9 in less than eight hours, fly it anywhere in the world aboard a [C-17 Globemaster III](https://en.wikipedia.org/wiki/C-17_Globemaster_III), and then have it ready to fly in another eight hours to support special operations teams at places with no infrastructure. MQ-1 and MQ-9 drones must fly aboard cargo aircraft to travel long distances as they lack the refueling technology or speed to travel themselves; the C-17 is large enough to carry the aircraft and support systems and can land on short runways. Pilots traveling with the Reaper will use the ground control station to launch and land the aircraft, while most of the flying will be done by US-based pilots.

**Testbed and upgrades**

In November 2012, Raytheon completed ground verification tests for the [ADM-160 MALD](https://en.wikipedia.org/wiki/ADM-160_MALD) and [MALD-J](https://en.wikipedia.org/wiki/ADM-160_MALD) for integration onto the Reaper for an unmanned [suppression of enemy air defenses](https://en.wikipedia.org/wiki/Suppression_of_enemy_air_defenses) capability. On 12 April 2013, a company-owned MQ-9 equipped with a jamming pod and digital receiver/exciter successfully demonstrated its [electronic warfare](https://en.wikipedia.org/wiki/Electronic_warfare) capability at Marine Corp Air Station (MCAS) Yuma, performing its mission in coordination with over 20 participating aircraft. A second electronic warfare test, fitted with the [Northrop Grumman](https://en.wikipedia.org/wiki/Northrop_Grumman) Pandora EW System, was conducted on 22 October 2013 with other unmanned aircraft and[Northrop Grumman EA-6B Prowlers](https://en.wikipedia.org/wiki/Northrop_Grumman_EA-6B_Prowler%22%20%5Co%20%22Northrop%20Grumman%20EA-6B%20Prowler), showing effectiveness in a multi-node approach against a more capable IADS.

In 2011, the U.S. [Missile Defense Agency](https://en.wikipedia.org/wiki/Missile_Defense_Agency) (MDA) reported its interest in using the Reaper and its MTS-B sensor to provide firing quality data for early interception of [ballistic missile](https://en.wikipedia.org/wiki/Ballistic_missile) launches. The MDA is exploring concepts to use the UAV's EO/IR sensor to achieve "launch-on-remote" capabilities with missile interceptors before detection by [Aegis](https://en.wikipedia.org/wiki/Aegis_Combat_System) radars. At least two aircraft would be needed to triangulate a target to provide high-fidelity data. The MTS-B includes short and mid-wave IR bands, optimal for tracking launch and rocket burn. In 2013, the MDA terminated plans to build a follow-on to the two orbiting [Space Tracking and Surveillance System](https://en.wikipedia.org/wiki/Space_Tracking_and_Surveillance_System) (STSS) satellites due to near-term costs, opting to continue testing the Reaper for ballistic missile target discrimination. The MDA planned to test the improved MTS-C sensor, which adds a long-wave IR detector optimized for tracking cold bodies such as missiles and warheads after booster burnout, or plumes and exhaust. The goal is to use data from multiple high-flying UAVs to provide an off-board cue to launch an [SM-3 missile](https://en.wikipedia.org/wiki/RIM-161) from an Aegis ship. Two Reapers demonstrated their ability to track ballistic missiles using their MTS-B EO/IR turret during a test in late June 2016.

In June 2015, a study by the USAF's Scientific Advisory Board identified several improvements for operating the Reaper in contested airspace; adding readily available sensors, weapons, and threat detection and countermeasures could increase situational awareness and enable riskier deployments. Suggestions included a [radar warning receiver](https://en.wikipedia.org/wiki/Radar_warning_receiver) (RWR) to know when it's being targeted, air-to-air and miniature air-to-ground weapons, manned-unmanned teaming, multi-UAV control, automatic take-offs and landings, and precision navigation and timing systems to fly in [GPS](https://en.wikipedia.org/wiki/GPS)-denied areas. Another idea was redesigned ground control stations with user-friendly video game-like controllers and touchscreen maps to access data without overwhelming operators.

In October 2015, Air Force deputy chief of staff for ISR Robert Otto suggested redesigning the MQ-9's GCS to be operated by one person for most missions rather than two (to fly and work the sensors) to simplify operations and reduce manpower requirements by hundreds of sensor operators. Introducing an auto-land capability would also reduce the Reaper's manpower requirements to staff launch and recovery teams. Automatic take-off and landing capabilities are already present in the [RQ-4 Global Hawk](https://en.wikipedia.org/wiki/RQ-4_Global_Hawk) and [MQ-1C Gray Eagle](https://en.wikipedia.org/wiki/General_Atomics_MQ-1C_Gray_Eagle), and are planned to be provided to the MQ-9 in 2017. The Air Force requires the manually loaded Reaper to operate from a runway at least 5,000 ft (1.5 km) long, but automated take-offs and landings would enable it to operate from a 3,000 ft (0.91 km) runway.

In April 2017, an MQ-9 Block 5 flew with a [Raytheon](https://en.wikipedia.org/wiki/Raytheon) [ALR-69A RWR](https://en.wikipedia.org/wiki/ALR-67_Radar_Warning_Receiver) in its payload pod to demonstrate the aircraft's ability to conduct missions in the proximity of threat radars and air defenses, the first time this capability was demonstrated on a remotely piloted aircraft.

Design

An MQ-9 taxiing in [Afghanistan](https://en.wikipedia.org/wiki/Afghanistan), 2007

A typical MQ-9 system consists of multiple aircraft, ground control station, communications equipment, maintenance spares, and personnel. A military crew includes a pilot, sensor operator, and Mission Intelligence Coordinator. The aircraft is powered by a 950 horsepower (710 kW) [turboprop](https://en.wikipedia.org/wiki/Turboprop), with a maximum speed of about 260 knots (480 km/h; 300 mph) and a cruising speed of 150–170 knots (170–200 mph; 280–310 km/h). With a 66 ft (20 m) wingspan, and a maximum payload of 3,800 lb (1,700 kg), the MQ-9 can be armed with a variety of weaponry, including [Hellfire missiles](https://en.wikipedia.org/wiki/Hellfire_missiles) and [500-lb laser-guided bomb](https://en.wikipedia.org/wiki/Laser-guided_bomb) units. Endurance is 30 hours when conducting [ISR](https://en.wikipedia.org/wiki/ISTAR#ISR_.28Intelligence.2C_surveillance_and_reconnaissance.29) missions, which decreases to 23 hours if it is carrying a full weapons load. The Reaper has a range of 1,000 nmi (1,150 mi; 1,850 km and an operational altitude of 50,000 ft (15,000 m), which makes it especially useful for long-term loitering operations, both for surveillance and support of ground troops.

First MQ-9 arriving at [Creech AFB](https://en.wikipedia.org/wiki/Creech_AFB), March 2007

The Predator and Reaper were designed for military operations and not intended to operate among crowded airline traffic. The aircraft typically lack systems capable of complying with FAA See-And-Avoid regulations. On 18 May 2006, the [Federal Aviation Administration](https://en.wikipedia.org/wiki/Federal_Aviation_Administration) (FAA) issued a certificate of authorization allowing MQ-1 and MQ-9 UAVs to fly in U.S. civil airspace to search for survivors of disasters. In 2005, requests were made for MQ-9s to be used in [search and rescue](https://en.wikipedia.org/wiki/Search_and_rescue) operations following [Hurricane Katrina](https://en.wikipedia.org/wiki/Hurricane_Katrina) but, as there was no FAA authorization in place at the time, it was not used.

An MQ-9 can adopt various mission kits and combinations of weapons and sensors payloads to meet combat requirements. Its Raytheon AN/AAS-52 multi-spectral targeting sensor suite includes a color/monochrome daylight TV, infrared, and image-intensified TV with [laser rangefinder](https://en.wikipedia.org/wiki/Laser_rangefinder)/[laser designator](https://en.wikipedia.org/wiki/Laser_designator) to designate targets for laser guided munitions. The aircraft is also equipped with the Lynx Multi-mode Radar that contains [synthetic aperture radar](https://en.wikipedia.org/wiki/Synthetic_aperture_radar) (SAR) that can operate in both spotlight and strip modes, and [ground moving target indication](https://en.wikipedia.org/wiki/Ground_moving_target_indication) (GMTI) with Dismount Moving Target Indicator (DMTI) and Maritime Wide-Area Search (MWAS) capabilities. The Reaper was used as a test bed for [Gorgon Stare](https://en.wikipedia.org/wiki/Gorgon_Stare), a wide-area surveillance sensor system. Increment 1 of the system was first fielded in March 2011 on the Reaper and could cover an area of 16 km2 (6.2 sq mi); increment 2, incorporating [ARGUS-IS](https://en.wikipedia.org/wiki/ARGUS-IS) and expanding the coverage area to 100 km2 (39 sq mi), achieved initial operating capability (IOC) in early 2014. The system has 368 cameras capable of capturing five million pixels each to create an image of about 1.8 billion pixels; video is collected at 12 frames per second, producing several terabytes of data per minute.

In January 2012, General Atomics released a new trailing arm design for the Reaper's main landing gear; benefits include an over 30 percent increase in landing weight capacity, a 12 percent increase in gross takeoff weight (from 10,500 pounds (4,800 kg) to 11,700 pounds (5,300 kg)), a maintenance-free shock absorber (eliminating the need for nitrogen pressurization), a fully rejected takeoff brake system, and provisions for automatic takeoff and landing capability and Anti-lock Brake System (ABS) field upgrades. In April 2012, General Atomics announced possible upgrades to USAF Reapers, including two extra 100 US gallons (380 l) fuel pods under the wings to increase endurance to 37 hours. The wingspan can also be increased to 88 feet (27 m), increasing endurance to 42 hours. The USAF has bought 38 Reaper Extended Range (ER) versions, carrying external fuel tanks (which don't affect weapon capacity), the heavy-weight landing gear, a four-bladed propeller, a new fuel management system which ensures fuel and thermal balance among external tank, wing, and fuselage fuel sources, and an alcohol water injection (AWI) system to shorten required runway takeoff length; these features increase endurance from 27 to 33–35 hours, while the company is still pitching the lengthened wing option. The Reaper ER first flew operationally in August 2015. The aircraft also has the sensor ball replaced with a high-definition camera, better communications so ground controllers can see the higher quality video, software to enable automatic detection of threats and tracking of 12 moving targets at once, and the ability to "super ripple" fire missiles within 0.32 seconds of each other.

On 25 February 2016, General Atomics announced a successful test flight of the new Predator-B/ER version. This new version has had the wingspan extended to 79 feet, increasing its endurance to 40 hours. Other improvements include "short-field takeoff and landing performance and spoilers on the wings which enable precision automatic landings. The wings also have provisions for leading-edge de-ice and integrated low- and high-band RF antennas."

Operational history

**U.S. Air Force**

UAV Operators at Joint Base Balad (LSA Anaconda), Iraq, 20 April 2005

On 1 May 2007, the USAF's [432d Wing](https://en.wikipedia.org/wiki/432d_Wing) was activated to operate MQ-9 Reaper as well as MQ-1 Predator UAVs at [Creech Air Force Base](https://en.wikipedia.org/wiki/Creech_Air_Force_Base), [Nevada](https://en.wikipedia.org/wiki/Nevada). The pilots first conducted combat missions in Iraq and Afghanistan in the summer of 2007. On 28 October 2007, the [*Air Force Times*](https://en.wikipedia.org/wiki/Air_Force_Times) reported an MQ-9 had achieved its first "kill", successfully firing a[Hellfire missile](https://en.wikipedia.org/wiki/Hellfire_missile%22%20%5Co%20%22Hellfire%20missile) against Afghanistan insurgents in the Deh Rawood region of the mountainous Oruzgan province. By 6 March 2008, according to USAF Lieutenant General Gary North, the Reaper had attacked 16 targets in Afghanistan using 500 lb (230 kg) bombs and Hellfire missiles.

On 17 July 2008, the USAF began flying Reaper missions within Iraq from [Balad Air Base](https://en.wikipedia.org/wiki/Balad_Air_Base). It was reported on 11 August 2008 that the [174th Fighter Wing](https://en.wikipedia.org/wiki/174th_Fighter_Wing) would consist entirely of Reapers. By March 2009 the USAF had 28 operational Reapers. Beginning in September 2009, Reapers were deployed by the [Africa Command](https://en.wikipedia.org/wiki/Africa_Command) to the[Seychelles](https://en.wikipedia.org/wiki/Seychelles%22%20%5Co%20%22Seychelles) islands for use in [Indian Ocean](https://en.wikipedia.org/wiki/Indian_Ocean) [anti-piracy](https://en.wikipedia.org/wiki/Piracy_in_Somalia) patrols.

On 13 September 2009, positive control of an MQ-9 was lost during a combat mission over Afghanistan, after which the control-less drone started flying towards the Afghan border with [Tajikistan](https://en.wikipedia.org/wiki/Tajikistan). An [F-15E Strike Eagle](https://en.wikipedia.org/wiki/F-15E_Strike_Eagle) shot it down with an [AIM-9](https://en.wikipedia.org/wiki/AIM-9) missile. It was the first US drone to be destroyed intentionally by allied forces.

By July 2010, thirty-eight Predators and Reapers had been lost during combat operations in Afghanistan and Iraq, another nine were lost in training missions in the U.S. In 2010, the USAF conducted over 33,000 close air support missions, a more-than-20 percent increase compared with 2009. By March 2011, the USAF had 48 Predator and Reaper combat air patrols flying in Iraq and Afghanistan compared with 18 in 2007.

MQ-9 Reaper in Afghanistan, 2007

As of March 2011, the USAF was training more pilots for advanced unmanned aerial vehicles than for any other single weapons system. In 2012, the Reaper, Predator and[Global Hawk](https://en.wikipedia.org/wiki/Northrop_Grumman_RQ-4_Global_Hawk%22%20%5Co%20%22Northrop%20Grumman%20RQ-4%20Global%20Hawk) were described as "... the most accident-prone aircraft in the Air Force fleet." These figures must be taken with caution due to the aircraft's nature, often performing hostile or dangerous missions.

In October 2011, the USAF began operating Reapers out of [Arba Minch](https://en.wikipedia.org/wiki/Arba_Minch_Airport) in [Ethiopia](https://en.wikipedia.org/wiki/Ethiopia) for surveillance-only operations in [Somalia](https://en.wikipedia.org/wiki/Somalia). In 2012, both Reapers and Predators were deployed in [Benghazi](https://en.wikipedia.org/wiki/Benghazi), [Libya](https://en.wikipedia.org/wiki/Libya) after [the attack](https://en.wikipedia.org/wiki/2012_Benghazi_attack) that killed the US ambassador in that city. In February 2013, the U.S. stationed a Predator at [Niamey](https://en.wikipedia.org/wiki/Niamey) to provide intelligence for French forces during [Operation Serval](https://en.wikipedia.org/wiki/Operation_Serval) in [Mali](https://en.wikipedia.org/wiki/Mali), it was later replaced by two MQ-9 Reapers. In April 2013, one of these Reapers crashed on a surveillance flight due to mechanical failure.

On 22 October 2013, the USAF's fleets of MQ-1 Predator and MQ-9 Reaper UAVs reached 2,000,000 flight hours. The RPA program began in the mid-1990s, taking 16 years for them to reach 1 million flight hours; the 2 million hour mark was reached just two and a half years later.

The high demand for UAVs has caused [Air Combat Command](https://en.wikipedia.org/wiki/Air_Combat_Command) to increase pilot output from 188 in 2015 to 300 in 2017 at Holloman.

On 13 November 2015, the Pentagon reported that an MQ-9 had killed [ISIL](https://en.wikipedia.org/wiki/Islamic_State_of_Iraq_and_the_Levant) member Mohammed Emwazi, popularly known as "[Jihadi John](https://en.wikipedia.org/wiki/Jihadi_John%22%20%5Co%20%22Jihadi%20John)", who was responsible for executing several Western prisoners.

In 2015, a record number (20) of Air Force drones crashed in major accidents. Working with engineers from General Atomics, investigators identified three parts of the starter-generator that were susceptible to breakdowns. But they couldn’t figure out why they were failing. Col. William S. Leister informed Pentagon officials that investigators from the Air Force, General Atomics and Skurka had investigated the problem for more than a year. The team, he said, had identified “numerous manufacturing quality issues” yet had been unable to determine the exact cause of the failures.

On 2 October 2017, [U.S. Central Command](https://en.wikipedia.org/wiki/U.S._Central_Command) stated that a MQ-9 had been shot down by Houthi air defense systems over [Sanaa](https://en.wikipedia.org/wiki/Sanaa) in western Yemen the previous day. The aircraft took off from [Chabelley Airport](https://en.wikipedia.org/wiki/Chabelley_Airport) in[Djibouti](https://en.wikipedia.org/wiki/Djibouti), and was armed.

**NASA**

NASA version Altair

NASA version Ikhana

NASA initially expressed interest in a production version of the B-002 turbofan-powered variant, but instead leased an unarmed Reaper variant, which carries the GA-ASI company name "Altair". Altair is one of the first three "Predator-B" airframes. The other two airframes, known as "Predator-B 001" and "Predator-B 002", had a maximum gross weight of 7,500 pounds (3,400 kg). Altair differs from these models in that it has an 86-foot (26 m) long wingspan (20-foot (6.1 m) greater than early and current MQ-9s). The Altair has enhanced avionics systems to better enable flights in FAA-controlled civil airspace and demonstrate "over-the-horizon" command and control capability from a ground station. These aircraft are used by NASA's [Earth Science Enterprise](https://en.wikipedia.org/wiki/NASA_Earth_Science_Enterprise) as part of the [NASA ERAST Program](https://en.wikipedia.org/wiki/NASA_ERAST_Program) to perform on-location science missions.

In November 2006, NASA's [Dryden Flight Research Center](https://en.wikipedia.org/wiki/Dryden_Flight_Research_Center) obtained an MQ-9 (and mobile ground control station), named *Ikhana*, for the Suborbital Science Program within the Science Mission Directorate. In 2007, Ihkana was used to survey the [Southern California wildfires](https://en.wikipedia.org/wiki/October_2007_California_wildfires), supporting firefighter deployments based upon the highest need. The [California Office of Emergency Services](https://en.wikipedia.org/wiki/California_Office_of_Emergency_Services) had requested NASA support for the [Esperanza Fire](https://en.wikipedia.org/wiki/Esperanza_Fire), and the General Atomics Altair was launched less than 24 hours later on a 16-hour mission to map the fire's perimeter. The fire mapping research is a joint project with NASA and the US Forest Service.

The NASA Ikhana was used to survey the descent of the [Orion](https://en.wikipedia.org/wiki/Orion_%28spacecraft%29) [Exploration Flight Test 1](https://en.wikipedia.org/wiki/Exploration_Flight_Test_1) (EFT-1) module on its first test mission 5 December 2014. The aircraft loitered at 27,000 ft (8,200 m), used its IR camera to detect the capsule, then switched to the optical camera to observe its descent through parachute deployment and landing in the [Pacific](https://en.wikipedia.org/wiki/Pacific) Ocean.

**U.S. Homeland Security**

CBP's maritime variant named "Guardian"

[U.S. Customs and Border Protection](https://en.wikipedia.org/wiki/U.S._Customs_and_Border_Protection) (CBP) operated nine MQ-9s in August 2012. Two were based in North Dakota at [Grand Forks Air Force Base](https://en.wikipedia.org/wiki/Grand_Forks_Air_Force_Base), four were based in Arizona, at [Fort Huachuca](https://en.wikipedia.org/wiki/Fort_Huachuca) and one was based at the [Naval Air Station Corpus Christi](https://en.wikipedia.org/wiki/Naval_Air_Station_Corpus_Christi), Texas. These aircraft were equipped with GA-ASI's Lynx [synthetic aperture radar](https://en.wikipedia.org/wiki/Synthetic_aperture_radar) and Raytheon's MTS-B electro-optical infrared sensors. CBP also had two maritime MQ-9s called Guardians, based at [Cape Canaveral Air Force Station](https://en.wikipedia.org/wiki/Cape_Canaveral_Air_Force_Station), Florida and [Naval Air Station Corpus Christi](https://en.wikipedia.org/wiki/Naval_Air_Station_Corpus_Christi), Texas. The Guardians were equipped with the SeaVue marine search radar; their electro-optical [infrared](https://en.wikipedia.org/wiki/Infrared) sensor was optimized for maritime operations. The CBP operates one MQ-9 Guardian jointly with the [U.S. Coast Guard](https://en.wikipedia.org/wiki/U.S._Coast_Guard) out of land-based stations in Florida and Texas.

The [United States Department of Homeland Security](https://en.wikipedia.org/wiki/United_States_Department_of_Homeland_Security) initially ordered one Predator B for border protection duty, referred to as MQ-9 CBP-101. It began operations 4 October 2005 and crashed in the [Arizona](https://en.wikipedia.org/wiki/Arizona) desert on 25 April 2006. The [NTSB](https://en.wikipedia.org/wiki/NTSB) determined that the crash's cause most likely [pilot error](https://en.wikipedia.org/wiki/Pilot_error) by the ground-based [pilot](https://en.wikipedia.org/wiki/Pilot_in_command), inadvertently shutting down the UAV's engine by failing to follow the [checklist](https://en.wikipedia.org/wiki/Checklist). During its operational period, the aircraft flew 959 hours on patrol and had a part in 2,309 arrests. It also contributed to the seizure of four vehicles and 8,267 pounds (3,750 kg) of marijuana.

A second Predator B, called "CBP-104" (initially referred to as "CBP-102"), was delivered in September 2006 and commenced limited border protection operations on 18 October 2006. The president's FY2006 emergency supplemental budget request added $45 million for the program and the FY2007 Homeland Security Appropriations Bill added an additional $20 million. In October 2006, GA-ASI announced a $33.9 million contract to supply two more Predator B systems by the fall of 2007. On 16 February 2009, the program was further expanded to include patrols of the Canada–US border.

On 14 October 2013, an MQ-9 began patrolling the [Manitoba](https://en.wikipedia.org/wiki/Manitoba) portion of the U.S.-Canada border. The UAV is based at [Grand Forks Air Force Base](https://en.wikipedia.org/wiki/Grand_Forks_Air_Force_Base) and will watch the 400 km (250 mi)-long border. The drone will not carry weapons and needs permission to enter Canadian airspace. U.S. authorities fear that drug smugglers, migrants, and terrorists may exploit the long border. The use of the unmanned surveillance aircraft is an enhancement of the partnership between U.S. and Canadian agencies.

In January 2014, Customs and Border Protection grounded its UAVs after an unmanned aircraft was ditched off the Californian coast by the operator due to a mechanical failure on 27 January 2014.

**Other users**

**Australia**

In September 2006, the General Atomics Mariner demonstrator aircraft was operated by the Australian [Defence Science and Technology Organisation](https://en.wikipedia.org/wiki/Defence_Science_and_Technology_Organisation) (DSTO) in an exercise designed to evaluate the aircraft's ability to aid in efforts to stem illegal fishing, drug running and illegal immigration. The Mariner operated from [RAAF](https://en.wikipedia.org/wiki/RAAF) bases [Edinburgh, South Australia](https://en.wikipedia.org/wiki/RAAF_Base_Edinburgh) and [Learmonth, Western Australia](https://en.wikipedia.org/wiki/RAAF_Learmonth) in conjunction with a [Royal Australian Navy](https://en.wikipedia.org/wiki/Royal_Australian_Navy) [*Armidale* class patrol boat](https://en.wikipedia.org/wiki/Armidale_class_patrol_boat), the [Joint Offshore Protection Command](https://en.wikipedia.org/wiki/Border_Protection_Command_%28Australia%29) and the [Pilbara Regiment](https://en.wikipedia.org/wiki/Pilbara_Regiment).

In February 2015, it was announced that six RAAF personnel have been sent to [Holloman AFB](https://en.wikipedia.org/wiki/Holloman_AFB) in [New Mexico](https://en.wikipedia.org/wiki/New_Mexico) and [Creech AFB](https://en.wikipedia.org/wiki/Creech_AFB) in [Nevada](https://en.wikipedia.org/wiki/Nevada) to undergo training.

In August 2015, it was revealed that Australians had begun flying MQ-9s over Syria, the first time Australia expanded operations past Iraq during the [Military intervention against the Islamic State of Iraq and the Levant](https://en.wikipedia.org/wiki/Military_intervention_against_the_Islamic_State_of_Iraq_and_the_Levant). Five RAAF personnel were embedded with the USAF [432d Operations Group](https://en.wikipedia.org/wiki/432d_Operations_Group), which flies armed Reapers, performing operational duties with the unit as MQ-9 system pilots and sensor operators.

**Dominican Republic**

The Predator UAV "Guardian" has been used by the [Dominican Republic](https://en.wikipedia.org/wiki/Dominican_Republic), under U.S. supervision and funding, against drug trafficking from mid-2012.

**France**

On 31 May 2013, French Defense Minister [Jean-Yves Le Drian](https://en.wikipedia.org/wiki/Jean-Yves_Le_Drian) confirmed the order of two MQ-9 Reapers, to be delivered by the end of 2013. It was chosen to replace the [EADS Harfang](https://en.wikipedia.org/wiki/EADS_Harfang) and was picked over the Israeli [Heron TP](https://en.wikipedia.org/wiki/IAI_Eitan). On 27 June 2013, the U.S. [Defense Security Cooperation Agency](https://en.wikipedia.org/wiki/Defense_Security_Cooperation_Agency) notified Congress of a possible Foreign Military Sale to France for 16 unarmed MQ-9s, associated equipment, ground control hardware, and support, worth up to $1.5 billion total. On 26 August 2013, France and the US Department of Defense concluded the deal for 16 Reapers and 8 ground control stations, with French operators beginning training.

On 24 September 2013, France's first pair of MQ-9 pilots conducted a two-hour training sortie at [Holloman Air Force Base](https://en.wikipedia.org/wiki/Holloman_Air_Force_Base), New Mexico. Both French pilots had prior UAV experience, and went through a five-week ground-based training course and 5 hours on a flight simulator before the first flight. Two additional crews were also receiving instruction at the facility. General Atomics is due to deliver two Reapers and one ground control station to the [French Air Force](https://en.wikipedia.org/wiki/French_Air_Force) by the end of 2013. On 26 November 2013, France declared that six pilots in three teams were operational, following 100 hours on flight simulators and 4 flights. French MQ-9s were first put into action in January 2014 at Niamey Air Base in [Niger](https://en.wikipedia.org/wiki/Niger) for border reconnaissance in the [Sahel](https://en.wikipedia.org/wiki/Sahel) desert.

On 16 January 2014, France's first MQ-9 flight occurred from [Niger](https://en.wikipedia.org/wiki/Niger). The first two Reapers to enter French service are designated Block 1 and use U.S. equipment; further orders are to be modified with European payloads such as sensors and datalinks. On 31 March 2014, French Air Force Reapers accumulated 500 flight hours in support of Operation Serval. In July 2014, a French MQ-9 was reportedly helping to locate the wreckage of a crashed airplane in Mali.

**Germany**

Germany made a request to purchase five Reapers and four ground control stations, plus related support material and training. The request, being made through the [Foreign Military Sales](https://en.wikipedia.org/wiki/Foreign_Military_Sales) process, was presented to Congress through the Defense Security Cooperation Agency on 1 August 2008 and is valued at US$205 million. However, Germany did not go through with this procurement for the time being and decided to lease the [IAI Heron](https://en.wikipedia.org/wiki/IAI_Heron) offered by IAI and [Rheinmetall](https://en.wikipedia.org/wiki/Rheinmetall) instead, initially for the duration of one year, representing a stop-gap measure before a long-term decision on a MALE-system is being made.

**Italy**

On 1 August 2008, Italy submitted FMS request through the [Defense Security Cooperation Agency](https://en.wikipedia.org/wiki/Defense_Security_Cooperation_Agency) for four aircraft, four ground stations and five years of maintenance support, all valued at US$330 million. Italy ordered two more aircraft in November 2009. On 30 May 2012, it was reported that the U.S. planned to sell kits to arm Italy's six Reapers with Hellfire missiles and laser-guided bombs. However Gen. Alberto Rosso has expressed frustration at American delays in integrating additional weapons onto the platform and suggested that Italy may have to seek UAS alternatives. Italian Reapers were used:

* in Libya, since 10 August 2011, as part of its contribution to NATO’s Operation Unified Protector (flew about 300 hours)
* in Kosovo, since 13 March 2012 inbound NATO KFOR “Joint Enterprise" operation
* on "Mare Nostrum" mission (Mediterranean sea, migrants search and rescue operation) by October 2013
* into Afghanistan theater by January 2014. (to replace Predator A+).

On 3 November 2015, the U.S. approved a deal covering weapons integration onto Italy's Reaper aircraft, which would make it the first country outside the UK to weaponise the drone. The potential for increased contribution to NATO coalition operations, improved operational flexibility, and enhanced survivability for Italian forces prompted the request.

**Netherlands**

On 19 June 2013, General Atomics and [Fokker Technologies](https://en.wikipedia.org/wiki/Fokker_Technologies) signed a [Memorandum of Understanding](https://en.wikipedia.org/wiki/Memorandum_of_Understanding) (MOU) to offer the MQ-9 Reaper to the Dutch government for their need of a Medium-Altitude Long-Endurance (MALE) UAV. The MOU recognizes that Fokker will assist in maintenance and support of the aircraft in the Netherlands if a deal goes through.

On 21 November 2013, the Dutch Minister of Defense announced that the [Royal Netherlands Air Force](https://en.wikipedia.org/wiki/Royal_Netherlands_Air_Force) (RNLAF) has selected the MQ-9 Reaper as its new MALE UAV. The new MALE UAV 306 squadron will be based at [Leeuwarden Air Base](https://en.wikipedia.org/wiki/Leeuwarden_Air_Base). The Dutch MQ-9 will have the standard SAR radar and also a special ground search radar with more range and electronic sensors to detect ground radar and signals. The RNLAF will buy one ground station and four MQ-9s, of which two will receive the special radar and the other two will receive the electronic sensors. The aircraft are to enter service in 2016 and should be fully operational at the end of 2017. No weapons are planned for the Reapers so far.

**Spain**

On 6 August 2015, the [Spanish Ministry of Defence](https://en.wikipedia.org/wiki/Ministry_of_Defence_%28Spain%29) announced it would buy four Reaper surveillance aircraft with two ground control stations for €25 million ($27 million) in 2016, costing €171 million over five years. General Atomics will partner with Spanish Company [SENER](https://en.wikipedia.org/wiki/SENER) to deliver unarmed versions to Spain, making it the fifth European country to order the Reaper. In addition to selecting the Reaper, Spain it interested in the joint German-French-Italian project to develop a European MALE UAV. The Defense Department cleared the purchase on 6 October 2015. Spain selected the Reaper over the [Heron TP](https://en.wikipedia.org/wiki/Heron_TP) to perform homeland security, counter-insurgency, and counter-terrorism operations. The Spanish government agreed to purchase the system on 30 October. The Reaper was selected over the Heron TP mainly for commonality with NATO allies who also use the airframe. Although Spain's immediate priority is for surveillance, they will eventually try to weaponize the platform. The first two aircraft and first GCS is planned for delivery in 2017, with the third aircraft in 2018 when they achieve IOC, and the last in 2020 achieving full operational capability (FOC).

**United Kingdom**

A British MQ-9 Reaper operating over Afghanistan in 2009

On 27 September 2006, the U.S. Congress was notified by the [Defense Security Cooperation Agency](https://en.wikipedia.org/wiki/Defense_Security_Cooperation_Agency) that the United Kingdom was seeking to purchase a pair of MQ-9 Reapers. They were initially operated by [No. 39 Squadron RAF](https://en.wikipedia.org/wiki/No._39_Squadron_RAF) from [Creech Air Force Base](https://en.wikipedia.org/wiki/Creech_Air_Force_Base), Nevada later moving to [RAF Waddington](https://en.wikipedia.org/wiki/RAF_Waddington). A third MQ-9 was in the process of being purchased by the RAF in 2007. On 9 November 2007, the [UK Ministry of Defence](https://en.wikipedia.org/wiki/Ministry_of_Defence_%28United_Kingdom%29) (MOD) announced that its Reapers had begun operations in [Afghanistan](https://en.wikipedia.org/wiki/Afghanistan) against the [Taliban](https://en.wikipedia.org/wiki/Taliban). In April 2008, following the crash of one of the UK's two Reapers, British special forces were sent to recover sensitive material from the wreckage before it was blown up to prevent the enemy from obtaining it. By May 2011, five Reapers were in operation, with a further five on order.

The second RAF squadron to operate five Reapers is [XIII Sqn](https://en.wikipedia.org/wiki/No._13_Squadron_RAF), which was formally activated and commissioned on 26 October 2012. No. 39 Squadron personnel were planned to gradually return to the UK in 2013 and in time both squadrons would each operate five Reapers from [RAF Waddington](https://en.wikipedia.org/wiki/RAF_Waddington). In April 2013, XIII squadron started full operations from RAF Waddington, exercising control over a complement of 10 Reapers, at that point all based in Afghanistan. Five Reapers can provide 36 hours of combined surveillance coverage in Afghanistan with individual sorties lasting up to 16 hours; a further five vehicles increases this to 72 hours. In total, RAF Reapers flew 71,000 flight hours in Afghanistan, and dropped 510 guided weapons (compared to 497 for Harrier and Tornado). In April 2013, it was revealed that the MOD was studying the adoption of [MBDA](https://en.wikipedia.org/wiki/MBDA)'s [Brimstone](https://en.wikipedia.org/wiki/Brimstone_%28missile%29) missile upon the MQ-9. In December 2013, several successful test firings of the Brimstone missile from a Reaper at [Naval Air Weapons Station China Lake](https://en.wikipedia.org/wiki/Naval_Air_Weapons_Station_China_Lake) to support integration onto RAF Reapers. Nine missiles were fired at an altitude of 20,000 ft at distances of 7 to 12 km (4.3 to 7.5 mi) from the targets; all nine scored direct hits against static, accelerating, weaving, and fast remotely controlled targets.

In 2014, the MOD decided that its Reaper fleet will be brought into the RAF's core fleet once operations over Afghanistan cease. Procurement of the MQ-9 was via an urgent operational capability requirement and funded from the Treasury reserve, but induction into the core fleet will have them funded from the MoD's budget. The Reapers were retained for contingent purposes, mainly to perform [intelligence, surveillance and reconnaissance](https://en.wikipedia.org/wiki/Intelligence%2C_surveillance_and_reconnaissance) (ISR), until [its replacement](https://en.wikipedia.org/wiki/Future_of_the_Royal_Air_Force#Scavenger.2FTelemos) enters service around 2018. On 4 October 2015 David Cameron announced that the RAF would replace its existing fleet of 10 Reapers with more than 20 of the "latest generation of RPAS", named as "Protector", In April 2016 document, the MoD revealed the Protector will be a version of the Reaper, the Certifiable Predator B (CPB) version that is made to fly in European airspace, and will be acquired from 2018–2030.

On 16 October 2014, the MOD announced the deployment of armed Reapers in [Operation Shader](https://en.wikipedia.org/wiki/Operation_Shader), the UK's contribution to the [United States-led military intervention against Islamic State](https://en.wikipedia.org/wiki/2014_military_intervention_against_the_Islamic_State_of_Iraq_and_the_Levant), the first occasion the UK had used its Reapers outside Afghanistan. The number of aircraft out of the RAF's 10-plane fleet was not disclosed, but it was expected that at least two were sent; more were dispatched as the UK drew down from Afghanistan. RAF Reapers' primary purpose is to provide surveillance support and situational awareness to coalition forces. On 10 November 2014, the MoD reported that an RAF Reaper had conducted its first airstrike against [Islamic State](https://en.wikipedia.org/wiki/Islamic_State_of_Iraq_and_the_Levant) forces, firing a Hellfire missile at militants placing an IED near Bayji. RAF Reapers based at [RAF Akrotiri](https://en.wikipedia.org/wiki/RAF_Akrotiri) in [Cyprus](https://en.wikipedia.org/wiki/Cyprus) conducted one surveillance mission over Syria in November 2014, four in December 2014, and eight in January 2015. On 7 September 2015, Prime Minister David Cameron announced that two Islamic State fighters from Britain had been killed in an intelligence-led strike by an RAF Reaper near Raqqa, Syria, the first armed use of RAF assets in Syria during the civil war. By January 2016, RAF Reapers had flown 1,000 sorties in support of Operation Shader. Compared to operations in Afghanistan, where RAF Reapers fired 16 Hellfire missiles in 2008, 93 in 2013, and 94 in 2014, in operations against ISIL 258 Hellfires were fired in 2015.

**India**

In June 2017, the US State Department approved the sale of 22 drones to India, costing around 2-3 billion USD.

Variants

**Naval version**

A navalised Reaper, named *Mariner*, was proposed for the U.S. Navy's [Broad Area Maritime Surveillance](https://en.wikipedia.org/wiki/Broad_Area_Maritime_Surveillance) (BAMS) program. It had an increased fuel capacity for an endurance of up to 49 hours. Variations included one for [aircraft carrier](https://en.wikipedia.org/wiki/Aircraft_carrier) operations with folding wings for storage, shortened, reinforced landing gear, an arresting hook, cut-down or eliminated ventral flight surfaces and six stores pylons for a total load of 3,000 pounds (1,360 kilograms). The [Northrop Grumman RQ-4N](https://en.wikipedia.org/wiki/RQ-4_Global_Hawk) was selected as the BAMS winner.

The US Customs and Border Protection (CBP) operates two maritime variants of the MQ-9, known as *Guardians*. The [U.S. Coast Guard](https://en.wikipedia.org/wiki/United_States_Coast_Guard) evaluated the Guardian, including performing joint operations with CBP. The CBP and the Coast Guard operate one MQ-9 Guardian jointly out of land-based stations in Florida and Texas.

General Atomics hopes to test a [sonobuoy](https://en.wikipedia.org/wiki/Sonobuoy) launch capability from the Guardian in 2016 to demonstrate its ability to carry them, control them, and send information back to the ground station over a SATCOM link.

**MQ-9 Block 5**

On 24 May 2012, General Atomics conducted the successful first flight of its upgraded MQ-9 Block 1-plus Reaper. The Block 1–plus version was designed for increased electrical power, secure communications, automatic landing, increased gross takeoff weight (GTOW), weapons growth, and streamlined payload integration capabilities. A new high-capacity starter generator offers increased electrical power capacity to provide growth capacity; a backup generator is also present and is sufficient for all flight-critical functions, improving the electrical power system's reliability via three independent power sources. New communications capabilities, including dual ARC-210 VHF/UHF radios with wingtip antennas, allow for simultaneous communications between multiple air-to-air and air-to-ground parties, secure data links, and an increased data transmission capacity. The new trailing arm main landing gear allows the carriage of heavier payloads or additional fuel. Development and testing were completed, and Milestone C was achieved in September 2012. Follow-on aircraft will be redesignated *MQ-9 Block 5*. On 15 October 2013, the USAF awarded General Atomics a $377.4 million contract for 24 MQ-9 Block 5 Reapers. The MQ-9 Block 5 flew its first combat mission on 23 June 2017.

**Certifiable Predator B**

General Atomics modified the Reaper platform into the so-called certifiable Predator B in order to make it compliant with European flight regulations to get more sales in European countries. In order to fly over national airspace, the aircraft meets [NATO STANAG 4671](https://en.wikipedia.org/wiki/NATO_STANAG_4671) airworthiness requirements with lightning protection, different composite materials, and [sense and avoid technology](https://en.wikipedia.org/w/index.php?title=Sense_and_avoid_technology&action=edit&redlink=1); performance changes include a 79 ft (24 m) wingspan that has [winglets](https://en.wikipedia.org/wiki/Winglet) and enough fuel for a 40-hour endurance at 50,000 ft (15,000 m). The version is expected to be certified before 2019.

In April 2016, the United Kingdom announced that it intended to place an order for the Certifiable Predator B as part of its [Protector MALE UAV programme](https://en.wikipedia.org/wiki/Future_of_the_Royal_Air_Force#Protector). According to the [2015 Strategic Defence and Security Review](https://en.wikipedia.org/wiki/2015_Strategic_Defence_and_Security_Review), the Royal Air Force will operate at least 20 Protector systems by 2025, replacing all of its current 10 MQ-9 Reapers.

Operators

[**France**](https://en.wikipedia.org/wiki/France)

* [French Air Force](https://en.wikipedia.org/wiki/French_Air_Force) (Armée de l'air)
	+ [Escadron de drones 1/33 Belfort](https://en.wikipedia.org/w/index.php?title=Escadron_de_drones_1/33_Belfort&action=edit&redlink=1)

[**India**](https://en.wikipedia.org/wiki/India)

* [Indian Navy](https://en.wikipedia.org/wiki/Indian_Navy)

[**Italy**](https://en.wikipedia.org/wiki/Italy)

* [Italian Air Force](https://en.wikipedia.org/wiki/Italian_Air_Force) (Aeronautica Militare)
	+ [32° Stormo](https://en.wikipedia.org/wiki/32%C2%B0_Stormo)

[**Netherlands**](https://en.wikipedia.org/wiki/Netherlands)

* [Royal Netherlands Air Force](https://en.wikipedia.org/wiki/Royal_Netherlands_Air_Force)
	+ [Leeuwarden Air Base](https://en.wikipedia.org/wiki/Leeuwarden_Air_Base)
		- [306 Squadron](https://en.wikipedia.org/w/index.php?title=306_Squadron&action=edit&redlink=1)

[**Spain**](https://en.wikipedia.org/wiki/Spain)

* [Spanish Air Force](https://en.wikipedia.org/wiki/Spanish_Air_Force)
	+ [No. 47 Grupo Mixto](https://en.wikipedia.org/w/index.php?title=No._47_Grupo_Mixto&action=edit&redlink=1)

[**United Kingdom**](https://en.wikipedia.org/wiki/United_Kingdom)

* [Royal Air Force](https://en.wikipedia.org/wiki/Royal_Air_Force)
	+ [No. 13 Squadron RAF](https://en.wikipedia.org/wiki/No._13_Squadron_RAF)
	+ [No. 39 Squadron RAF](https://en.wikipedia.org/wiki/No._39_Squadron_RAF)
	+ [No. 54 Squadron RAF](https://en.wikipedia.org/wiki/No._54_Squadron_RAF)

[**United States**](https://en.wikipedia.org/wiki/United_States)

* [United States Air Force](https://en.wikipedia.org/wiki/United_States_Air_Force)
	+ [Air Combat Command](https://en.wikipedia.org/wiki/Air_Combat_Command)
		- [49th Wing](https://en.wikipedia.org/wiki/49th_Wing) ([Holloman Air Force Base](https://en.wikipedia.org/wiki/Holloman_Air_Force_Base), [New Mexico](https://en.wikipedia.org/wiki/New_Mexico))
			* [29th Attack Squadron](https://en.wikipedia.org/wiki/29th_Attack_Squadron)
		- [53d Wing](https://en.wikipedia.org/wiki/53d_Wing) ([Eglin Air Force Base](https://en.wikipedia.org/wiki/Eglin_Air_Force_Base), [Florida](https://en.wikipedia.org/wiki/Florida))
			* [556th Test and Evaluation Squadron](https://en.wikipedia.org/wiki/556th_Test_and_Evaluation_Squadron) ([Creech Air Force Base](https://en.wikipedia.org/wiki/Creech_Air_Force_Base), Nevada)
		- [432d Wing](https://en.wikipedia.org/wiki/432d_Wing) ([Creech Air Force Base](https://en.wikipedia.org/wiki/Creech_Air_Force_Base), Nevada)
			* [19th Attack Squadron](https://en.wikipedia.org/w/index.php?title=19th_Attack_Squadron&action=edit&redlink=1)
			* [42d Attack Squadron](https://en.wikipedia.org/wiki/42d_Attack_Squadron)
	+ [Air Force Special Operations Command](https://en.wikipedia.org/wiki/Air_Force_Special_Operations_Command)
		- [27th Special Operations Wing](https://en.wikipedia.org/wiki/27th_Special_Operations_Wing)
			* [33d Special Operations Squadron](https://en.wikipedia.org/wiki/33d_Special_Operations_Squadron) ([Cannon Air Force Base](https://en.wikipedia.org/wiki/Cannon_Air_Force_Base), New Mexico)
		- [58th Special Operations Wing](https://en.wikipedia.org/wiki/58th_Special_Operations_Wing)
			* [551st Special Operations Squadron](https://en.wikipedia.org/wiki/551st_Special_Operations_Squadron)
	+ [Air National Guard](https://en.wikipedia.org/wiki/Air_National_Guard)
		- [107th Airlift Wing](https://en.wikipedia.org/wiki/107th_Airlift_Wing) ([Niagara Falls Air Force Base](https://en.wikipedia.org/wiki/Niagara_Falls_Air_Force_Base), New York)
		- [174th Attack Wing](https://en.wikipedia.org/wiki/174th_Attack_Wing) ([Hancock Field](https://en.wikipedia.org/wiki/Syracuse_Hancock_International_Airport), New York)
		- [111th Fighter Wing](https://en.wikipedia.org/wiki/111th_Fighter_Wing) (Horsham Air Guard Station in Montgomery County Pa)
		- [118th Wing](https://en.wikipedia.org/wiki/118th_Wing) (118 WG) (Berry Field, Tennessee Air National Guard, Nashville, Tennessee)
		- [188th Wing](https://en.wikipedia.org/wiki/188th_Wing) (188 WG) (Fort Smith Air National Guard Station, Arkansas Air National Guard, Fort Smith, Arkansas)
* [U.S. Customs and Border Protection](https://en.wikipedia.org/wiki/U.S._Customs_and_Border_Protection)
	+ Sierra Vista, Arizona
	+ [Grand Forks Air Force Base](https://en.wikipedia.org/wiki/Grand_Forks_Air_Force_Base), North Dakota
	+ [Cape Canaveral Air Force Station](https://en.wikipedia.org/wiki/Cape_Canaveral_Air_Force_Station), Florida
	+ [Naval Air Station Corpus Christi](https://en.wikipedia.org/wiki/Naval_Air_Station_Corpus_Christi), Texas

Accidents

* On 13 December 2011, a MQ-9 Reaper crashed due to mechanical reasons while landing at the [United States drone base in Seychelles](https://en.wikipedia.org/wiki/United_States_drone_base_in_Seychelles). The drone failed to stop and hit some rocks at the end of the runway.
* On 5 April 2012, a Reaper crashed into the sea soon after take off at the U.S. drone base in Seychelles.
* On 24 November 2015, a USAF MQ-9 Reaper crashed near Bagram Air Field, Afghanistan.
* On 21 February 2016, a USAF MQ-9 crashed in Kandahar Airfield, Afghanistan.
* On 5 July 2016, a USAF Reaper crashed in Syria during a combat mission against ISIS. It was later destroyed by an airstrike.
* On 2 May 2017, a USAF Reaper based at [Holloman AFB](https://en.wikipedia.org/wiki/Holloman_AFB) crashed near the base while on a regularly scheduled training mission. The incident is under investigation.

Specifications

Honeywell turboprop

MQ-9 Reaper taxiing

*Data from* USAF Fact Sheet, Globalsecurity.org

**General characteristics**

* **Crew:** 0 onboard, 2 in ground station
* **Length:** 36 ft 1 in (11 m)
* **Wingspan:** 65 ft 7 in (20 m)
* **Height:** 12 ft 6 in (3.81 m)
* **Empty weight:** 4,901 lb (2,223 kg)
* **Max takeoff weight:** 10,494 lb (4,760 kg)
* **Fuel capacity:** 4,000 lb (1,800 kg)
* **Payload:** 3,800 lb (1,700 kg)
	+ *Internal:* 800 lb (360 kg)
	+ *External:* 3,000 lb (1,400 kg)
* **Powerplant:** 1 × [Honeywell TPE331-10](https://en.wikipedia.org/wiki/Honeywell_TPE331-10) turboprop, 900 hp (671 kW) with Digital Electronic Engine Control (DEEC)

**Performance**

* **Maximum speed:** 300 mph; 260 kn (482 km/h)
* **Cruise speed:** 194 mph; 169 kn (313 km/h)
* **Range:** 1,151 mi; 1,852 km (1,000 nmi)
* **Endurance:** 14 hours fully loaded
* **Service ceiling:** 50,000 ft (15,000 m)
* **Operational altitude:** 25,000 ft (7.5 km)

**Armament**

* 7 hardpoints
	+ Up to 1,500 lb (680 kg) on the two inboard weapons stations
	+ Up to 750 lb (340 kg) on the two middle stations
	+ Up to 150 lb (68 kg) on the outboard stations
	+ Center station not used
* Up to 4 [AGM-114 Hellfire](https://en.wikipedia.org/wiki/AGM-114_Hellfire) air to ground missiles can be carried or four Hellfire missiles and two 500 lb (230 kg) [GBU-12 Paveway II](https://en.wikipedia.org/wiki/GBU-12_Paveway_II) laser-guided bombs. The 500 lb (230 kg) GBU-38 [Joint Direct Attack Munition](https://en.wikipedia.org/wiki/Joint_Direct_Attack_Munition)(JDAM) can also be carried. Testing is underway to support the operation of the [AIM-92 Stinger](https://en.wikipedia.org/wiki/AIM-92_Stinger) air-to-air missile. In March 2014, [MBDA](https://en.wikipedia.org/wiki/MBDA) successfully test fired a dual mode [Brimstone missile](https://en.wikipedia.org/wiki/Brimstone_missile) from a Reaper aircraft on behalf of the UK Ministry of Defence and Royal Air Force.

**Avionics**

* AN/DAS-1 MTS-B Multi-Spectral Targeting System
* AN/APY-8 Lynx II radar
* Raytheon SeaVue Marine Search Radar (Guardian variants)