

Queen of the Skies UAS Training in the US



MetaVR has supplied numerous licences for its VRSG image generator for US Army UAS training. Shown here is a Grey Eagle UAV.

(Source: MetaVR)

Napoleon referred to artillery as the Queen of the Battlefield. Today it can be rightly claimed that Unmanned Aerial Systems (UAS) are the Queen of the Skies due to their ability to undertake a broad range of roles and their growing ubiquity. Trevor Nash investigates the training required to operate such systems.

According to a recent statement by the Secretary of the [US] Air Force, "intelligence, surveillance and reconnaissance (ISR) missions continue to be the number one most requested capability of combatant commanders at multiple locations throughout the world. Remotely Piloted Aircraft (RPA) are in demand and Air Force RPAs operate on a 24/7 basis. Thru December 2014, the Air Force has flown MQ-1B Predators and MQ-9 Reapers more than 2,208,985 hours (RQ-4 Global Hawk/MQ-1 equals 1,661,887 hours and MQ-9 equals 547,978)."

As is clear already, nomenclature presents a challenge in defining UAS. In terms of definition, the widely accepted term UAS refers to a system that includes the platform, crew, Ground Control Station (GCS), technical support structure and intelligence staff.

The flying vehicle itself is referred to as an Unmanned Aerial Vehicle or more gender neutral, Uninhabited Aerial Vehicle (UAV), Remotely Piloted Aircraft (RPA) or Remotely Piloted Air System (RPAS). The public and the press tend to refer to such systems as drones.

In the US, sequestration and the high demand for UAS is causing considerable stress which is resulting in many operators leaving the USAF.

In an effort to retain UAS crews new initiatives have been adopted that, "include incentive pay increases and bonuses for crews, directing additional funds to the mission, augmenting current crew manning, increasing the number of RPA pilot graduates, and increasing the use of Guard and Reserve Airmen as well as contractors to bring relief to a community in high demand."

This continuous high operational tempo (OpTempo) has a major impact on training and the need for new crews to spread the load has clearly been recognised.

"Maintaining operational success and fulfilling combatant command requirements for a sustained period of time has impacted our ability to train the force and risks the health and long-term viability of the enterprise," said Gen. Mark A. Welsh III, Air Force Chief of Staff. "Current demand put requirements for active-duty RPA pilots at about 300 per year. However, our current active-duty training production output is only 180 pilots per year. The new plan aims to add more than 100 additional pilot graduates per year."

As well as increasing pay levels for UAS pilots and payload specialists, the USAF is making more use of contractor support and the Air Force reserve component. The USAF recently moved USD 7.8 million into the RPA programme to increase school house capacity, add reserve component manpower augmentation days and contract some down-range and recovery efforts to industry.

The USAF's recent UAS initiatives will have implications for the likes of CAE and L3 Link. CAE provides formal MQ-1 Predator and MQ-9 Reaper training at four locations in the US whilst L3 Link produces the Predator Mission Aircrew Training System (PMATS) that is used for synthetic training. (see *MT&SN Vol.16 Iss.3, pp.24-27 for a full report on this programme.*)

US Army Training

Although the USAF often hogs the limelight when it comes to UAS operations, the US Army operates the largest UAS fleet. Its platforms include the MQ-1C Grey Eagle, RQ-5A Hunter, RQ-7 Shadow, RQ-11 Raven and a number of Small Tactical UAS (STUAS). In all, the US Army operates around 7,000 small UAVs, 408 RQ-7 Shadows and a fleet of MQ-1C Grey Eagles that will reach 152 by FY 2019.

During the recent AUVSI show in Atlanta, Colonel Thomas von Eschenbach, the UAS Capability Manager at the US Army's Training and Doctrine Command (TRADOC) said that the US Army had built up UAS capability to cover operations in Iraq and Afghanistan but now it was time, "to improve the integration of those assets with other aviation assets."



The US Army is a major operator of UAS. Shown here is the Universal Ground Control Station.

(Source: US Army)

US Army UAS operator training consists of an eight-week common syllabus that concentrates on the fundamentals of aerodynamics, navigation, rules of the air and flight safety. Once completed, the UAS pilot moves on to a UAS type-specific training course that can last from 12 – 25 weeks depending on the complexity of the platform. This course concentrates on flying the specific platform and as well as learning operational and tactical skills. All US Army UAS pilots are also qualified as sensor operators.

The epicentre of the US Army's UAS training is at Fort Huachuca in Arizona, the home of 2nd Battalion, 13th Aviation Regiment (2-13th), the UAS Training Battalion (UASTB). Coming under the command of the 1st Aviation Brigade at Fort Rucker, the 2-13th trains operators and maintainers for the RQ-7 Shadow, RQ-5A/B Hunter and MQ-1C Grey Eagle UAS.

The battalion runs more than 20 courses of instruction and flies more than 5,000 hours a year. Currently, the 2-13th Aviation Regiment comprises five companies. A Company undertakes Initial Entry Training for pilots and maintainers; B Company conducts Shadow and Hunter flight operations out of Rugged-Hamilton and Pioneer runways at Black Tower in the West Range; C Company conducts Grey Eagle UAS operator and repairer training at Libby Army Airfield.

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Camber Corporation is offering a games-based training system that allows operators to conduct mission rehearsal exercises.

(Source: Camber Corporation)

D Company is responsible for the development and administration of five programmes of instruction including: Shadow UAS Repairer, Hunter UAS Repairer, UAS Operator Common Core, UAS Warrant Officer Technician, and UAS Unit Commander and Staff Officer Course.

The company also provides training development, information technology, logistical support, audio visual, flight line maintenance and emergency medical support to the battalion. Finally, E Company conducts advanced training for pilots and maintainers.

In terms of the synthetic training equipment in use by the US Army UAS units, Fort Huachuca provides a representative view. The US Army's Universal Mission Simulator (UMS) features the Universal Ground Control Station (UGCS) that is common for the Shadow, Grey Eagle and Hunter. Shadow training is also provided using the Textron AAI Shadow Crew Trainer. Responsibility for providing much of this training falls to Raytheon who have been in post since 2007.

Another company to provide UAS training systems at Fort Huachuca is Camber Corporation. Covering both maintenance and tactics training, the company provides instructors and conducts 'train the trainers' courses. Much of this instruction is conducted using a variety of applications delivered on PCs, tablets or mobile devices as well as around 90 hours of conventional computer based training.

"Our latest training system is based on the Unity GameEngine and called 'Eagle Eye'," explains Jeremy Reddoch, Production Manager – Training Systems at Camber. "We launched this system around six months ago and it is used to train UAS crews in over-watch and convoy protection duties. It's in service with the US Army at Fort Huachuca and the NCO Academy at Fort Rucker."

One company to come in nearly on the ground floor of US Army UAS training is visualization specialists, MetaVR. In 2002 the

company started supplying the US Army's Joint Technology Center/Systems Integration Laboratory (JTC/SIL) Multiple Unified Simulation Environment/Air Force Synthetic Environment for Reconnaissance and Surveillance MUSE/AFSERS with its Virtual Reality Scene Generator (VRSG) at Fort Huachuca as well as other sites.

MUSE/AFSERS is an intelligence, surveillance and reconnaissance (ISR) and UAS simulation system that is used by the US DoD for command and staff training. In essence JTC/SIL acts as a testing laboratory to provide proof of concept studies, evaluation of tactics, techniques and procedures as well as to conduct high-level exercises.

Today, MetaVR's VRSG is the visual solution of choice for many US Army UAS applications that demand highly resolute synthetic video feeds. VRSG is integrated with Textron AAI's Shadow and Aerosonde crew trainers and embedded as part of the UMS/UGCS. It is also used within the Institutional Mission Trainers (IMT) for the Hunter and Grey Eagle as well as Shadow and Aerosonde. In 2014 alone, the US Army procured 300 VRSG licences from the company.

The US Army is now looking to network the UMS with the AH-64 Longbow Crew Trainer (LCT) and its Aviation Combined Arms Tactical Trainer. With its so-called Manned-Unmanned Teaming (MUM-T) initiatives the training requirements for US Army UAS crews will continue at pace for some years to come.

Emerging Technologies

One company that hopes to break into this market is Bihrl Applied Research. At the recent AUVSI event in Atlanta, the company was showcasing its UAS simulation, design and analysis services.

As a company specialising in engineering research, Bihrl has a broad canvas on which to paint its capabilities in the field of UAS. These include operator training, the development of high-fidelity flight models, UAS design and flight dynamics analysis.

One of the tools that it was showing that directly compliments the US Army's MUM-T initiative was its NavPath UAS Flight Planner. NavPath is a UAS autopilot agnostic flight planning tool that allows the operator to generate the most efficient and optimal flight plan for a given mission.

It can generate flight plans for multiple UAS and provides the ability to plan flights that avoid air defence zones or enemy locations through the use of GeoFences. These GeoFences link way points and provide routes or 'tunnels in the sky' along which the UAS flies.

Once the process of loading data, creating waypoints, defining flight profiles, assigning commands and establishing GeoFences is complete, the flight can be previewed, modified if required,

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and then the flight plan file exported for use on the actual mission.

"We started development of the NavPath product around nine months ago and although this was driven by a commercial UAS operator, we are now getting interest from the military for applications such as mission rehearsal and operational evaluation," said Brian Wachter, Bihrl's VP Corporate Development.

In terms of the US Army's Small Unmanned Aerial Systems (SUAS) such as Vampire, Raven, Wasp and Puma, training for these systems are undertaken at Fort Benning. One of the major players in this arena is Aegis Technologies.

The company started by developing the Vampire Instructional Training System (VITS) in 2006 and now provides training for all four systems.

The systems run on Panasonic Toughbook computers and ground control stations. A development of this system is the Vampire institutional training system (ITS). This system features an instructor operating station and 10 student training stations.

Although the US Army's initial UAS training appears well planned and delivered, there are problems in continuation training. A recent report by the US General Accounting Office (GAO) highlighted a number of training deficiencies with the US Army's UAS operators.

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Long time manufacturer of UAS and their associated training systems, Textron Systems have recently launched a range of UAS operator and maintainer courses.

(Source: Textron Systems)

According to the report, recurrent UAS training was being interrupted by pilots having to undertake other duties, a lack of awareness of senior commanders about UAS training requirements as well as a lack of money to carry out the training.

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