

# GA-ASI's MQ-9B SkyGuardian

## Developed to become the most advanced RPAS in the world

**MQ-9B SkyGuardian is the latest technological advancement from General Atomics Aeronautical Systems, Inc. (GA-ASI). The Remotely Piloted Aircraft System (RPAS) will become the world's most advanced unmanned system when it is delivered to the Royal Air Force (RAF) as the PROTECTOR RG Mk1 in the early 2020s.**

The RAF has operated RPAS for 10% of its existence with 2017 marking 10 years of partnership with GA-ASI and the MQ-9 Reaper® delivering more than 100,000 hours of operational missions.

MQ-9 will continue to support RAF operations until they are replaced by PROTECTOR. "PROTECTOR will be a step change for us in terms of capability," said RAF Group Captain Lyndon Jones. "The new aircraft will offer greater range and endurance, greater weapon capabilities and will be certified to fly in UK airspace."

### Airworthiness certification

SkyGuardian was first conceived as a development program by GA-ASI using Internal Research and Development (IRAD) funding. One of the driving principles was to deliver a RPAS that would become the first unmanned system to achieve airworthiness approval to fly in civilian airspace.

"We took a clean-sheet approach to the design of SkyGuardian," said Linden Blue, CEO, GA-ASI. "In order to achieve our objective of developing an aircraft certified to fly in civil airspace, the airframe had to conform to strict requirements, many of which are the same as traditional passenger aircraft."

SkyGuardian's airframe is designed to meet lightning strike, damage-tolerance, and turbulence-induced stress requirements specified by the

NATO airworthiness standards (STANAG-4671). The aircraft is ready to be fitted with an integrated Detect and Avoid (DAA) system that features an anti-collision radar system.

The DAA system that GA-ASI has developed for the aircraft is comprised of an air-to-air radar, Traffic Collision Avoidance System (TCAS), Automatic Dependent Surveillance-Broadcast (ADS-B), and the ability to blend that surveillance onboard in support of alerting and providing maneuvering guidance for the pilot in the Ground Control Station (GCS). DAA has gone through considerable initial testing on MQ-9 aircraft being operated by NASA and the U.S. Department of Homeland Security (DHS)/Customs and Border Protection (CBP) as well as the GA-ASI MQ-9B development aircraft.

### Multi-mission flexibility

SkyGuardian is a multi-mission aircraft with nine hardpoints to provide unmatched configurability to meet a wide array of mission requirements. In 2017, the MQ-9B development aircraft set a new endurance record for GA-ASI aircraft when it flew for more than 48 consecutive hours with a clean airframe. This unprecedented level of endurance enables MQ-9B to provide persistent Intelligence, Surveillance, and Reconnaissance (ISR) at a significantly lower cost than is possible when the aircraft operates with an onboard crew.



On 12 June 2018, NASA was approved by the FAA to fly its Ikhana, a Predator B/MQ-9 RPAS, through National Airspace. The aircraft was equipped with the GA-ASI-developed Detect and Avoid (DAA) avionics system, which was an enabling technology for the RPAS to meet the FAA's 14 CFR 91.113(b) requirement to 'see and avoid' other aircraft. DAA is key to eventual airworthiness certification and will be featured on the PROTECTOR.



GA-ASI President Dave Alexander (centre) and CEO Linden Blue (right) hosted a group of international dignitaries when they unveiled MQ-9B SkyGuardian at the GA-ASI test facility in Gray Butte, California in January 2017.

MQ-9B SkyGuardian will become the world's most advanced RPAS when it is delivered to the RAF as the Protector in the early 2020s.

In basic ISR configuration, SkyGuardian will have a high-definition Electro-optical/Infrared (EO/IR) sensor and GA-ASI's Lynx® Multi-mode Radar. This configuration provides highly detailed intelligence from a significant standoff range.

MQ-9B is being designed for a focused military purpose and was created for use in operational theatres, leveraging GA-ASI's Predator family legacy of more than five million flight hours, 90% of which have been flown in combat. The U.S. Air Force, U.S. Army, UAE, France, Italy, the United Kingdom and others are currently flying the Predator series in theatre.

### Maritime features

SkyGuardian has an optional maritime radar that has been fielded on U.S. DHS's MQ-9 aircraft, though this is not currently a part of the UK programme. This maritime kit can host a variety of radars, including those manufactured by Raytheon or Leonardo, providing long-range surveillance, coastal surveillance, small target detection, and search and rescue operations. Further aiding maritime surveillance, SkyGuardian can be fitted with an Automatic Identification System (AIS) transponder to provide positive identification of vessels.

The new RPA can also be configured for Signals Intelligence (SIGINT) missions. Payloads can include Electronic Support Measures (ESM), Radar Warning Receivers (RWR), and a variety of SIGINT packages. The aircraft also will be capable of using the Link-16 military tactical data exchange network.

GA-ASI is developing an Anti-submarine Warfare (ASW) capability. In 2017, the company demonstrated remote detection and tracking of submerged contacts using an MQ-9.

### History of performance

GA-ASI has delivered more than 800 aircraft and more than 300 GCS. Every second of every day, over 69 GA-ASI aircraft are flying in support of a variety of missions. Interoperability with other NATO assets and its multi-mission capability makes it a valued asset in a variety of scenarios – from environmental protection and maritime domain awareness to search and rescue and military surveillance.

"We worked with GA-ASI right from the outset to be able to meet all of the stringent UK laws and regulations that surround certification," said Group Captain Jones. "I know lots of countries are watching us do this. Those countries know that when the UK's stringent regulations are met, then it will meet the requirements from anywhere else in the world."

With more important steps to be taken and achievements to be completed, the Royal Air Force and GA-ASI look forward to fielding PROTECTOR RG Mk1.

