Unmanned Aircraft Systems
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Unmanned aircraft systems (UASs) and remotely piloted aircraft (RPA) have brought significant capability to the battlefield in the areas of intelligence collection, command and control, and fires. Originally a small, niche community, unmanned aircraft now occupy a place at the forefront of our military operations and national security strategy. Over the last decade, the rapid improvements in aircraft and systems have resulted in significant increases in capabilities. Operational lessons during this time have shown warfighters at all levels depend on UASs and RPA. Efficiency in acquisition, staffing, and training will be essential to the UAS and RPA communities in the coming era of drawdowns and budget constraints.

This issue of the Air Land Sea Bulletin (ALSB) presents some of the challenges facing the UAS and RPA community, and some possible solutions.

In the first article, “Look, Up in the Sky: A Clarification on ‘Drone’ Terminology”, Capt Alexander Roman (USAF) considers the evolution of the terms associated with unmanned aircraft and remotely piloted systems. Capt Roman is an MQ-9 Reaper Mission Intelligence Coordinator for the 432d Attack Squadron.

“MQ-1C Gray Eagle Quick Reaction Capability Legacy” is the second article. It is written by CPT Randy Beck (USA) and CW2 Scott Dozier (USA) and describes the Army’s unique MQ-1C Quick-Reaction Capability units. Both authors served with Unit 2 of Quick Reaction Capability 2.

The third article, “Post OEF Way Ahead for the MQ-1 and MQ-9”, by Capt Daniel Wasmuth (USAF), Chief, Weapons and Tactics Officer for the 15th Reconnaissance Squadron, discusses the consequences of the rapid expansion of the Air Force’s RPA community.

The fourth article is, “Mission Command and the Employment of the Gray Eagle”, by CPT Steve Sevigny (USA) an aviation Observer-Coach, Trainer from the Army’s Mission Command Training Program. The article introduces planning considerations for employing UAS.

Dr. Mark Lilly, a program analyst for the 1st Air Force A3O branch, presents some issues encountered by UAS and RPA in the United States’ national airspace in the fifth article, “Unmanned Aircraft Systems in the National Airspace System”.

Lt Col Bryan Callahan (USAF), Director of Operations for the 42d Attack squadron contributes the sixth article. In “Do Remotely Piloted Vehicles Represent a Revolution? Not Yet”, he points out introducing remotely piloted vehicles to the battlefield does not represent a revolution in military affairs.

The seventh article, “Current and Future Unmanned Aircraft System Challenges”, by COL Thomas von Eschenbach (USA) and Charles E. Hover from the TRADOC Capability Manager-UAS office, compares the Army’s introduction of its UASs with historic technological innovations.

As we continue to tackle the challenges ahead, now more than ever, we need your participation in our joint working groups (JWGs) and future ALSBs. It is your opportunity to share your expertise and fulfill your duty as a warfighter to enhance our combat capabilities. For a list of upcoming 2014 JWGs and future ALSB topics, go to http://www.alsa.mil. Get involved and get your voice heard.

At the start of the summer personnel movement season, I would be remiss if I did not convey my gratitude to the members of the ALSA staff that will depart this season. They are LTC Deidra Broderick (USA), Lt Col William Wallis (USAF), Lt Col Richard Freeman (USAF), Maj Clay Laughlin (USAF), and Maj Sam Denney (USAF). Their collective efforts have enabled valuable tactics, techniques, and procedures to reach warfighters around the globe. Thank you.

JOHN L. SMITH, Colonel, USA
Deputy Director
By Capt Alexander W. Roman, USAF

If it bears neither cape nor feathers—as in the Superman TV show exclamation that makes one muse on birds, planes, and the venerable flying man—that unknown object in the sky just may be a type of 21st century mis-named flyer.

Modern battlefields are veritably teeming with them. They are called drones, unmanned aerial vehicles, or remotely piloted aircraft (RPA). An appropriate, all-encompassing name for them has eluded standardization in the years since their operational employment; sometimes for good reason. However, it is useful for categorization in military and scientific communities, to draw some delineation among their names.

Unmanned Aircraft

The term “unmanned aircraft” is one of the earlier attempts at describing such assets as the MQ-1 Predator, MQ-9 Reaper, or RQ-4 Global Hawk. “Unmanned aerial vehicle” (UAV) is another common term, but it really adds no descriptive value, since the “aerial vehicle” is synonymous with “aircraft.” While either of these captures the reality that there is no pilot onboard the aircraft, the use of the word “unmanned” should present some consternation to the scrupulous mind. Rather than refer to the geographic separation of the pilot’s location from the aircraft, the word “unmanned” seems instead to imply that the aircraft operates without human influence. This, of course, is far from the truth. The pilot operating the aircraft may be miles or oceans away, using the concept of remote-split operation (RSO); but he or she is very much involved in controlling the plat-
form without more than a few seconds of delay. The inaccuracy of these terms has led to the usage of another, more encompassing phrase.

**Unmanned Aircraft System (UAS)**

One might have guessed the next evolution in terminology would be RPA, considering unmanned aircraft failed to mention the pilot. Instead, the next term to emerge in the community was “unmanned aircraft system,” probably with the intent that a pilot’s presence can be inferred from the aircraft being part of a larger framework. However, the term “system” leaves open to interpretation exactly what level of connectivity the aircraft has with other nodes. Does the other part of the system merely receive information? Does it control the aircraft? Does it do this all the time, or only when required? And, what type of “system” is it? The addition of the word “system” quite possibly makes the term more ambiguous.

The Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, definition of UAS addresses this concern by specifying a UAS as: “That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft.” Nonetheless, this has not stopped many in the community from using UAS to refer to only the aircraft; the term fails to provide any more useful information. The audience can, therefore, easily misconstrue the term and hold either too broad or too narrow a connotation based on individual perspectives.

**Remotely Piloted Aircraft**

In a necessary acknowledgement to the qualified operator as well as the airborne vehicle, the phrase “remotely piloted aircraft” indeed specifies the mechanisms involved in aerial RSO. Instead of implying the presence of the pilot (as is the case with UAS), RPA clearly spells out the nature of the system and operator. The term “RPA” is probably as well-received as any other, and may be sufficient for many modern assets. And yet, the specific words “piloted” and “aircraft” leave little room for the term to evolve alongside similarly envisioned technologies. Consider, for example, what one might call a watercraft controlled via RSO. “Remotely piloted vessel” would be a logically correct construct, as the word “pilot” can refer to one steering a ship or one flying an airplane. However, the ubiquitous nature of “pilot wings” earned in the armed services equates a pilot with an aircraft, so this phrase would be subject to a high probability of misinterpretation. Equally confusing, due to the nuances of the English language, is the fact that the word “vessel” can also refer to an airship. And such is the crux of the confusion.

Before proposing a change in terminologies, it is helpful to address one other term, if only to eliminate it. The politically sensitive nature of RSO has led to questioning the traditional boundaries of governmental involvement, at home and abroad. Along with the backlash from negative perceptions of this phenomenon, a pejorative term has developed and gained widespread use in the media.

**Drones**

A cursory web search for “drones” will yield a trove of controversial material, from politically charged reporting, of questionable authenticity, to growing conspiracy theories. It is likely that the pages of history depicting early 21st century political incum- bents will include substantial sections on their handling of drone policies. While this remains a classified sphere of operations, and many reporters may lack sufficient military knowledge to understand associated processes, there is still no excuse for the uninformed usage of this word.

The use of the word “drone” for describing an aircraft has already made it into modern dictionaries, usually after the entry for a stingless male bee. However, the nature of events by which
this term was incorporated makes it unbalanced at best. A former generation may have feared anything related to “robots,” with the mere mentioning of the word conjuring up images of metallic humanoids stumbling forward with outstretched arms, beeping unintelligibly and somehow bent on causing harm. It is just such a picture—unrealistic and emotionalized—that modern media has painted of “drones” in the public eye. Films portray them as sinister, menacing, and synonymous with Government warmongering or spying. This pernicious terminology serves neither the public nor the profession of journalism, as it results in hyperbole.

Dismissing the usage of the word “drone” in anything but jest, one may return to the necessity of a new terminology scheme that is precise.

Calling Them as They Are

It could well be argued that the confusion or inaccuracy of terms in this area is due to inflexibility among participating communities in and out of the military. Once a technology is developed, the manufacturer will surely seek to sell it repeatedly to those who would buy it. If something sells while labeled a “UAV,” why rename it just to see if it will still be popular as a “UAS” or “RPA”? Why go through the trouble of rewriting documentation standards, technical manuals, and the like?

The military, in particular, is very fond of TLAs, or three-letter acronyms. Sometimes mental inertia opposes the suggestion of a four-letter version. Nonetheless, the solution is not difficult. The communities should simply be willing to describe each invention or capability as accurately as necessary and as concisely as possible.

“Remote” is clearly preferable to “unmanned” except for truly autonomous assets, but it may often be necessary to use more description for the other details. If a fourth letter or a new scheme of categorization is necessary, so be it. Additionally, the word “system” is probably too ambiguous and should only apply to the entire interconnected sphere that supports and executes the operations.

Following the logic of the previous examples, we should call a watercraft controlled via RSO just that: a remotely operated watercraft (ROW). If it were fully submersible, the name would change to remotely operated submarine, perhaps designated “RO-Sub” to avoid confusion with remotely operated system. A land-tethered blimp with a sensor suite should be called a remote monitoring blimp—or remote monitoring lighter than air vehicle (RMLTAV), if blimp is considered too informal.

After surveying the options, clearly a more reliable terminology scheme is in order. Perhaps the most straightforward correction will be simply to “call them as they are”. We should name each platform according to its vehicle type, with enough specificity to distinguish it from other closely related platforms or from similar acronyms. Doing this will permit the joint community to standardize a great number of names with more specific meanings and replace the few ambiguous names currently in use.

Capt Roman is an MQ-9 Mission Intelligence Coordinator with the 432d Attack Squadron at Ellsworth Air Force Base, South Dakota.
By CPT Randy J Beck, USA and CW2 Scott E. Dozier, USA

The Army’s MQ-1C Gray Eagle quick reaction capability (QRC) will conclude its fifth, and final, combat rotation in May 2014. Although the rotations of the QRCs from the 2-13th Aviation Regiment will soon end, the legacy and lethal capabilities will continue. Echo Company, 160th Special Operations Aviation Regiment (Airborne) will assume the QRC mission and continue to provide armed reconnaissance, surveillance, and target acquisition (RSTA) support to ground force commanders anywhere in the world. The Army’s QRCs personify the special operation truth: quality is better than quantity.

Every nine months, for the past four years in the remote southern Arizona desert, the United States Army’s Unmanned Aircraft System Training and Doctrine Command Training Battalion assembled two 18-Soldier teams. These teams consist of 12 MQ-1C Gray Eagle operators (15W) fresh from the schoolhouse, a supply sergeant (92Y), a flight operations specialist (15P), two unmanned aircraft systems (UASs), warrant officers (150U), a first sergeant, and a commander. The two warrant officers provide technical and tactical expertise for UAS safety and operations. They come from either manned or unmanned aviation backgrounds and serve as platoon leaders, payload operators, and flight operations officers. The company commander, with a manned aviation background, and usually the last to arrive at the unit, has two months to develop and train the team for combat. These 18-Soldier teams deploy to Afghanistan and join the Combined Joint Special Operations Task Force. Upon arrival, and within a few months of their inception, the Army expects these units to support America’s most elite special

The Army’s QRCs personify the special operation truth: quality is better than quantity.
forces units with precision airstrikes and constant RSTA support across the theater. They are armed with AGM-114 Hellfire missiles and tasked to fly seven days a week. Each unit averages over 900 flight hours per month, limited only by weather.

The Army UAS operators are collocated with the ground force. They carry rifles, eat MREs, and live in tents in the middle of the fight. They meet with the joint terminal air controllers and ground force commanders before and after missions to exchange information and provide after-action reviews. They celebrate their victories and mourn their losses together. This cooperation builds camaraderie and trust, and has resulted in over 100 Hellfire missile strikes and unmeasurable intelligence data in support of special operations forces in every corner of Afghanistan.

The QRC capabilities continue to improve as the UAS technology develops. The QRCs often test new equipment and software in a combat environment to speed up the acquisition and fielding processes. The Gray Eagle software requires two or three upgrades each year to incorporate the latest advances. QRC operators routinely learn new control interface systems. It is common to hear the phrase, “I have never seen that before” during QRC operations.

Due to the small size of the QRC, operators train and perform various tasks beyond flying. They conduct preflight inspections, load their own missiles, and manage parts and resupply. Operators also perform guard duty along with other basic tasks required of an Army Soldier.

May 2014 will mark the end of this little known, yet highly regarded, capability called the QRC. The 160th Special Operations Aviation Regiment (Airborne) will take command and evolve this force into a fully staffed aviation company. They will receive the best training and the superior support that has become the hallmark of the 160th. They will continue to progress and achieve great results. They are the leading edge of Army UASs, and will change the battlefield and the face of Army aviation. When they look back, they will remember from where they came, a group of 18 young Soldiers with minimal guidance and training tasked to support and protect America’s elite.

When they look back, they will remember from where they came, a group of 18 young Soldiers with minimal guidance and training tasked to support and protect America’s elite.

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THE POST-OEF WAY AHEAD FOR MQ-1 PREDATORS AND MQ-9 REAPERS

By Capt Daniel C. Wassmuth, USAF

The use of remotely piloted aircraft, specifically the MQ-1 Predator and MQ-9 Reaper, has exploded over the past decade: growing an amazing 1,575% (from four combat air patrols (CAPs) in 2003 to 63 CAPs by 2013). Three reasons for this rapid growth were:

1. The insatiable demand for full-motion video (FMV) of the battlefield.
2. The extremely long loiter time allows ground commanders to build pattern-of-life on high-value individuals (HVIs) to surgically dismantle terrorist networks.
3. Both platforms carry the AGM-114 Hellfire, which has proven to be invaluable as a low-collateral-damage weapon in counterinsurgency (COIN) environments.

However, the increased demand for Predators and Reapers was not without consequences. Most notably, the rapid expansion of the community prevented the appropriate forethought into long-term training and sustainment. The impending withdrawal of troops from Afghanistan and the current fiscal crisis demand that the United States Air Force (USAF) determine the expectation of future Predator and Reaper mission sets and employment capabilities. The joint force has developed some less-than-optimal processes in Iraq and Afghanistan, making current COIN operations inadequate models for future conflicts. This article provides a recommendation for effectively optimizing the Predator and Reaper roles in airpower, post-Afghanistan, by setting a minimum crew-to-sortie ratio of 13:1, which enables a 6-week training cycle every 18 weeks.

The joint force has developed some less-than-optimal processes in Iraq and Afghanistan, making current COIN operations inadequate models for future conflicts.
Before we begin analyzing the problems and recommended fixes, we must develop a common set of definitions. A sortie is the common term for a single flight, which lasts approximately 22 hours for the Predator, and approximately 16 hours for the Reaper. The crew-to-sortie ratio is the number of crewmembers in the squadron available to support operations for each sortie. Per Air Force Instruction (AFI) 65-503, US Air Force Cost and Planning Factors, the current intended crew-to-sortie ratio for Predator and Reaper squadrons is 10:1. It is worth noting, however, that AFI 65-503 bases the 10:1 ratio on a staffing study done in 2008 while the sole focus was Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF).

Initially, the RQ-1 (predecessor to the MQ-1) was fielded merely as a reconnaissance aircraft to supply FMV of the battlefield. As RQ-1 crews consistently watched HVIs conduct business, United States senior leaders realized the incredible utility in arming the RQ-1. The addition of the AGM-114 Hellfire under the wings changed the RQ-1 into a lethal, multirole aircraft. Subsequently, the USAF has continually developed and employed new sensors, targeting pods, weapons, and software on the Predators and Reapers. The addition of new sensors and lethal weapons transformed these platforms from unblinking eyes into highly effective, multirole assets that can find, fix, and finish the enemy.

Unfortunately, the exponential growth of Predator and Reaper sorties, combined with the nature of COIN operations, contributed to the implementation of several poorly developed processes. The joint community must reconcile these processes to effectively and efficiently posture the Predator and Reaper for future operations. Lt Col Bryan Callahan’s paper written for the School of Advanced Air and Space Studies titled, “The Limits of Airpower in Information-Dominant Warfare,” highlights two critical issues with the way the USAF tasks and manages Predators and Reapers. First, the air component commander in Central Command lacks allocation authority. The monthly allocation directive allots 100% of the assets to specific supported units, which reduces the combined forces air component commander’s (CFACC’s) flexibility to reallocate assets when priorities change. Second, the CFACC pairs Predators and Reapers to tasks before the ground commander has used his organic assets, such as Scan Eagles and RQ-7s. Therefore, the CFACC’s Predators and Reapers are typically allocated to one supported unit performing a singular mission set for months, or even years. This allocation and tasking process makes the Predators’ and Reapers’ units quasi-organic assets thereby undermining their ability to train for, and be qualified in, multiple mission sets.

With the addition of multiple sensors and several variants of weapons, the Predator and Reaper have become lethal multirole assets. Both platforms’ units have demonstrated their ability to enable mission successes in combat search and rescue (CSAR), air operations in maritime surface warfare (AOMSW), strike coordination and reconnaissance (SCAR), close air support (CAS), and air interdiction (AI). The USAF has documented and codified these successes, along with tactics, techniques, and procedures and lessons learned from combat operations and large-force exercises (such as ODYSSEY DAWN and RED FLAG) in tactics publications. However, the majority of Predator and Reaper crews have a limited, and sometimes non-existent, opportunity to train for the various missions despite the community’s successful record of accomplishment.

Predator and Reaper crews can attribute their overall lack of training in mission sets other than intelligence, surveillance, and reconnaissance (ISR), to two factors:

1. The USAF was under extreme pressure to increase FMV for the con-
conflicts in Iraq and Afghanistan, so they added a daily sortie as soon as the minimum required crews arrived at the squadrons.

2. Training for various mission sets was not required because ground commanders in OIF and OEF were primarily concerned with the immediate needs of COIN operations.

So, deliberate decisions were made to train and field airpower to the current conflicts using the 10:1 manning model that was devoid of normal USAF continuation training, air expeditionary force (AEF) spin-up, mission specific training, and reconstitution requirements that strike and ISR platforms rely upon. Since then, the USAF created designed operational capability (DOC) mission statements for both platforms to articulate the various combatant commands’ (COCOMs’) requirements for each squadron. These include CAS, SCAR, CSAR, AOMSW, and AI. The COCOMs’ requirements for Predators and Reapers to be prepared to execute multiple mission sets at a moment’s notice validate a training requirement to maintain proficiency in those missions. As combat operations in Afghanistan wind down, the USAF is overdue to analyze and implement a new staffing model, which allows Predator and Reaper squadrons to train for warfare in the same fashion as their manned counterparts.

The USAF must correctly posture Predators and Reapers as multimission assets and allocate the requisite training time for crews to conduct those mission sets effectively. Squadrons for both platforms are currently only staffed to operate the combat lines and are largely unable to accomplish continuation, upgrade, or spin-up training.

The USAF should increase the minimum crew-to-sortie ratio for Predator and Reaper squadrons to 13:1. This increase will enable squadrons to execute a modified AEF-style rotation that fulfills combat requirements and affords squadrons the requisite staffing for dedicated training time. A 13:1 crew-to-sortie ratio would support a 3:1 “deploy to dwell” timeline, which is the absolute minimum for Predator and Reaper crews to be proficient in their squadron’s DOC missions. Under this system, Predator and Reaper crews can fly 18 weeks of combat and then enter a 6-week training cycle. The 6-week training cycle afforded by a 13:1 crew-to-sortie ratio enables the squadrons to effectively integrate across their various mission sets in joint and multinational environments.

No one could have predicted the Predator and Reaper communities’ explosive expansion. The staffing “rules-of-thumb” and poor processes developed during the past decade, while understandable, are not the models for the future employment of either platform. With OEF winding down, the USAF has a unique opportunity, through a change in the crew-to-sortie ratio, to maximize the Predator and Reaper abilities to provide a broad range of integrated effects to combatant commanders.

END NOTES

1. 432WG/432AEW “Remotely Piloted Aircraft Operational Update” (PowerPoint, 28 January 2014, classification up to SECRET). Information extracted is unclassified.

2. AFI 65-503. Table A36-1. Authorized Aircrew Composition—Active Forces, 01 February 2012, page 6.


4. Ibid, 23.

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Commanders must build a critical understanding of the Grey Eagle UAS capabilities and limitations to ensure it is properly employed on the battlefield.

By CPT Steve P. Sevigny, USA

Combat aviation brigades (CABs) across the United States Army are gradually fielding the Gray Eagle unmanned aircraft system (UAS). As the Army begins to focus training on combined arms maneuver, the Gray Eagle will play a critical role on the battlefield. Commanders must build a critical understanding of the Grey Eagle UAS capabilities and limitations to ensure it is properly employed on the battlefield. The use of UAS has expanded exponentially due to operations in Iraq and Afghanistan. Each Service has made advances in UAS employment resulting in incredible strides in the support they can provide to the ground force commander.

Along with the technological advancements in these systems, the Army has placed their UASs in different organizations, which indicates changing employment trends on the battlefield. Within the Army, for example, the Shadow has been fielded to divisions under the special troops battalion via the military intelligence company. Army leadership decided to assign the Gray Eagle UAS directly to CABs. This has led to some discussion and development as to how units should employ an armed UAS. The Gray Eagle’s surveillance capability is well suited for information collection operations (ICO), and its armed capability is well suited for interdiction attack (IA), and close air support (CAS) missions. Since Gray Eagles are likely to perform all three missions, which are not mutually exclusive, the following discussion highlights some considerations for use by commanders when making decisions on employing a Gray Eagle on the battlefield. The intent of this article is to have all elements and commanders on the battlefield understand the capabilities and limitations of the Gray Eagle UAS. It is not to argue for or against any specific role or even a combination of roles for employing the Gray Eagle.

IA. Field Manual (FM) 3-04.126, Attack Reconnaissance Helicopter Operations, defines IA as “an attack by Army aircraft to divert, disrupt, delay, degrade, or destroy enemy combat power before it can be used effectively against friendly forces. IA combines ground based fires, attack aviation,
unmanned systems, and joint assets to mass effects, isolate, and destroy key enemy forces and capabilities. Deliberate IAs are focused on key objectives and fleeting high-value targets, such as enemy C2 [command and control] elements, AD [air defense] systems, mobile, long-range surface missiles, surface-to-surface missiles..., artillery, and reinforcing ground forces.” The Gray Eagle, with its superior optics, range, and on-station time, is very well suited for IA missions which may take place well forward of friendly forces and involves attacking key, high-payoff targets (HPTs).

ICO. The Gray Eagle has tremendous endurance and a large combat radius, which are subject to restrictions of weather, ordnance on board, and other factors. The Gray Eagle’s endurance enables commanders to conduct reconnaissance and surveillance of critical named areas of interest (NAIs), to satisfy priority intelligence requirements (PIRs), and make timely decisions on the battlefield. Therefore, the Gray Eagle is well suited for ICO.

Commander’s Guidance. Recent Mission Command Training Program observations at a warfighter exercise involved a battlefield surveillance brigade (BFSB), that employed two CAB Gray Eagle UASs to facilitate their ability to conduct ICO for their higher headquarters. The BFSB staff conducted analyses and employed the Gray Eagle UAS predominantly to answer PIR for their division headquarters. At the onset of the exercise, the Gray Eagles provided surveillance of certain NAIs to accomplish this mission. They were very effective.

Friction developed as the Gray Eagles began to identify large numbers of HPTs, many of which were beyond the range of indirect fire systems. The BFSB continued to conduct reconnaissance and surveillance and sent spot reports of enemy activity, but the potential for units to use Gray Eagles in an IA role began to create a confusion of priorities for the BFSB. Division headquarters became much more directive regarding Gray Eagles’ weapon systems employment. The BFSB observed HPTs and the division-directed engagements. The BFSB commander sought the division commander to clarify his guidance. The question became: How is the Gray Eagle going to be employed?

Mission Command. Army Doctrinal Publication 6-0, Mission Command, defines mission command as “the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander’s intent to empower agile and adaptive leaders in the conduct of unified land operations.” For units to exercise disciplined initiative with Gray Eagles, the commander’s guidance concerning employing armed UASs is critical. Commanders cannot issue effective guidance without an understanding of the capabilities and limitations of the Gray Eagle.

Fighter Management. As part of understanding the capabilities of the Gray Eagle UAS, commanders must understand the fighter management restrictions placed on UAS operators by Army Regulation (AR) 95-23, Unmanned Aircraft System Flight Regulations. A CAB standard operating procedure will further address the length of duty day and what duties crews may perform within a day and month. An understanding of these restrictions is critical to commanders who seek to employ UAS effectively on the battlefield. FM 3-04.111, Aviation Brigades, dated December 7, 2007, Appendix D, table D-2 provides a sample crew endurance program.

Command Support Relationships. The nature of command support relationships creates potential confusion regarding risk approval between the CAB and the gaining unit. AR 95-23 defines final mission approval authority for UAS missions. Paragraph 2-12a(3) of that reference states, “final mission approval authorize(s) are members of the chain of command who
Regardless of the nature of the command and support relationship, gaining commanders should understand the aviation-specific risks inherent with UAS operations. AR 95-23 does not clearly define how this relationship for final mission approval works under command and support relationships. Command relationships (assigned, attached, operational control (OPCON), or tactical control (TACON)) imply a higher degree of control for the gaining unit. In the case of Gray Eagle, OPCON and TACON are the most commonly used types of control. Army doctrine reference publication (ADRP) 5-0, The Operations Process, par 2-80 defines OPCON as “the authority to perform those functions of command over subordinate forces that involve organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. OPCON includes authoritative direction over all aspects of military operations.” This description implies the gaining unit commander, usually a brigade commander, will exercise final mission approval authority of UAS operations under OPCON/TACON command relationships.

For support relationships, ADRP 5-0 states, “a unit assigned a direct support relationship retains its command relationship with its parent unit, but is positioned by, and has priorities of support, established by the supported unit.” If Gray Eagle companies fulfill a support relationship, such as direct support, the parent CAB will retain control of risk approval.

Regardless of the nature of the command and support relationship, gaining commanders should understand the aviation-specific risks inherent with UAS operations. Furthermore, they must clearly define responsibilities regarding risk approval and mitigation between the commanders of the parent and gaining units. The best way for gaining commanders to understand the details of risk approval for UAS missions, or any other aviation-specific
The best way for gaining commanders to understand the details of risk approval for UAS missions, or any other aviation-specific topics, is to establish effective liaison and a mutual relationship with the CAB.

Re-tasking. In addition to engagement criteria, commanders must clearly define what criteria are necessary to re-task the Gray Eagles. The Gray Eagle is capable of being re-tasked to conduct IA and CAS during an ICO mission. Commanders must ensure their battle captains understand their priorities for using and re-tasking the Gray Eagle. Battle captains also must consider how they will develop ICO requests in real time. The previously discussed capabilities of the Gray Eagle are critical to establishing these criteria.

Enemy. Consider the threat of enemy air defenses in employing any UAS. While these systems are unmanned, commanders must still consider their survivability. Strong enemy air defenses will significantly reduce the Gray Eagle’s ability to conduct ICO and IA. Commanders will need to carefully consider their use prior to shaping operations.

Conclusion. The Gray Eagle is a powerful tool for commanders to conduct IA, CAS, ICO, and shape the battlefield. With all of these capabilities, commanders must provide proper guidance to ensure their units use Gray Eagles to their full potential. The staffs are responsible for conducting the necessary analyses to ensure commanders can make informed decisions. With proper guidance from the commander, the Gray Eagle will have a significant impact on the battlefield. An understanding of the capabilities and limitations discussed in this article is critical to providing proper guidance.

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UNMANNED AIRCRAFT SYSTEMS OPERATIONS IN THE NATIONAL AIRSPACE SYSTEM

By Mark Lilly, Ed.D.

INTRODUCTION

One of the most significant advances in aviation for the Department of Defense (DOD) has been the advent of unmanned aircraft systems (UASs). UASs have emerged as indispensable tools that provide combat capabilities across a variety of mission sets. However, the DOD has experienced considerable obstacles while attempting to comply with federal aviation regulations for employing UASs in the national airspace system (NAS).

UAS MISSIONS IN THE NAS

The First Air Force/601st Air Operations Center’s joint force air component commander (JFACC) employs UASs in combat-related roles that support armed intelligence, surveillance, and reconnaissance missions. In addition to these, the JFACC has several mission requirements within the continental United States (CONUS) that are ideally supported by UASs. (The JFACC is directed by the Commander, United States Northern Command.)

First Air Force’s homeland defense mission can be associated with combat-type operations in defense support of civil authorities (DSCA). DSCA is best described as providing federal, state, tribal, and local critical resources and unique capabilities during natural or man-made disasters. Within the JFACC’s DSCA mission responsibilities, the First Air Force employs UASs for incident awareness and assessment; search and rescue; communications; chemical, biological, radiological, nuclear/high yield explosive...
One of the most restrictive requirements for UAS operations in the NAS is for UASs to be able to see and avoid other air traffic.

UNMANNED AIRCRAFT EMPLOYMENT ISSUES IN THE NAS

While UASs have been employed throughout the world to locations such as Bosnia, Iraq, and Afghanistan with the only airspace issue being separation from other DOD, coalition, and contract carrier aircraft, operations in the CONUS NAS are significantly more complex. Foremost is that while overseas combat air operations are managed by the military, air operations in the CONUS are regulated by the Federal Aviation Administration (FAA). The FAA has unique, and somewhat restrictive, requirements for UAS operations.

The FAA requirements for flying UASs in the NAS are based on Aircraft Certification Service (AIR)-160 Interim Operational Approval Guidance 08-01, Unmanned Aircraft Systems Operations in the US National Airspace Systems.2

One of the most restrictive requirements for UAS operations in the NAS is for UASs to be able to see and avoid other air traffic.3 “When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see-and-avoid other aircraft,” according to the Code of Federal Regulations, Part 91, General Operating and Flight Rules, Subpart B—Flight Rules, Sec. 91.113, (b).4

AIR-160 states:

“Although onboard cameras and sensors that are positioned to observe targets on the ground have demonstrated some capability, their use in detecting airborne operations for the purpose of de-confliction is still quite limited. Therefore, these types of systems may not be considered as a sole mitigation in the see-and-avoid risk assessment.”5

To satisfy the FAA’s see-and-avoid requirement, the AIR-160 states UAS operators must, when operating outside class A airspace; or restricted, prohibited, or warning areas; use ground observers or a chase aircraft.6 Using ground observers severely limits the range and altitude of unmanned aircraft to the visual line of sight of the observer and using a chase aircraft restricts the UAS to operating in daylight, restrained by visual meteorological conditions. Chase aircraft operations also limit the UAS capability to that of the chase aircraft. This negates the use of UASs except for transit escort duty to airspace cleared for unrestricted UAS operations. Either see-and-avoid solution negates UAS use to support DSCA missions on a broad scope.

Another AIR-160 requirement is that UAS operators submit a Certificate of Waiver or Authorization (COA) before flight.7 A COA is best described as a detailed flight plan designed to provide the FAA and the local operating area air traffic control (ATC) enough detailed flight data to mitigate associated risks for each UAS flight. The areas addressed in each COA include the following:

- Proponent information.
- Points of contact.
- Operational description.
- System description.
- Performance characteristics.
- Airworthiness procedures.
- Avionics or equipment.
- Lights.
- Spectrum analysis approval.
- ATC communications.
- Electronic surveillance or detection capability.
- Aircraft performance recording.
- Flight operations area/plan.
- Flight aircrew qualifications.
- Special circumstances.8

One of the most restrictive requirements for UAS operations in the NAS is for UASs to be able to see and avoid other air traffic.3
Far from being a file-and-fly solution, COAs can take from 60 days to a year for approval, based on the complexity and location of the desired flight route.

The AIR-160 also lists lost link emergency mission requirements. It states:

“In all cases, the UAS must be provided with a means of automatic recovery in the event of a lost link. There are many acceptable approaches to satisfy the requirement. The intent is to ensure airborne operations are predictable in the event of a lost link.”

Since most DSCA missions occur outside class A airspace restricted, prohibited, and warning areas, and in locations where a significant amount of civil air traffic operates, lost link emergency missions can result in significant high-risk events that must be mitigated to satisfy ATC’s operational safety concerns.

Another major restriction in the AIR-160 concerns flights over populated areas. It states, “Routine UAS operations shall not be conducted over urban or populated areas. UAS operations may be approved in emergency or relief situations if the proposed mitigation strategies are found to be acceptable.”Along those same restrictions are flights over heavily trafficked roads or open-air assemblages of people. It states:

“UAS operations shall avoid these areas. If flight in these areas is required, the applicant will be required to support proposed mitigations with system safety studies that indicate the operations can be conducted safely. Acceptable system safety studies must include a hazard analysis, risk assessment, and other appropriate documentation that support an ‘extremely improbable’ determination.”

Both of these restrictions address concerns of airworthiness, reliability, and safety of UAS operations in the NAS.

**WHY CAN’T DOD CONTROL NAS AIRSPACE?**

It may seem to be an easy solution for the DOD to segregate airspace over areas requiring DSCA support during times of crises (such as above areas in the states affected by Hurricane Katrina in 2005). That would allow unrestricted UASs to operate without having to be concerned about the impact on other aviation assets. However, DOD operates in support of a lead primary federal agency during DSCA events and coordinates with countless other critical players. These critical players, or stakeholders, include aviation assets from state and local first responders, civil search and rescue, key political decision-makers, and news organizations that support general aviation. Blocking off large swaths of airspace to provide DOD UAS segregation is not a reasonable solution to the current problem of UAS access to the NAS.

**UNMANNED AIRCRAFT ACCESS TO THE NAS SOLUTIONS**

The DOD has, for some time and with limited success, attempted multiple, work-around solutions to gain better UAS access to the NAS. Most of these solutions have been designed to segregate civil air traffic from DOD UASs. The majority of UAS issues in the NAS will require the DOD to employ a more technologically advanced aircraft to take advantage of unused NAS airspace, and a commitment by DOD to mitigate the FAA’s concerns about safe UAS operations.

Three of the biggest technological challenges for UAS NAS access are based on mission requirements, the platforms’ service ceilings and optical sensor capabilities. The MQ-1 Predator and MQ-9 Reaper platforms, for example, must be forward deployed to local areas requiring UAS support based on their relatively slow cruise speeds (i.e., 100 and 220 knots, respectively). Deploying these UAS assets from their home units to CONUS locations is time consuming, expensive, and can result in multiple, complex logistical and air-
space issues depending on the location of the DSCA event.

The DOD is developing a UAS that is capable of operating altitudes in excess of flight level (FL) 500. This will allow a UAS to operate unobstructed by other air traffic with the exception of other DOD aircraft. UASs operating from a central CONUS geographic location with a platform capable of a 300-knot cruise speed above FL 500, and at least a 20 hour flight duration, can provide UAS coverage of the entire CONUS using the concept of four hours to the area of interest, eleven hours of continuous station-time coverage, four hours to return to home station, with a one-hour fuel reserve. The DOD should recognize the value of a platform that can not only operate at those flight levels, but possesses the transient speeds that would allow it to fly from an airport located within a restricted area, to anywhere in the CONUS above or within class A airspace. UASs taking off from DOD airfields located in restricted airspace and climbing into class A airspace will remove the requirement for ground observers or chase aircraft. Flights at these altitudes will simplify the COA process and possibly reduce the timeline to file and fly comparable to that of manned aircraft. Additionally, lost-link UASs above FL 500 pose little to no risk to civil air traffic and should be more easily risk mitigated to the satisfaction of the FAA and local ATC. Finally, any UAS must be able to possess an optical capability to provide adequate situational awareness from higher altitudes.

In addition to a UAS that is capable of taking advantage of available NAS airspace of FL 500 and above, the DOD must provide the FAA all available UAS safety data. Flight restrictions over populated areas, heavily trafficked roads, and open-air assembly of people can be mitigated by DOD providing the FAA UAS safety data. The data show these platforms have an exceptional mishap safety rate record and have flown countless flight hours with no unintended injury to personnel or damage to equipment or structures on the ground.

**SUMMARY**

The DOD should no longer be looking at ways to bend the NAS around the capabilities of current UASs, but should develop a platform that utilizes the vast amounts of airspace not being used by other air traffic. Waiting until a nuclear accident like the one that occurred in Fukushima, Japan will prove too late. The DOD should recognize there is a CONUS mission set that is significant enough to develop a platform to meet the requirements of the FAA to operate in the NAS and abandon complex workaround solutions.

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**END NOTES**

1 See, United States Northern Command Unmanned Aircraft Systems Domestic Concept of Operations.
3 Ibid., p. 2.
4 See, 2010 Federal Aviation Regulations
6 Ibid., p. 9.
8 See Federal Aviation Administration OE/AAA System web site at https://ioeaaa.faa.gov/oeaaa/Welcome.jsp
11 Ibid. 11.

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We use the terms transformation and revolution in military affairs (RMA) interchangeably. Often, remotely piloted vehicles (RPVs) are touted as instruments of an RMA. This essay attempts to determine whether RPVs represent an RMA or are just another means of performing the same functions the United States (US) defense mechanism has always performed. This article will define the most common criteria of an RMA, and compare those criteria to a current RPV system case study. It will show that RPVs do not represent an RMA. However, it will highlight an aspect of RPVs that could usher in great transformation if, and when, the US defense apparatus embraces such a concept.

**WHAT IS AN RMA?**

A wide range of opinions exists regarding what constitutes an RMA. Most definitions focus on the impact of technology and whether the newest piece of hardware represents a “revolution”. With respect to RPVs, we could easily be drawn into a discussion revolving around a technology-centric definition of an RMA. The issue of transformation is much broader than simply applying new technology. The Chinese invented the stirrup, but the Europeans perfected its use in warfare.1 Simply having the technology is not enough; applying the technology in a way that represents a dramatic change in the means by which we fight wars represents true transformation.

Thomas Keaney and Elliot Cohen defined an RMA as “a quantum change in the means of waging war and its out-

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1. Simply having the technology is not enough; applying the technology in a way that represents a dramatic change in the means by which we fight wars represents true transformation.
come, such that the very face of battle—its lethality, its pace, and geographical scope—is transformed. In most cases, a revolution in war involves the rise of new warrior elites, new forms of organization, and new dominant weapons.  

From this definition, several examples come to mind that represent clear RMAs. The aforementioned stirrup is one such example. The stirrup allowed a mounted rider to harness the power and inertia of a horse to drive the rider’s weapon into an opponent. So, armored cavalry and the subsequent tactics of shock warfare were formed. The thermonuclear-armed intercontinental ballistic missile (ICBM) is another form of an RMA. ICBMs travel at a pace never seen before in warfare, can deliver unprecedented destruction; and, those who employ them are a group of unique professionals whose training and expertise is specific to their system. Both the stirrup and ICBM represent quantum changes to the means by which we wage war.

UNITED STATES AIR FORCE REMOTELY PILOTED AIRCRAFT (RPA) AND BUSINESS AS USUAL

Accounts from the past decade of war in Iraq and Afghanistan document the USAF’s extensive use of RPA. Since 2009, the USAF has trained more RPA aircrew than all fighter and bomber pilots combined. Furthermore, Air Combat Command has increased the number of RPA hours to the Central Command Area of Responsibility by over 1,400% since 2006. The RPA represents the USAF’s most prolific weapons system, eclipsing the F-16 as the numerically superior weapons system that defines US airpower.

Commensurate levels of innovation in doctrine, tactics, procedures, organization, training, or any other indications of a paradigm shift, however, have not matched this herculean effort. For example, RPA fly the same missions the USAF has been flying since the USAF’s inception. RPA engage in reconnaissance, close air support, interdiction, and strategic attack. When RPA begin to fly air-to-air missions, they will complete the checklist of existing roles and responsibilities of airpower, but they will not be doing anything new. RPAs do not employ any special weapons beyond those already in the inventory. The aircrew flying RPA are the same aircrew, for the most part, who flew manned USAF platforms. These crews have largely been passed over and left undereducated. The promotion rate for RPA pilots to lieutenant colonel is 47%—compared to the 76% of their peers still flying their previous platform. In short, the expanded use of RPAs does not meet the criteria of a “quantum change in the means of waging war.” The system looks different from its manned counterparts, but RPA has not been applied in a transformational manner.

AN OPPORTUNITY FOR TRANSFORMATION

Unmanned vehicles represent an opportunity to do something never considered in military affairs. The syntax here is significant. This opportunity applies to all unmanned vehicles, not just aircraft. It also concerns a shift in mindset, not technology. Like the stirrup, having unmanned technology is interesting, but seeing it as a source of transformation is compelling. The revolutionary aspect of unmanned platforms is not the technological wizardry of long-range communications or the ability to sit on top of a target for hours. The RMA lies within the fact that unmanned vehicles change the way we look at risk.

Risk has long been a driving force behind military decision making. Commanders must weigh the cost of an operation, in materials and lives, against the benefits of a potential victory, and determine if the risk is worth the reward. Can unmanned vehicles change this risk calculation? Yes, they can by removing the human element from the risk equation; and by doing so, they represent an RMA. The Guadalcanal battle during World War II represents one such example. Would Japanese Admiral Gunichi Mikawa have pressed his attacks, had he been equipped with unmanned ships, the revolutionary aspect of unmanned platforms is not the technological wizardry of long-range communications or the ability to sit on top of a target for hours. The RMA lies within the fact that unmanned vehicles change the way we look at risk.
despite his lack of situational awareness on the enemy facing him? Perhaps his actions would have altered the outcome of the Guadalcanal campaign if he had unmanned capabilities that could have changed his risk calculations.

The USAF has unmanned capability in its RPAs, but has not embraced the idea of changing its risk calculations. For example, during Operation UNIFIED PROTECTOR, only two MQ-1 Predators were available to support the entire air campaign. When calls for more RPA went out, the only conceivable solution was to generate more assets rather than leverage the aircraft’s revolutionary attributes. In this case, available aircrew limited the USAF’s RPA capability even though there was an abundant supply of aircraft. A proposal was made to allow additional MQ-1s to launch and fly to the operating area without a dedicated crew sitting in the remote cockpit. The proposal would double the amount of coverage without costing additional aircrew. However, there was a risk associated with this decision. Should the aircraft encounter bad weather or a systems malfunction, there would be no crew available to counter the emergency situation. The proposal was denied at the force provider and supported headquarters levels.

The Operation UNIFIED PROTECTOR example highlights the risk calculation now available to US commanders. The USAF could increase its combat capability over Libya without involving additional US personnel. US commanders could shift risk from lives to equipment; a far less contentious calculation when considering the risk versus reward decision previously discussed. Furthermore, unmanned systems change the risk calculation for the enemy. An enemy commander, equipped with manned systems, but fighting against unmanned systems, must realize he/she stands to lose a more costly resource than the adversary would lose. An enemy commander is at a disadvantage when having to risk his/her force’s lives against an adversary’s equipment.

US commanders can press this advantage in an asymmetric manner of unprecedented proportions. The USAF has yet to fully embrace the asymmetric capability in its possession, and recognize the potential for an unmanned RMA.

CONCLUSION

Transformation comes in many forms. A quantum leap in capability, however, only comes along through intersecting emergent technology and unconventional thinking. Unmanned vehicles are not new. Like the Chinese and the stirrup, the USAF has had RPAs for quite some time, but they are not looking at them with an unconventional mindset. The RMA lies in how we use the technology, not the technology itself. Time will tell if the US defense establishment figures this out before someone else does.

END NOTES

7 Author’s personal observations from participating in AFPC promotion and cross training boards for RPA aircrew.
8 Keaney and Cohen, Revolution in Warfare, 200.
11 Author’s experience generating OUP deployment of forces proposals while at ACC headquarters, 2009-2011.

Lt Col Callahan serves as the Director of Operations at the 42d Attack Squadron and Creech AFB, NV.
Battlefield commanders have continually adapted their equipment, attempting to leverage the technology of the time to enhance their knowledge of the enemy and terrain, and increase their chances for victory. As an example, the use of balloons during the American Civil War, designed to support topographical engineers in mapmaking, later performed aerial observations of enemy encampments and movements. Further recognizing the potential for balloons, commanders quickly integrated telegraphs into them to enable directed fires on the unseen enemy from unseen firing positions. Today, the same innovative cycle continues as warfighters attempt to leverage unmanned systems and sensors to detect, identify, and neutralize the IED threat. This coalescence of maturing technologies and tactical ingenuity of adaptive warfighters brought to bear a tactical overmatch that provided better intelligence regarding IED emplacement by the enemy. Additionally, it enabled warfighters to destroy hundreds of high-value objectives, IEDs, and dangerous weapons caches. These actions turned the tide of the counter IED fight.

Today, the Army continues to mature capabilities to provide commanders with unprecedented capabilities and reduced risk of collateral damage. With the likelihood of urban warfare increasing, the development of manned and unmanned teaming doctrine and technology is a high priority for Army aviation. Specifically, Army aviation has sought to leverage the ad-

By COL Thomas von Eschenbach, USA and Charles E. Hover

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With today’s technology, multi-role UASs could provide an unprecedented increase in network support, electronic attack, and chemical, biological, radiological, and nuclear detection capabilities.

As the roles and capabilities of UAS expand, the Army plans for UAS employment to fill capability gaps well beyond that of traditional aerial reconnaissance. With today’s technology, multi-role UASs could provide an unprecedented increase in network support, electronic attack, and chemical, biological, radiological, and nuclear detection capabilities. However, with the increase in technology comes challenges in how to quickly procure and integrate these capabilities in support of the Army’s warfighting functions. The high demand for UASs and prioritization of their payloads is a complex process that requires new paradigms to plan, budget, and procure capabilities.

Integrating more payloads into UASs, such as synthetic aperture radar and ground moving target indicators, requires updates to TTP. A steep learning curve develops and drives changes to operations as these sensors prove more effective at tracking, cueing, and handing over targets to manned systems. Additionally, signal intelligence and electronic warfare payloads, currently found only on manned platforms due to size and weight, will match well with UASs in the future.

To improve the acceleration of fielding new technologies the Army adopted capability set (CS) fielding. A CS is a two-year cycle in which the Army fields new and emerging capabilities with the goal of keeping processes synchronized. This process provides the United States Army Training and Doctrine Command capability managers and project managers (PMs) opportunities to prioritize resources and capabilities to a predetermined fielding schedule. The need to get UAS into missions quickly, normally accomplished with large manned systems, presents challenges in not only integrating the capability into operations, but also training the operators, analysts, and leaders.

An RQ-7 Shadow launches from Forward Operating Base Sharana, Afghanistan, Aug 26, 2011. US Soldiers assigned to Bravo Company, Special Troops Battalion, 3rd Brigade Combat Team, 1st Infantry Division, Task Force Duke launched it while conducting a surveillance and reconnaissance mission. (Photo by SPC Tobey White, USA)
In the future, the Army will need to focus on properly integrating future UAS capabilities to meet the tactical and operational needs of the future force.

While the continued maturity of UASs will not change basic doctrine, the new capabilities they employ challenge our old methods for accomplishing the functional tasks of mission command, movement and maneuver, fires, protection, intelligence, and sustainment. A key challenge in successfully fielding a range of UAS capabilities will be overcoming the shortcomings in the current Joint Capabilities Integration Development System and normal procurement cycle. Recently, the Army tried to acquire, rapidly, new technologies outside of the acquisition cycle as a means to address specific Operational Needs Statements. Although this method was effective in providing real-time solutions to combat challenges by using the spectrum of military, industry, academia, and science communities for existing and emerging technologies, it often spawned federated systems or equipment that has no long-term sustainment or training plan. In the future, the Army will need to focus on the seamless integration and investments in capabilities that give the warfighter a tactical advantage in a variety of operational environments. Army units must be able to train with and maintain the equipment throughout its lifecycle.

The future success of UASs is also heavily dependent upon a continued partnership with vendors and the PM UAS office to continue the development of the Interoperability Profile (IOP) working group. The IOP subgroup defines the standards and protocols needed to ensure unmanned systems and products are interoperable with joint, coalition, government interagency, and first responder systems. With all the Services adopting this process, a seamless operational environment concept can become a reality, achieving greater levels of interoperability among UASs, the warfighters, and mission command systems.

Future threats and the quickening pace of technology development by adversaries are requiring the need to rely less on continuous data links that could come under electronic attack. A possible method to counter this would be autonomous UASs that have the potential to operate through artificial intelligence that allows them to team not only with manned platforms but also with each other through cueing.

Regardless of what the future holds, only continued close collaboration (i.e., fusing ideas, visions, and facts) between combat developers and industry will provide Soldiers with the products they need. Just as innovators placed cameras in observation balloons (providing a picture worth a thousand words) and then placed telegraphs or signal flags in balloons to improve fires and effects, we must continue to envision the applications and systems that lead to improving the commander’s tactical advantage.

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<td>ADVISING Multi-Service Tactics, Techniques, and Procedures for Advising Foreign Forces Distribution Restricted</td>
<td>10 SEP 09</td>
<td>FM 3-07.10 MCRP 3-33.8A NTTP 3-07.5 AFTP 3-2.76</td>
<td>Description: This publication discusses how advising fits into security assistance/security cooperation and provides definitions for specific terms as well as listing several examples to facilitate the advising process. Status: Revision</td>
</tr>
<tr>
<td>AIRFIELD OPENING Multi-Service Tactics, Techniques, and Procedures for Airfield Opening Distribution Restricted</td>
<td>15 MAY 07</td>
<td>FM 3-17.2 NTTP 3-02.18 AFTP 3-2.68</td>
<td>Description: This publication provides guidance for operational commanders and staffs on opening and transferring an airfield. It contains information on service capabilities, planning considerations, airfield assessment, and establishing operations in all operational environments. Status: Revision</td>
</tr>
<tr>
<td>CF-SOF Multi-Service Tactics, Techniques, and Procedures for Conventional Forces and Special Operations Forces Integration and Interoperability Distribution Restricted</td>
<td>13 MAR 14</td>
<td>FM 6-05 MCRP 3-36.1 NTTP 3-05.19 AFTP 3-2.73 USSOCOM Pub 3-33</td>
<td>Description: This is a comprehensive reference for commanders and staffs at the operational and tactical levels with standardized techniques and procedures to assist in planning and executing operations requiring synchronization between CF and SOF occupying the same area of operation. Status: Current</td>
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<tr>
<td>CORDON AND SEARCH Multi-Service Tactics, Techniques, and Procedures for Cordon and Search Operations Distribution Restricted</td>
<td>10 MAY 13</td>
<td>ATP 3-06.20 MCRP 3-31.4B NTTP 3-05.8 AFTP 3-2.62</td>
<td>Description: This is a comprehensive reference to assist ground commanders, subordinates, and aviation personnel in planning, training, and conducting tactical cordon and search operations. Status: Current</td>
</tr>
<tr>
<td>EOD Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance Disposal in a Joint Environment Distribution Restricted</td>
<td>20 SEP 11</td>
<td>ATP 4-32.16 MCRP 3-17.2C NTTP 3-02.5 AFTP 3-2.32</td>
<td>Description: This publication identifies standard MTTP for planning, integrating, and executing EOD operations in a joint environment. Status: Revision</td>
</tr>
<tr>
<td>IMSO Multi-Service Tactics, Techniques, and Procedures for Integrated Money Shaping Operations Distribution Restricted</td>
<td>26 APR 13</td>
<td>ATP 3-07.20 MCRP 3-33.1G NTTP 3-57.4 AFTP 3-2.80</td>
<td>Description: IMSO describes how to integrate monetary resources with various types of aid within unified action to shape and influence outcomes throughout the range of military operations. Status: Current</td>
</tr>
<tr>
<td>MILITARY DECEPTION Multi-Service Tactics, Techniques, and Procedures for Military Deception Classified SECRET</td>
<td>13 DEC 13</td>
<td>MCRP 3-40.4A NTTP 3-58.1 AFTP 3-2.66</td>
<td>Description: This publication facilitates integrating, synchronizing, planning, and executing MILDEC operations. It is a one-stop reference for service MILDEC planners. Status: Current</td>
</tr>
<tr>
<td>MILITARY DIVING OPERATIONS (MDO) Multi-Service Service Tactics, Techniques, and Procedures for Military Diving Operations Distribution Restricted</td>
<td>12 JAN 11</td>
<td>ATTP 3-34.84 MCRP 3-36.9A NTTP 3-07.7 AFTP 3-2.80 CG COMDTINST 3-07.7</td>
<td>Description: This publication is a single source, descriptive reference guide to ensure effective planning and integration of multi-Service diving operations. It provides combatant command, joint force, joint task force, and operational staffs with a comprehensive resource for planning military diving operations, including considerations for each Service's capabilities, limitations, and employment. Status: Revision</td>
</tr>
<tr>
<td>NLW Multi-Service Service Tactics, Techniques, and Procedures for the Tactical Employment of Nonlethal Weapons Distribution Restricted</td>
<td>24 OCT 07</td>
<td>FM 3-22.40 MCRP 3-16.6 NTTP 3-07.3 AFTP 3-2.45</td>
<td>Description: This publication provides a single-source, consolidated reference on employing nonlethal weapons. Its intent is to make commanders and subordinates aware of using nonlethal weapons in a range of scenarios including security, stability, crowd control, determination of intent, and situations requiring the use of force just short of lethal. Status: Revision</td>
</tr>
<tr>
<td>PEACE OPS Multi-Service Tactics, Techniques, and Procedures for Conducting Peace Operations Approved for Public Release</td>
<td>20 OCT 03</td>
<td>Change 1 incorporated 14 APR 09</td>
<td>Description: This publication offers a basic understanding of joint and multinational PO, an overview of the nature and fundamentals of PO, and detailed discussion of selected military tasks associated with PO. Status: Revision</td>
</tr>
<tr>
<td>TACTICAL CONVOY OPERATIONS Multi-Service Tactics, Techniques, and Procedures for Tactical Convoy Operations Distribution Restricted</td>
<td>18 APR 14</td>
<td>ATP 4-01.45 MCRP 4-11.3H NTTP 4-01.3 AFTP 3-2.58</td>
<td>Description: This is a quick-reference guide for convoy commanders operating in support of units tasked with sustainment operations. It includes TTP for troop leading procedures, gun truck employment, IEDs, and battle drills. Status: Current</td>
</tr>
<tr>
<td>TECHINT Multi-Service Tactics, Techniques, and Procedures for Technical Intelligence Operations Approved for Public Release</td>
<td>9 JUN 06</td>
<td>FM 2-22.401 NTTP 2-01.4 AFTP 3-2.63</td>
<td>Description: This publication characterizes how threat forces maneuver in the operational environment. It presents guidance on evacuating captured material of intelligence value, and provides joint force staffs and other communities of interest with specific data concerning the mission requirements of TECHINT. Status: Assessment</td>
</tr>
<tr>
<td>UXO Multi-Service Tactics, Techniques, and Procedures for Unexploded Explosive Ordnance Operations Distribution Restricted</td>
<td>20 SEP 11</td>
<td>ATP 4-32.2 MCRP 3-17.2B NTTP 3-02.4 NTTP 3-2.12</td>
<td>Description: This publication provides commanders and their units guidelines and strategies for operating with UXO threats while minimizing the impact of the threats on friendly operations. Status: Revision</td>
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<td>AOMSW Multi-Service Tactics, Techniques, and Procedures for Air Operations in Maritime Surface Warfare</td>
<td>15 JAN 14</td>
<td>MCRP 3-25J, NTTP 3-20.8, AFTTP 3-2.74</td>
<td>Description: This publication consolidates Service doctrine, TTP, and lessons-learned from current operations and exercises to maximize the effectiveness of air attacks on enemy surface vessels. Status: Current</td>
</tr>
<tr>
<td>BIOMETRICS Multi-Service Tactics, techniques, and Procedures for Tactical Employment of Biometrics in Support of Operations</td>
<td>1 APR 14</td>
<td>ATP 2-22.85, MCRP 3-33.1J, NTTP 3-07.16, AFTTP 3-2.85, CGTTP 3-93.6</td>
<td>Description: Fundamental TTP for biometrics collection planning, integration, and employment at the tactical level in support of operations is provided in this publication. Status: Current</td>
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<tr>
<td>BREVITY Multi-Service Brevity Codes</td>
<td>20 SEP 12</td>
<td>ATP 1-02.1, MCRP 3-25B, NTTP 6-02.1, AFTTP 3-2.5</td>
<td>Description: This publication defines multi-Service brevity which standardizes air-to-air, air-to-surface, surface-to-air, and surface-to-surface brevity code words in multi-Service operations. Status: Revision</td>
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<tr>
<td>COMCAM Multi-Service Tactics, Techniques, and Procedures for Joint Combat Camera Operations</td>
<td>19 APR 13</td>
<td>ATP 3-55.12, MCRP 3-33.7A, NTTP 3-61.2, AFTTP 3-2.41</td>
<td>Description: This publication fills the combat camera doctrine void and assists JTF commanders in structuring and employing combat camera assets as effective operational planning tools. Status: Current</td>
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<tr>
<td>DEFENSE SUPPORT OF CIVIL AUTHORITIES (DSCA) Multi-Service Tactics, Techniques, and Procedures for Civil Support Operations</td>
<td>11 FEB 13</td>
<td>ATP3-28.1, MCRP 3-57.2, NTTP 3-67.2, AFTTP 3-2.67</td>
<td>Description: DSCA sets forth MTTP at the tactical level to assist the military planner, commander, and individual Service forces in the employment of military resources in response to domestic emergencies in accordance with US law. Status: Revision</td>
</tr>
<tr>
<td>EW REPROGRAMMING Multi-Service Tactics, Techniques, and Procedures for the Reprogramming of Electronic Warfare and Target Sensing Systems</td>
<td>17 JUN 14</td>
<td>ATTP 3-13.10, NTTP 3-51.2, AFTTP 3-2.7</td>
<td>Description: This publication describes MTTP for EW reprogramming; the EW reprogramming process, requirements, and procedures for coordinating reprogramming during joint and multi-Service operations, Services' reprogramming processes, organizational points of contact, and reprogramming databases and tools. Status: Current</td>
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<tr>
<td>JATC Multi-Service Procedures for Joint Air Traffic Control</td>
<td>14 FEB 14</td>
<td>ATP 3-52.3, MCRP 3-25A, NTTP 3-56.3, AFTTP 3-2.23</td>
<td>Description: This is a single source, descriptive reference guide to ensure standard procedures, employment, and Service relationships are used during all phases of ATC operations. It also outlines how to synchronize and integrate JATC capabilities. Status: Current</td>
</tr>
<tr>
<td>TACTICAL CHAT Multi-Service Tactics, Techniques, and Procedures for Internet Tactical Chat in Support of Operations</td>
<td>24 JAN 14</td>
<td>ATP 6-02.73, MCRP 3-40.2B, NTTP 6-02.8, AFTTP 3-2.77</td>
<td>Description: This publication provides commanders and their units guidelines to facilitate coordinating and integrating tactical chat when conducting multi-Service and joint force operations. Status: Current</td>
</tr>
<tr>
<td>TACTICAL RADIOS Multi-Service Communications Procedures for Tactical Radios in a Joint Environment</td>
<td>26 Nov 13</td>
<td>ATP 6-02.72, MCRP 3-40.3A, NTTP 6-02.2, AFTTP 3-2.18</td>
<td>Description: This is a consolidated reference for TTP in employing, configuring, and creating radio nets for voice and data tactical radios. Status: Current</td>
</tr>
<tr>
<td>UHF SATCOM Multi-Service Tactics, Techniques, and Procedures Package for Ultra High Frequency Military Satellite Communications</td>
<td>9 AUG 13</td>
<td>ATP 6-02.90, MCRP 3-40.3G, NTTP 6-02.9, AFTTP 3-2.53</td>
<td>Description: Operations at the JTF level have demonstrated difficulties in managing a limited number of UHF SATCOM frequencies. This publication documents TTP that will improve efficiency at the planner and user levels. Status: Current</td>
</tr>
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</table>
**Got a story? Want to tell it? Help us help you!**

The Air Land Sea Application (ALSA) Center develops multi-Service tactics, techniques, and procedures (MTTP) with the goal of addressing the immediate needs of the warfighter. In addition to developing MTTP, ALSA provides the ALSB forum to facilitate tactically and operationally relevant information exchanges among warfighters of all Services.

There is no better resource for information than the people currently doing the job. Personal experiences, individual study, and passion for our profession lead to inspirational and educational articles. Therefore, we invite you to share your insight and experience, and possibly have them published in an upcoming ALSB.

Only you can share your hard earned lessons learned from recent operations and multi-Service or multi-national missions with the joint community.

The September 2014 ALSB topic is “Joint Training in a Constrained Environment”. It will address current challenges of conducting quality training and leveraging joint force capabilities as our military downsizes and resets after a decade of continuous combat operations.

The January 2015 ALSB topic is “Defense Support of Civil Authorities and Inter-Agency Support”. It will focus on the issues and best practices for integrating military assets with civil authorities and US interagencies.

The proposed May 2015 issue is an Open Warfighter Forum where Warfighters will have an opportunity to discuss topics of their choosing. This is an excellent opportunity for you to share your insights, on topics that may not be covered in doctrine or address an operational gap that highlights emerging needs for supporting multi-Service publications.

Please keep your submissions unclassified and in accordance with the article requirements box on this page.

---

**Article Requirements**

**Submissions must:**

- Unclassified
- Be 1,500 words or less
- Be publicly releasable
- Be double spaced
- Be in MS Word format
- Include the author’s name, unit address, telephone numbers, and email address
- Include current, high-resolution, 300 dpi (minimum), original photographs and graphics. Public affairs offices can be good sources for photographs or graphic support.

**Article and photo submission deadlines are below. Early submissions are highly encouraged and appreciated.**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Deadline</th>
<th>Point of Contact</th>
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<tbody>
<tr>
<td>Joint Training</td>
<td>1 Aug 2014</td>
<td><a href="mailto:alsaB@us.af.mil">alsaB@us.af.mil</a> (757) 225-0961</td>
</tr>
<tr>
<td>DSCA</td>
<td>31 Oct 2014</td>
<td><a href="mailto:alsaC@us.af.mil">alsaC@us.af.mil</a> (757) 225-0903</td>
</tr>
<tr>
<td>Open Warfighter Forum</td>
<td>1 Feb 2015</td>
<td><a href="mailto:alsA@us.af.mil">alsA@us.af.mil</a> (757) 225-0905</td>
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**ALSA JOINT WORKING GROUPS**

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<th>Date</th>
<th>Publication</th>
<th>Location</th>
<th>Point of Contact</th>
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<tr>
<td>15-18 July</td>
<td>Air-to-Surface Radar System Employment</td>
<td>Joint Base Langley-Eustis</td>
<td>Air Branch <a href="mailto:alsaA@us.af.mil">alsaA@us.af.mil</a></td>
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<tr>
<td>15-18 July</td>
<td>Dynamic Targeting</td>
<td>Joint Base Langley-Eustis</td>
<td>Air Branch <a href="mailto:alsaA@us.af.mil">alsaA@us.af.mil</a></td>
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<td>15-17 July (T)</td>
<td>DSCA</td>
<td>DCO/Joint Base Langley-Eustis</td>
<td>C2 Branch <a href="mailto:alsaC@us.af.mil">alsaC@us.af.mil</a></td>
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<tr>
<td>October 14 (T)</td>
<td>JFIRE</td>
<td>Nellis AFB, NV (T)</td>
<td>Air Branch <a href="mailto:alsaA@us.af.mil">alsaA@us.af.mil</a></td>
</tr>
<tr>
<td>November 14 (T)</td>
<td>JSEAD</td>
<td>Joint Base Langley-Eustis</td>
<td>Air Branch <a href="mailto:alsaA@us.af.mil">alsaA@us.af.mil</a></td>
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(T) - tentative
**ALSA MISSION**

ALSA's mission is to rapidly and responsively develop multi-Service tactics, techniques and procedures, studies, and other like solutions across the entire military spectrum to meet the immediate needs of the warfighter.

ALSA is a joint organization governed by a Joint Actions Steering Committee chartered by a memorandum of agreement under the authority of the Commanders of the Army Training and Doctrine Command, USMC Combat Development Command, Navy Warfare Development Command, and Headquarters, Curtis E. LeMay Center for Doctrine Development and Education.

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