



Of Shadows and white scarves

The U.S. Air Force believes the best people to fly UAVs are officers with experience in an actual cockpit. But operating an unmanned aircraft requires different skills than flying a jet, argues MIT professor M.L. Cummings. The Air Force should take a page from the Army's UAV manual and put enlisted nonpilots in control.

By M.L. Cummings
August 01, 2008

As a professor who specializes in ground control station design for unmanned vehicles, I was dismayed, but not surprised, "When more is less" [May], essentially stating that the U.S. Air Force should continue its policy of allowing only rated pilots to fly UAVs.

There are a number of issues that need to be addressed in this debate over what qualifications are needed by UAV "pilots." So I speak the record straight, both as a professor who conducts research in this area for all branches of the military and as a former pilot of Skyhawks and F/A-18 Hornets.

A critical fact not stated in the editorial is that the Army's Shadow, with roughly equivalent flight hours as the Predator, is not even flown by officers. It is flown by junior- to mid-grade enlisted personnel. The Shadow has the same basic mission as the Predator and what generally sets them apart now, functionally, is the Hellfire missile capability of the Predator. Shadow operators can be trained in weeks, while Predator pilots require years of pilot training in addition to Predator training, which amounts to more than a million dollars per pilot.

Recently, an Army Hunter UAV, which operates in similar fashion to the Shadow, successfully completed an airstrike on enemy targets in Iraq with a Viper missile. In addition, the Army is acquiring Sky Warriors, a Predator variant with Hellfire missiles, and will acquire similar enlisted complements, closing the gap between Air Force and Army ISR operations. While the Sky Warrior crews require additional training, there is no question that when considering time and cost of training, the Army model of using enlisted personnel to fill pilot gaps has historical precedence, as more than 3,000 enlisted men were used in World War II to man the aircraft.

The Shadow (and Hunter) can effectively do the same mission as the Predator because Army operators leverage higher levels of automation onboard the Shadow than do their Air Force counterparts. While both aircraft have the ability to be flown through a point-and-click interface, only the Army chooses this mode as standard operating procedure, while Air Force pilots rarely use it. Make no mistake, operations are not perfect, and there are many lessons the service could learn from aviation communities, especially in regard to maintenance programs. However, the Army's model in terms of role allocation between the human and the computer is more effective than that of the Air Force.

The technology has existed for years, in the commercial and military sectors, for planes to fly themselves from takeoff to landing. The role for what we typically think of as a pilot is rapidly diminishing. The value pilots and operators bring to a UAV is the ability to handle contingencies, but given the remote nature of control, very few stick-and-rudder skills are needed in emergencies. Instead, the operator needs system-management knowledge, and experience and training in handling contingencies. A typical argument raised in defense of rated pilots is that they are needed to fly UAVs through that airspace. Even if we agreed that rated pilots are needed in command of that airspace, then the Air Force could tell its takeoff and landing crews to hand over flight operations to a few pilots to staff that airspace. Once in a military operating area, control could be handed over to other crews without a pilot. This approach is used by the Army. The bottom line is that more creative and adaptive solutions are available to address manning shortfalls, but they require breaking the white-scarf tradition.

Another important consideration not addressed in the May editorial is the push across the services to move toward a one-operator paradigm. Research has shown that one operator can "fly" (but really manage) multiple UAVs. In fact, the Air Force recently demonstrated this in the unmanned aerial system (UAS) roadmap states that this is a major future thrust. When this happens, and it will sooner or later, the pilot will have to rely on higher levels of automation and will no longer be "flying" the aircraft. In the future, the real value needed is not a traditional stick-and-rudder background, but one more akin to an air traffic controller.

Successful warriors in future network-centric operations will be more like air traffic controllers and, to some degree, video game players in today's military. They will need to be able to rapidly multitask, assimilate information from a large array of remote sensors, coordinate many co-located and remote agencies, and exercise knowledge-based reasoning to direct highly cooperative vehicles (akin to the concept of a network-centric warrior). They will not need a fancy set of wraparound displays that give them the "feel" of being in the cockpit. They will need significantly improved automated sensing and target recognition, voice recognition, and more intuitive interfaces to command UAVs based on high-level tasks, not via altitude and heading commands. In short, the real UAS warrior of the future will be a computer geek rather than a strong-jawed, steely-eyed ace with a leather jacket and scarf.

I suspect many Air Force personnel struggle with the approaching demise of the awe-inspiring fighter and bomber pilots. It is an upheaval in the pilot-centric Air Force to consider the operational background of a UAV operator superior to that of a fighter pilot.

This leads me to my last major point in the debate: the morale of Air Force UAV operators and their second-class-citizen status.

Stuck in the desert

For some, an assignment to Creech Air Force Base, Nev., to fly UAVs is akin to an assignment to the 10th circle of hell. The the Predator community is a problem, as is morale. As a former pilot, I certainly can see why. An Air Force pilot gets his drea an F-15 or F-16 squadron, gets to yank and bank and drop bombs, and then, after an unparalleled high, is sent to the middle boring job that requires very few actual flying skills. He is looked down upon by other pilots (and the close proximity to Nell must smart a bit) and treated accordingly. For example, in response to the shortage of Predator pilots, an Air Force general h. don't care if we have to stop-loss folks, recall folks, freeze folks, etc., to make the sustainment baseline on people ... and I don to take drastic measures on deployment. At the end of the day ... what's new about that in our UAV world anyway?"

So back to the original debate: Should the Air Force continue its policy requiring rated pilots to command Predators? The pro "When more is less" of increasing the instructor-pilot pool to train more pilots, at the expense of operational sortie completions: which I concur, given all of the issues stated above.

This is a shortsighted response that will not resonate well with the operational community, will continue to reduce morale in an situation and ultimately fails to address the basic problems. In addition to the need for more adaptability, my proposed soluti components: personnel and technological interventions.

In terms of personnel interventions, the Air Force should revive its program of training UAV pilots and operators through a disti that would not have them fly fighters or bombers first but would specialize in issues unique to UAS control and operations. 1 idea. The Air Force established a prototype training program for UAV-only pilots, but senior Air Force leaders scrapped the ef 2006.

Such a program is needed for all the reasons stated above, but also because of a phenomenon called negative transfer of t when skills learned in one training setting interfere with those in another. It is possible that the highly specialized skill set of pilots and the resultant mental models actually can interfere with pilots' abilities to operate UAVs. A recent study by the Administration revealed that a far greater percentage of Predator crashes are a result of human error than are Shadow crashes are crashing than Shadows because of pilot confusion with interfaces and modes of automation, and difficulties with system ma the educational and operational experience of Predator officer pilots as compared to the enlisted Shadow operators, this should fact alone indicates that a re-evaluation of UAV pilot training is needed. One other personnel intervention that also is needed and achievable career paths for UAV pilots. This will represent a major shift in the Air Force culture, but Air Force UAV pilots ar programmatic and operational interventions are needed to change the current stepchild stigma.

The other intervention needed is the technological solution of the single-operator, multiple-vehicle model. Allowing operators 1 fly) multiple UAVs will not only be a force multiplier, but it will provide for streamlined operations. It also will raise the required to be more in line with the officer community. While the science and technology arm of the Air Force realizes this, there need coupling between the operational Air Force and its research efforts in order to identify feasible concepts of operations and tech paths.

Defense Secretary Robert Gates recently said the Air Force could do more to support battlefield efforts in terms of ISR missions disgruntled people at the problem is not the solution. What is needed speaks to very core of the Air Force's culture and mission major transformation, both at the personnel and technological levels. The technological solution is the easy one. å

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