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***“We have just won a war with a lot of heroes flying around in planes. The next war may be fought by airplanes with no men in them at all . . . Take everything you’ve learned about aviation in war, throw it out of the window, and let’s go to work on tomorrow’s aviation. It will be different from anything the world has ever seen.”***

**Gen Hap Arnold, USAAF – US Army Air Forces, 1945**

Although many people in all walks of life, especially pioneering aviators, had predicted the era of pilotless aircraft and unmanned operations, no one had better foresight than General Henry “Hap” Arnold more than 60 years ago. His emphasis was not on the actual technological aspects of remotely flying the aircraft, but on the broader concepts involved. Only in the past 10 years has the United States Air Force taken the General’s advice and started turning his vision into operational reality. This article will serve as a “status report” now that the USAF’s only Unmanned Aircraft Systems (UAS) Wing, the 432d Wing, has existed one year. Additionally, this article looks forward to provide a window into the future uses of, training for, and operational concept of operations (CONOPs) for the USAF’s largest medium-altitude unmanned fleet, the MQ-1 Predator and MQ-9 Reaper.

When the 432d Wing stood up on 1 May 2007 at Creech AFB, Nevada, the Air Force did more than just unfurl a unit flag that had been cased since 1994 when the former fighter wing was deactivated at Misawa AB, Japan. First, all Air Combat Command (ACC) combat operations for Predator (Reaper had yet to be deployed into combat) and training for both weapon systems were consolidated under 12th Air Force, commanded by Lieutenant General Norman Seip. Moving the operation out from under the USAF Warfare Center at Nellis AFB, and placing it under a war-fighting, Numbered Air Force, commander was, and is, much more than symbolism. It gave the new wing and its people a renewed mission focus. Similarly, on 15 May 2008, when the wing was also designated as the 432d Air Expeditionary Wing (AFW), it not only became the only USAF wing so “dual-hatted,” but also consolidated all US Air Forces Central (AFCENT) combat capability for these systems under a single command and control node, which had not previously existed. Both were significant events in the UAS community, as well as for the Airmen fixing, flying, and fighting with Predator and Reaper.

What absolutely did not change, however, was the mission of the Airmen in these weapon systems. Just as when Predator operations were aligned under the 57th Wing at Nellis AFB, Nevada, prior to the activation of the 432d Wing “Hunters,” the mission remained the same: “Combat-ready Airmen, using MQ-1 Predator and MQ-9 Reaper aircraft systems, providing war fighters long endurance, real-time reconnaissance, surveillance, and precision attack against fixed and time-critical targets.” Additionally, and perhaps just as importantly, the Hunters conduct Predator and Reaper initial qualification training for aircrew, intelligence, weather, and maintenance personnel.

Currently, all Predator and Reaper qualification training takes place at Creech AFB, and that training “mission” has increased dramatically in the past few years. For instance, 4 years ago, the 11th Reconnaissance Squadron (RS), the sole Predator training squadron, trained 30 two-person crews consisting of a pilot and sensor operator to fly the Predator per year. In Fiscal Year (FY) 2008, they trained more than 160 crews. In 2009, with further refinements in the syllabus and increased simulator training, the 11th RS could produce almost 200 crews. Additionally, the California Air National Guard (ANG) 163d Reconnaissance Wing (RW) at March Reserve Base will also begin MQ-1 qualification training, producing an additional 40 crews per year. The MQ-9, Predator’s larger, more lethal “big brother,” is flown by the 42d Attack Squadron, which conducts qualification training and combat operations. Both aircraft systems are similar in terms of concept and methods of employment, so training is similar in the two squadrons. While Predator is capable of carrying the AGM-114 Hellfire missile, Reaper can also carry 500 pound-class weapons, a huge increase in combat capability available to ground commanders. In fact, the Reaper was considered such a big increase in combat capability that the ACC Commander sent the system into combat in 2007, more than one year ahead of schedule. As the USAF increases the number of Reapers and their associated Ground Control Stations (GCSs) in the field, training is expected to increase as it did for Predator,

requiring separation of training from the combat squadron and the creation of a new training squadron and an additional training location.

The dramatic increase in Predator and Reaper training has been necessitated by the dramatic increase in requests for these systems in the AFCENT Area of Responsibility (AOR). When the 432d Wing began operations in May 2007, the USAF had twelve 24-hour Combat Air Patrols (CAPs) airborne over Iraq and Afghanistan. The plan at that time was to be able to field 21 CAPs by FY2010. Through successive accelerations of the program, the USAF reached the 21 CAP milestone in April 2008, more than two years ahead of schedule. Combined with the early fielding of Reaper, by August 2008 there were 28 Predator/Reaper CAPs airborne, and there will be 34 total by December 2008. Although the plan has not changed, current USAF thinking puts the number of CAPs needed at around 50. Eventually, at that size, Predator and Reaper would require at least two operational active duty wings, several Air National Guard wings, and training wing to provide enough qualified crews to employ the weapon systems.

One of the many reasons for the success of these weapon systems is their overall utility to the ground commander. Unlike some Unmanned Aircraft Vehicles (UAVs) that simply transmit the video or still picture signal from their sensor to one location on the ground, USAF CONOPs for Predator/Reaper UAS employ Remote Split Operations (RSO) in which a very small forward-deployed Launch-Recovery Element (LRE) is responsible for launch, recovery, and maintenance of the aircraft on the ground in the AOR. Once the aircraft is launched and its systems are functioning, it is handed off to one of several units in the Continental US (CONUS), currently either the 432 AEW, 27 Special Operations Wing, 163 RW, 119 Wing, 147 RW, or 214 Reconnaissance Group to employ it for the next 20-22 hours of its mission. Using ACC, Air Force Special Operations Command, Air Force Reserve Command, and ANG units for these missions is truly a Total Force success story. Once handed off, the LRE then either launches another aircraft for another CONUS squadron or recovers one that is waiting to be handed off to it for landing. The LRE repeats this cycle continuously in their forward location, again making maximum use of people and equipment forward. This RSO concept results in a much more efficient use of equipment and personnel resources than deploying the entire unit forward to fly locally. Only the LRE rotates in and out of the AOR on an Air Expeditionary Force cycle. The vast majority of personnel remain at their CONUS base, flying continuous combat operations without the need to reconstitute after deployment, retrain in tactics, or work up for their next deployment. The GCSs and other equipment are much more efficiently used as well, since they are in continuous use, flying whatever aircraft are assigned by the Combined Air Operations Center (CAOC) in theater, under the command and control of the Combined Force Air Component Commander through the 432 AEW. For instance, if weather is bad in Iraq, or an operation in Afghanistan requires the additional sorties that day, more aircraft can be launched in Afghanistan, creating more missions for ground commanders there. The crews simply arrive on shift in the CONUS for a mission brief, are informed that on that day they will fly in Afghanistan, and proceed from there. The inherent flexibility of RSO is impressive. If the crews and equipment were located in theater and dedicated to one local area in the above scenario, they would simply go unused. But with RSO, the USAF puts more assets into the fight.

The other primary reason the RSO concept is much more efficient and effective than local operations is that the full-motion video (FMV) from the primary sensor is pushed from the CONUS unit to other users besides the local ground commander. FMV goes to the CAOC for command and control decisions, to imagery analysts at one of several locations worldwide for exploitation and analysis, to other air and ground commanders to build situational awareness and inform their decisions, and so on, to a virtually unending "customer base" as necessary. This ability to conduct Intelligence, Surveillance and Reconnaissance (ISR) missions, close air support (CAS) missions (especially in urban environments), armed overwatch of convoy operations, or strategic strike missions on high-value targets is what keeps these weapons systems in such high demand by commanders on the ground and by leaders in Washington, D.C.

So, if Predator and now Reaper are so successful, what is on the horizon? In keeping with General Arnold's admonition to "go to work on tomorrow's aviation," what are the things we as an Air Force should be considering, discussing, or working on concerning these medium-altitude UASs?

First, we should not forget the old maxim "train for tomorrow's fight, not today's." While Predator has served us incredibly well so far, and will continue to do so in the near-term, it operates in areas and conflicts that are unusual in historical terms. During this long period in Operation Iraqi Freedom and Operation Enduring Freedom, flight operations are totally controlled by the military. Other than restricted operating zones set up by ground

commanders, UAS operations are virtually unimpeded by civilian traffic. Basically, aircraft roam the skies at will, without the concerns about civilian airspace integration experienced in other locations, such as the United States or other nations with their own national airspace system. We must find technological and administrative ways to improve airspace integration. Reaper, with twice the speed and ten times the payload of Predator, is an intermediate step toward future systems, which the USAF calls Next Generation UAS (NGUAS). These NGUAS or NGUCAS (C is for combat), will be faster, carry more ordinance, and be more fighter or bomber-like than current UAS (similar to the US Navy's UCAS, currently undergoing testing), and will come with their own, more complicated problems to solve. Currently, USAF UAS training happens from takeoff to landing in restricted airspace, obviating the need for national airspace integration, but the explosive growth in sheer numbers and capabilities of these systems requires long-term solutions to national airspace integration.

How UAS are tasked in combat is also a concern. Because Predator began as a purely unarmed, ISR aircraft, many saw it as an ISR asset, and still see it that way today. But the "M" in MQ-1 stands for multi-mission, and today's Predator and Reaper, with their highly accurate Hellfire missiles, are seen by ground commanders as the urban CAS weapons of choice. Many aircraft, manned and unmanned, are capable of performing the ISR mission, but that doesn't make them "ISR assets." USAF CONOPs today task airborne assets such as Predator less efficiently than they could. Today's Predator tasking mechanisms simply are not flexible enough to respond to rapidly-changing conditions on the ground, whether predator is operating in the ISR role or an attack one, which is why Reaper is not tasked through the older, ISR-style process. Reaper, and NGUCAS, will require further refinement in these processes so that USAF aircraft can deliver desired results on the battlefield even more efficiently. Predator will be around for several years, more than enough time to solve this issue quickly and wring more productivity out of each sortie.

Who will use these systems to fly the aircraft is also currently under debate. While the USAF is currently committed to using fully-qualified pilots in almost all cases to fly these systems, rapid growth is pulling more and more pilots out of manned cockpits and into unmanned operations. Certainly the requirement for a pilot to be at the controls of UASs will continue to be debated, and we will have to decide whether the high cost of using fully-trained pilots is a bill that we can continue to pay. Conversely, one can make the case for using less than fully qualified pilots for Predator due to its slow speed and limited armament, but is the same true for Reaper, or for NGUCAS? Short-sighted solutions now may lead to future problems.

The Predator system, flown by active duty, AF Reserve, ANG, and other units, recently crossed the 400,000 flight hour milestone. It took more than 10 years to fly the first 100,000 hours, yet only slightly more than 10 months to fly the last 100,000. In FY2009, 38% of USAF aircraft purchases will be unmanned. By FY2010, more crewmembers will be trained to fly Predator and Reaper than will be trained to fly the sum total of all fighter aircraft in the US Air Force. While manned aircraft will continue to have the predominant role in USAF combat and non-combat operations, we must devote equal thought, doctrinal development, and attention to unmanned aircraft operations at all levels in the USAF and Department of Defense (DoD). In 5 or 10 years, if those responsible do it in a correct, thoughtful, and integrated manner, the US Air Force, sister services, and DoD, may truly realize the incredible potential of unmanned aircraft, their systems, and those that fly and use them. Then the use of these unique systems truly may be what General Arnold called "different from anything the world has ever seen."