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Threat & Intelligence Preparation of the Battlefield

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The Doctrine Division, Directorate of Training and Doctrine (DOTD), U.S. Army Aviation Center of Excellence (USAACE), Fort Rucker, AL 36362 produces the *Aviation Digest* quarterly for the professional exchange of information related to all issues pertaining to Army Aviation. The articles presented here contain the opinion and experiences of the authors and should not be construed as approved Army policy or doctrine.

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ABOUT THE COVER

United States Army information collection - past and present.

Editor's Note

Recent observations from the combat training centers suggest the transition to the decisive action training environment has forced commanders and staffs to exercise systems and skill sets that have not been fully employed during the past decade. In this issue of Aviation Digest, we turn our focus to the critical subjects of intelligence preparation of the battlefield and the threats aviation can expect to encounter in the current and future complex environments in which we will operate.

Anyone can speculate on the challenges our adversaries will present in order to deny our ability to assure, deter and compel others on the world stage. Although threat system technology continues to provide increasing challenges to Army Aviation, our article from the archives shows that even the ominous specter of directed energy weapons is not new and has been a concern since at least the early 1970s. However, increased ease of accessibility to sophisticated threat systems and innovative methods of employment may present a wide variety of unanticipated threats to Army Aviation.

Even the casual reader of Aviation Digest will appreciate our contributing authors' efforts not only to describe the possible nature of future conflict, but to provide insight into how aviation leaders can train their formations to succeed in those conflicts. From operating in littoral and chemical, biological, and radiological environments to developing air mission commanders, the authors provide scenarios and desired skill sets which current and future aviation commanders and staffs can consider in their unit training plan development.

This issue of Aviation Digest will be my last as Editor-in-Chief. It has been a privilege to have been a part of the continuing evolution of our professional journal, an important medium for interaction and feedback across our Branch. My successor as the Directorate of Training and Doctrine's (DOTD) Doctrine Division Chief and Editor-in-Chief of Aviation Digest is LTC Fernando Guadalupe, who will join us this summer after commanding the 2916th Aviation Battalion at Fort Irwin, CA.

ABOVE THE BEST!

LTC Frank P. Intini III
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LTC Frank P. Intini, III is the DOTD Doctrine Division Chief at the United States Army Aviation Center of Excellence. Over the course of his career, LTC Intini served with the 101st Airborne Division (Air Assault); 1-228th Aviation Regiment in Honduras; the 1st Infantry Division and the 12th Combat Aviation Brigade in Katterbach, Germany; the JRTC at Fort Polk; and I Corps/Multi-National Corps-Iraq/U.S. Forces-Iraq. He has deployed to Kosovo, Iraq, and Afghanistan. Most recently, he commanded the 3rd Battalion, 158th Aviation Regiment and deployed to Regional Command-West, Afghanistan, as the commander of Task Force Storm. LTC Intini has over 20 years of service and is qualified in the UH-60A/L, UH-1H, and OH-58A/C.

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The Aviation Digest will publish once a quarter with distribution on or about the 15th of February, May, August, and November of each year. In order to receive information for publication and allow appropriate time for editing and layout, the deadline for submission of articles is the 15th of December, March, June, and September.

Please forward any Reader's Respond comments to the Aviation Digest mailbox at usarmy.rucker.avncoe.mbx.aviation-digest@mail.mil.

The Command Corner

Since the re-introduction of Aviation Digest last year, I have been impressed with the professional exchange and discussion of key topics and issues affecting our branch. This dialogue reinforces the importance of continuing to foster a learning culture in all of our leaders to drive intellectual curiosity, critical thinking, and the free exchange of ideas. With your continued input, Aviation Digest will continue to serve as one of the "ways" to this "end".

As you read this quarter's issue, you will see that the first half of the digest is focused on the analysis and understanding of some of the complex variables of the operational environment (OE). Analyzing and understanding the interdependence of the operational variables (PMESII-PT: political, military, economic, social, information, infrastructure, physical environment, and time) and mission variables (METT-TC: mission, enemy, terrain and weather, troops and support available, time, and civil considerations) provides the foundation for commanders to develop their visualization and describe their end-state in context to the problem — the mission.

ADP 3-0 and JP 1-02 define the OE as "a composite of conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander." Given our historical track record of near zero on predicting what the exact next fight is, it's easy to say "why bother" or to relegate the OE to an academic exercise in the S-2 shop; but, this is short sighted. Although we can't say with any certainty that we will face a particular threat or formation in a particular geographic location, we can view the OE from a hybrid perspective. War is a human endeavor and by this very fact it will be amorphous. The speed and unpredictability of human interaction, coupled with politics and culture, tells us that the next fight will not be a clean, linear problem. Instead, it will be dynamic, volatile, and unpredictable. This is why we must develop creative, critical-thinking leaders who are comfortable adapting to change and volatility, and why we can't box ourselves into the needy security of a certain future. Our leaders and Soldiers have to thrive on ambiguity and uncertainty – our enemy faces the same dilemma.

Unified land operations doctrine is built on this understanding - the complex and uncertain nature of future warfare with the focus of gaining, maintaining, and exploiting a position of relative advantage over the enemy. It is not a cookie cutter solution to the Fulda Gap. Instead, it requires adaptive and agile leaders that have shared understanding and mutual trust –exercising mission command. This allows disciplined initiative at all echelons so we can adapt faster than the speed of change of the OE. This is why we have to drive our training and leader development with the right level of physical and mental rigor under the wide variety of hybrid conditions we "could" expect to experience on future battlefields. Training our leaders and Soldiers on "how" to think versus "what" to think is essential and we can only do this through a reinvigoration of how we train at home station and how we deliver professional military education. The final few articles in this quarter's digest begin to open this dialog.

Above the Best!

Mike Lundy
Brigadier General, USA Commanding

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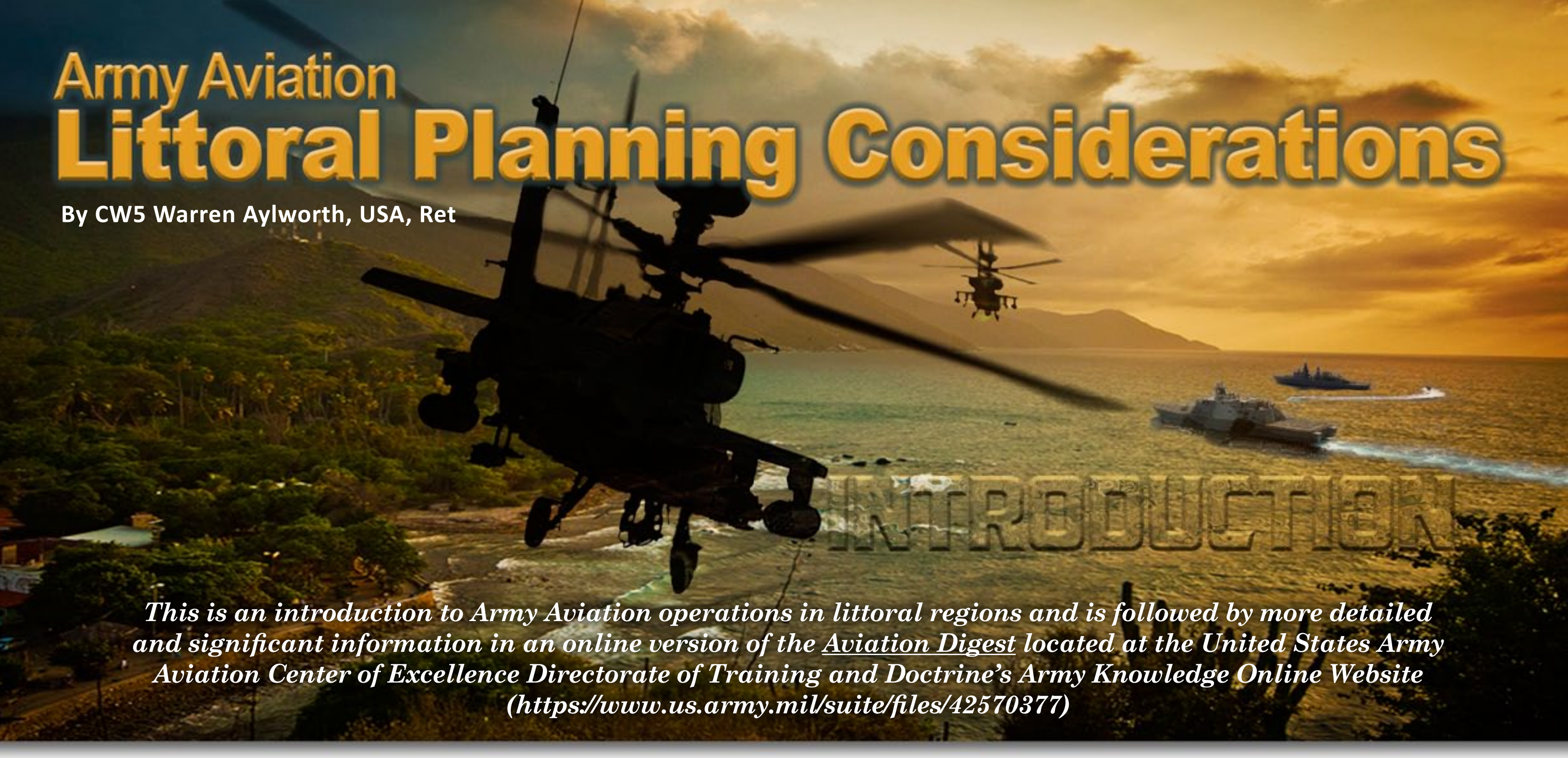
Army Aviation Littoral Planning Considerations

By CW5 Warren Aylworth, USA, Ret



This is an introduction to Army Aviation operations in littoral regions and is followed by more detailed and significant information in an online version of the Aviation Digest located at the United States Army Aviation Center of Excellence Directorate of Training and Doctrine's Army Knowledge Online Website (https://www.us.army.mil/suite/files/42570377)

The "littorals" are the regions of the world that border the sea. They contain most of the world's population and are critical to American interests. The littoral region ranges from miles inland to tens of miles off shore and could be described as the seam between the land, sea, and air.

The Army has a direct and historical interest in the "littorals" because our enemies would exploit this tactical seam to threaten the Army's land mission. In Asia, the enemy has threatened to exploit the long coast lines of the Korean peninsula to infiltrate maritime special operation forces or bypass allied land-based defenses through flanking amphibious attacks. In the Middle East, the Army's decisive land operations during Operation Desert Storm in 1990-91 and Operation Iraqi Freedom in 2003 would not have been possible if the U.S. Army could not have massed its heavy combat power.

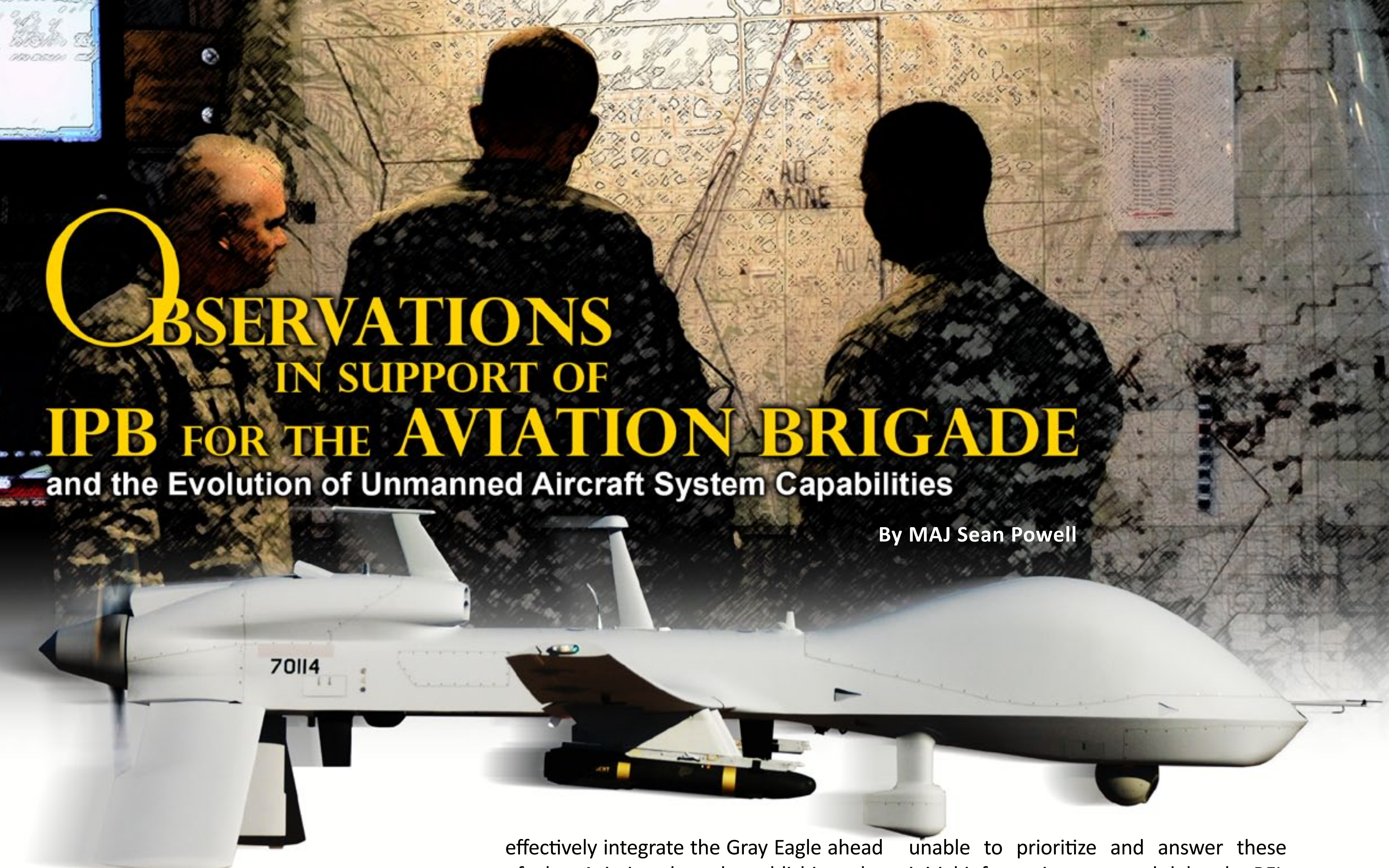
Potential adversaries learned from our past success and determined that if they could keep the Army separated from our tanks and heavy equipment they could keep us out of the fight. To do this they developed a robust anti-access/area denial (A2AD) strategy to prevent the buildup of ground combat power. Since no country can compete with the U.S. Navy on the open "blue water" of the high seas they have focused on the "green/brown water" found closer to shore in the littoral environment. This A2AD strategy attempts to deny entry into the area though a series of interwoven and overlapping defensive and offensive weapon systems capable of holding both commercial shipping as well as warships at risk.

Essential Information

A detailed discussion of this topic, may be found in a modified issue of the *Aviation Digest* at https://www.us.army.mil/suite/files/42570377 or http://usaace.army.smil.mil and should be of interest to Army Aviation units expecting to operate in this unique environment. Identifying the threat waterborne vehicles will provide valuable information to both planners and operators alike for predicting the threat staging areas and identifying threat tactics, techniques, and procedures. Further, the article will acquaint readers with nautical terminology, threat weapon systems of concern to Army Aviation, and recommended weaponeering tactics, techniques, and procedures to engage each of the threats discussed.

If you are now or are expecting to operate in the littoral environment, you are encouraged to access this enhanced version of this issue of the Aviation Digest.

CW5 (Retired) Warren Aylworth served over 31 years in the US Army. In that time he accumulated over 6,700 flight hours and has been an instructor pilot in every attack helicopter from the AH-1E to the AH-64E. He has served as a brigade master gunner, brigade standards officer, a brigade tactical operations officer, as well as the USAACE Aviation Branch Master Gunner, and the AH-64D/E Subject Matter Expert, for the Training and Doctrine Command Capabilities Manager for Reconnaissance & Attack. His overseas assignments include 3 tours in Iraq, 3 tours in Germany, and tours in Korea and UAE. Presently Mr. Aylworth works in the Apache Development and Modernization Project Manager's Office at Redstone Army Arsenal.



OBSERVATIONS IN SUPPORT OF IPB FOR THE AVIATION BRIGADE

and the Evolution of Unmanned Aircraft System Capabilities

By MAJ Sean Powell

The combat aviation brigade (CAB) has some unit specific topics within its intelligence preparation of the battlefield (IPB) as well as some processes that the headquarters staff does not consistently incorporate. From effective IPB, the CAB commander makes decisions to apply combat power at various points in time and space based on environmental effects on the unit and threat courses of action. Reflecting upon the four doctrinal steps of the IPB process provided in FM 2-01.3, I will provide recommendations for IPB based upon both doctrine as well as first hand observations. The intent is to distill the IPB steps and offer a more concise and direct approach to IPB in the CAB. I will also emphasize the importance of the CAB collection manager's plan in drafting of enemy courses of action. As a Combined Arms Command Mission Command Training Program (MCTP) Observer Coach/Trainer (OC/T), I have observed issues pertaining to the integration of the Gray Eagle unmanned aircraft system (UAS) that are directly related to collection management and operations. As a result of these issues, I will recommend procedures to more effectively integrate the Gray Eagle ahead of the Aviation branch publishing the expanded doctrine.

It is important to keep time management in mind while conducting IPB. The last two steps typically require more time spent critically analyzing information to craft enemy courses of action. If the entire brigade staff is synchronized when conducting IPB, some of the work that would normally be conducted in later steps can be conducted concurrently in earlier steps. An example would be the drafting of a collection plan in step three after drafting a high value target list (HVTL).

Step 1: Define the Operational Environment

The operational environment is often determined for the CAB by its higher headquarters. This initial step frames the geography and is where the S-2 initiates analysis of the threat and identifies information gaps. If information gaps become apparent, it is critical that the staff, not just the S-2, determines whether they can answer these gaps through organic research or whether they will be required to initiate a formal intelligence request for information. If the staff is unable to prioritize and answer these initial information gaps and delay the RFI, the effect will be a waste of valuable time spent in the initial stages of the IPB which reduces time for critical analysis in the follow-on process and ultimately degrades the quality of IPB. While not specified in the current FM 2-01.3, the output of defining the operational environment is typically a macro map graphic with boundaries representing the area of operations (AO), area of influence, and area of interest.

Step 2: Describe Environmental Effects on the Operational Environment

During this step there are multiple capabilities within the CAB to assist with the outputs, namely the geospatial team and the meteorological team. They will take the input from the S-2 and create a modified combined obstacle overlay (MCOO) and provide weather data associated with the area of operations and the expected effects of terrain on planned operations. The unique traits of a MCOO for a CAB include air corridors as well as operational graphics indicating the location of major obstacles and infrastructure such as urban areas with associated towers and power lines. Weather data provides

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context for the MCOO by acknowledging how seasonal weather such as monsoons, winds, and other weather variables affect air mobility across the AO. The analysis of civil considerations for the CAB is significant for operational awareness in order to avoid culturally sensitive areas, avoid the destruction of symbols of cultural significance, and to recognize the importance of local holidays and special events. The CAB does not have a large staff to conduct IPB and for this portion of step two, it is acceptable to adapt existing products from both other units and agencies. If available use of local knowledge provided by area experts will significantly reduce the required research and analysis of civil considerations and reduce the time requirement for this portion of the IPB.

Step 3: Evaluate the Threat

During this step, the S-2 section focuses analysis on the threat across the AO. The two expected products from this step are a threat template containing a written and graphic description and a draft HVTL with a high payoff target list (HPTL). The CAB S-2 must frame their perspective of the threat to aircraft operations as opposed to the S-2 in a ground based brigade combat team whose primary focus is the ground oriented threat. For example, the CAB S-2 analyzes such things as surface to air threat or the proliferation of man portable air defense systems (MANPADS) as they are a much higher priority to aircraft than the improvised explosive devices threat.

The small number of analysts within the S-2 section requires everyone in the section have the initiative to reach out to access sources within the CAB and outside the CAB organization to gather critical pieces of information to complete the IPB puzzle and to learn more of the threat application to Army Aviation. This step can take an extraordinary amount of time but can be mitigated by accumulating material for research at the beginning of the IPB process.

The first product of step three is the threat template. Doctrinally, the threat template is a standalone written description of the threat's preferred tactics as well as a graphic depiction of how the threat arrays their units. This typically involves analysis of the enemy order of battle as the starting point and is refined from follow-on reporting of observed enemy task organization. As the CAB S-2 analyzes the threat order of battle, they will describe, both in writing and graphically, the enemy air defense capability starting from the macro level down to irregular forces armed with heavy machine guns or MANPADS.

The threat template is the first product which depicts the threat and should provoke initial discussions of HVTL versus HPTL as well as indications and warnings associated with possible actions the threat could take. Further, the HVTL and HPTL for the CAB will lead to the development of possible named areas of interest in support of the collection plan. I will discuss the role of the collection manager within the CAB in step four.

The building of these target lists implies that the CAB will conduct targeting, which it should do no matter the mission set, if for nothing else, in support of the protection warfighting function. Based on my observations from unit observations, however, the CAB often overlooks their targeting process assuming that they will be integrated into another unit's process. An example of when a CAB would be required to develop their own targets would be for a deep strike operation against enemy armor or other critical units.

Step 4: Determine Threat Courses of Action

The final step of IPB brings all the analyses and products together to generate threat courses of action (COA), and is where the S-2 should provide a most likely and most dangerous threat COA. Doctrinally, the threat template, situational template (SITTEMP), and MCOO are used to create threat COAs which depict threat units and actions over time. The SITTEMP, based on the threat template incorporating current reporting, is intended to further refine initial discussions of threat actions evolving into enemy COA. This product depicts the threat as known at that moment in time and, as a running estimate, it is updated as new reporting arrives.

From the SITTEMP discussions, the S-2 drafts the threat COAs. The COA should include a written description to include the threat purpose and objective, a graphic overlay, and actions that may be

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associated with the threat commander decision points over time. This threat COA will provide the information needed to build an event template (EVENTTEMP) for each threat course of action. The EVENTTEMP will include recommended named areas of interest priority information requirements (PIRs).

The lack of a collection manager to advocate for CAB collection requirements may result in PIRs that go unanswered or result in longer timelines to answer because of a dependency on outside support for collection requirements. Without a collection manager, the CAB will find it difficult to receive collection support in a timely manner and coordinate the dynamic re-tasking of current collection assets.

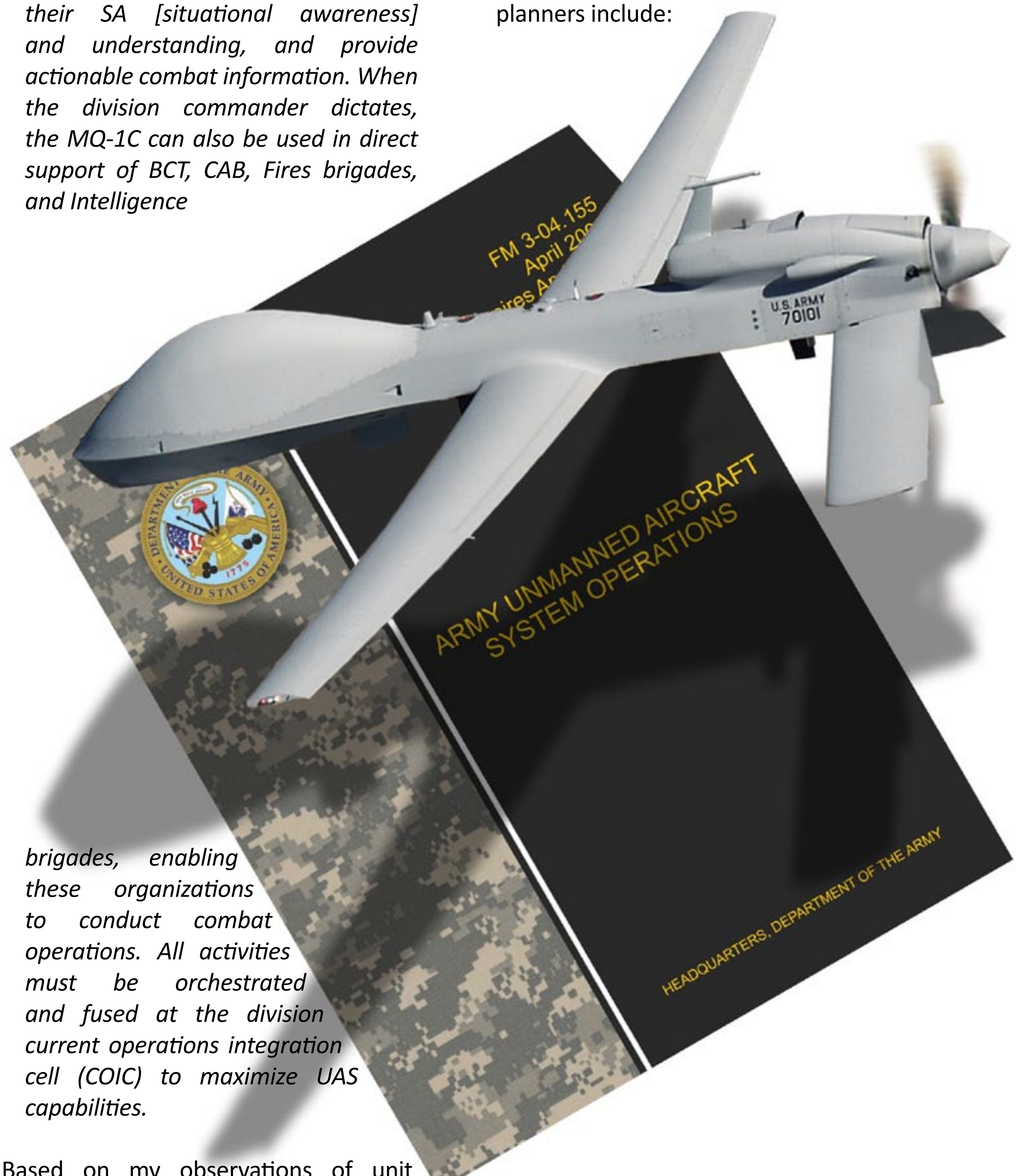
Integration of the Gray Eagle into Collection

The MQ-1C Gray Eagle is currently being fielded as a divisional organic, program of record, armed (with exception of the aerial exploitation battalions) UAS. The need occasionally arises for a new system to be fielded quickly in order to place a critical function into the hands of the commander. These fielding plans outpace the doctrine that should be in place to govern system use and, as is the case with the Gray Eagle, the Army must learn from division and CAB staffs' lessons learned and best practices. Employment tactics, techniques, and procedures (TTP) between units vary considerably with mixed results and it is expected that the best of these TTP will shape future doctrine.

Current Gray Eagle Integration Issues

A lack of updated doctrine and shared TTP have failed to enable a common understanding for operational integration. While the current doctrine in FM 3-04.155 dated July 2009 addresses some aspects of how to manage the MQ-1C, it lacks a clear description of the fundamental processes to manage the Gray Eagle. Gray Eagle/UAS doctrine, currently under revision, should emphasize how the Gray Eagle is managed and by whom. Currently, FM 3-04.155 concerning the Gray Eagle provides the broad intent that:

> *The MQ-1C UAS operates beyond the Shadow platoons organic to the BCT [brigade combat team], BfSB [brigade fires support battalion], or fires brigades. It provides a long endurance, extended range capability enabling the division commander to develop the situation best supporting his overall scheme of maneuver and intent. For many missions, the MQ-1C UAS will be in direct support of division missions, providing information to build intelligence or extend communications. In most other missions, the MQ-1C UAS provides GS [general support] to brigade/battalions that supply NRT [near real time] EO [electro-optical] /IR [infrared] video to tactical users to improve their SA [situational awareness] and understanding, and provide actionable combat information. When the division commander dictates, the MQ-1C can also be used in direct support of BCT, CAB, Fires brigades, and Intelligence brigades, enabling these organizations to conduct combat operations. All activities must be orchestrated and fused at the division current operations integration cell (COIC) to maximize UAS capabilities.*



Based on my observations of unit processes, the division and CAB staffs lack a firm starting point in UAS doctrine to build their management process. FM 3-04.155 makes no recommendations for the division staff to manage UAS other than they should be requested in the same way as manned aviation. Division and CAB staffs have the mistaken idea that the G-2 tasks collection assets. For example, the division G-2 collection manager controls the UAS assets and the G-3 air approves the air tasking order and the annex L collection plan with minimal review. The closest thing to providing doctrine for a staff to manage the Gray Eagle is found in the following paragraph from FM 3-04.155 which effectively categorizes the Gray Eagle with all other Army UAS.

> 2-52. UAS mission planning requires multi-echelon participation. Key planners include:
>
> - **G-3/Operations staff officer (S-3).** Integrates overall division and brigade-level UAS assets to meet the commander's scheme of maneuver.

- **G-2/Intelligence staff officer (S-2).** Develops and coordinates PIR. Integrates intelligence requirements with the G-3/S-3 to ensure maximized UAS employment.
- **CAB commander and staff.** Serves as the division commander's UAS subject matter expert.
- **UAS company commander and platoon leader.** Conducts UAS mission planning and provides tactical and technical input to commanders at all echelons.
- **UAS MC/UAS technician.** Provides technical and tactical UAS expertise, and conducts troop leading procedures (TLP) and missions.
- **ADAM/BAE cell.** Plans, coordinates, and executes brigade airspace requirements.
- **A2C2 cell.** Plans, coordinates, and executes division airspace requirements.

There is no mention of how to disseminate the request for collection process across echelons or what that process should look like.

Efforts are underway by the MCTP OC/Ts to ensure that division and CAB staffs develop the needed processes to properly task and manage the employment of the Gray Eagle during training exercises. These efforts are impeded, however, without updated doctrine for the Gray Eagle. The most obvious effect amongst staffs is a lack of common understanding as to why G-3 tasks the Gray Eagle versus the G-2. In the absence of updated doctrine and since the Gray Eagle is organic to the CAB, current FM 3-04.155 recommends that it should be treated the same as manned aviation from a tasking perspective. Observations from training exercises leads me to believe that there needs to be a deliberate reinforcement of the fundamental doctrine that the G-2 recommends collection and the G-3 tasks assets to collect.

The best improvised method I have observed of quickly establishing a common understanding among all units concerning the Gray Eagle is through the publication of a division fragmentary order (FRAGO) detailing the request procedures early in the planning process. Providing the Gray Eagle tasking or requesting procedures through the orders process, allows the unit staffs the opportunity to absorb and question any parts of the process they do not understand. The ultimate goal is to mitigate any subjective interpretation of how to task and dynamically retask the Gray Eagle and make the process as efficient as possible. However, the G-2 Collection Managers must acknowledge and plan for a collection platform which is also armed. The unspoken implications are that the collection managers must recognize that there may be additional priorities beyond information collection to account for during collection planning. If a target of opportunity emerges and the Gray Eagle attacks that target, the collection manager must assess the secondary and tertiary effects to the collection plan and overall operations.

Recommendations

The obvious long term solution to update UAS doctrine is well underway at the U.S. Army Aviation Center of Excellence. In the meantime, disseminating interim products such as a training support package with examples of how to manage the armed Gray Eagle, providing an example division FRAGO on command relationships, and reinforcing the UAS tasking process to be the same as manned aviation would better prepare units to develop the management process for the Gray Eagle in advance of an updated doctrinal publication.

FM 2-01.3 Intelligence Preparation of the Battlefield/Battlespace, Oct 2009
FM 3-04.155 Army Unmanned Aircraft Operations, June 2009

MAJ Sean Powell is currently serving as an Intelligence Observer Coach/Trainer for the Mission Command Training Program at the Combined Arms Center, Fort Leavenworth, KS. His previous assignment was as the 2-101st Brigade Combat Team S-2 at Fort Campbell, KY. He has also served at the Defense Intelligence Agency, G-2 U.S. Army Europe, and U.S. Army Corps of Engineers. MAJ Powell has deployed to Iraq, Afghanistan, and Bosnia. He has served 16 years as a Military Intelligence Officer.

Acronym Reference

A2C2 - Army air space command and control	**IPB** - intelligence preparation of the battlefield
AO - area of operation	**MANPADS** - man portable air defense system
BCT - brigade combat team	**MCOO** - modified combined obstacle overlay
CAB - combat aviation brigade	**MCTP** - Mission Command Training Program
COA - course of action	**OC/T** - observer coach/trainer
EO - electro-optical	**PIR** - Priority intelligence requirements
EVENTTEMP - event template	**SA** - situational awareness
FRAGO - fragmentary order	**SITTEMP** - situational template
GS - general support	**TLP** - troop leading procedure
HPTL - high payoff target list	**TTP** - tactics, techniques and procedures
HVTL - high value target list	**UAS** - unmanned aircraft system

A Review of the Threats to Army Aviation

By CW3 Robert Olson

In order to successfully accomplish a mission in a high threat environment, everyone who will operate in or plan a mission must understand the functionality of the threat, have a basic understanding of physics, and understand their own aircraft vulnerabilities. This knowledge will enhance the overall survivability of the aircraft, increase planner or aircrew situational awareness, drive or reinforce tactical decisions, and provide the background information for future tactics development and employment.

Electromagnetic Energy

Electromagnetic (EM) energy/radiation is emitted by all pieces and parts of an aircraft – not just the “hot” components such as the engine, transmission, or radios. This energy is what radar, infrared (IR), and visual detection, tracking, and guided systems use to identify a difference in the observed background. The portion of the EM spectrum that current electronic combat systems use starts with radio waves and continues through IR and a small portion of the ultraviolet regions. The region of the electromagnetic spectrum is generally measured and described by wavelength, frequency, and electron volts.

Radio Frequency Target Detection

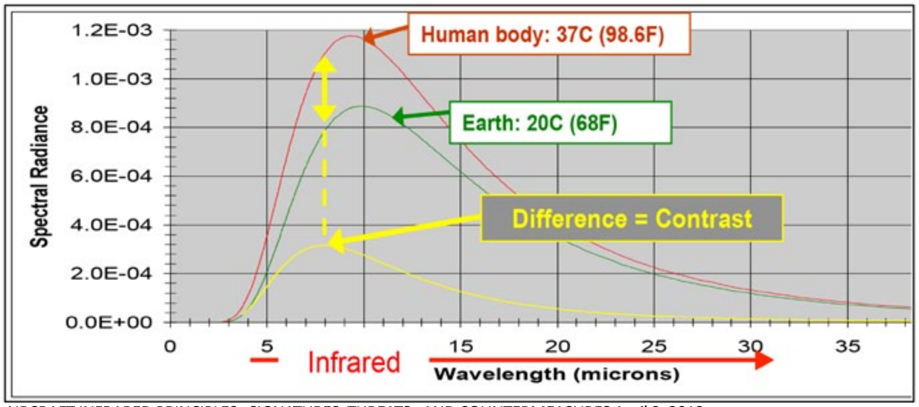
Radar emits focused EM or radio frequency energy that is reflected by objects it makes contact with. The resultant reflection is then returned and processed into usable information. Some objects contain properties of reflection better than other objects. Typical radar consists of a transmitter, one or more antennas, and a receiver. Radars emit a continuous or pulsed wave signal. The signal is transmitted into a direction or directions and a receiver looks for reflected energy. The energy will either be returned as an echo which would be the target or as clutter such as rain or birds. Depending on the system used, the information can provide data to engage a target. An in depth understanding is required in order to conduct successful operations in a radar threat environment. For instance, if you are transmitting on a radio or if your radar altimeter is operational you are enhancing your EM signature.

Contrast/Target Detection

The IR, visual, and ultraviolet parts of the EM spectrum are of military importance because objects either emit, reflect, or don’t emit in these regions which enables passive detection day or night. More important than the maximum emission, reflection, or lack of emission is the location of the difference between objects and their natural backgrounds.

The curves in the figure below show the spectral distribution for a human body (37°C) and earth background (about 20°C). If the human was the “target” viewed against a terrain background, the difference between their two curves is the contrast, which forms a curve that peaks at slightly shorter wavelength.

It is contrast that makes target detection possible. If there were no difference, that is, no contrast, then the target would



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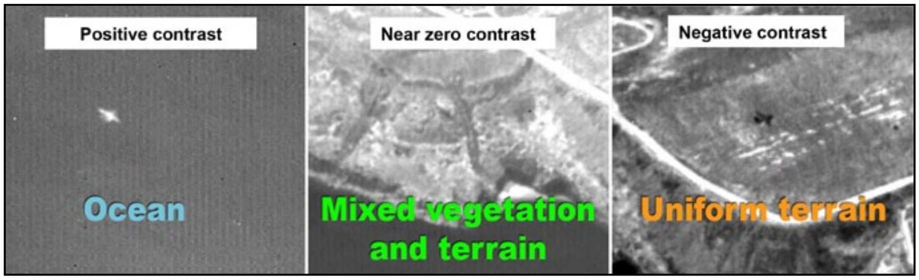
IR contrast



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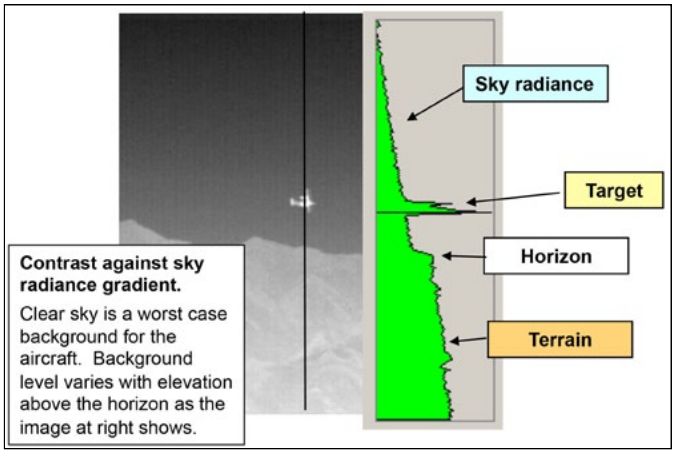
IR contrast over varying terrain



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IR Contrast background comparison

be undetectable. Low contrast is the IR equivalent of camouflage or protective coloration used by animals. An example for the visible spectrum is a polar bear seen against snow or ice background.

The challenge is to discriminate between the aircraft and normal background IR radiation. The discrimination or detection of the target is referred to as the signal whereas the background IR radiation is referred to as noise. The signal to noise ratio must be sufficient for the system to discriminate between the two.

IR Seeking Missile Systems

Passive IR seekers are only a portion of the weapon system. The weapon system must acquire, track, and get to its intended target. A seeker is a collection of parts with the purpose of the detection of and guidance to a target. The end state of these systems is the delivery of a warhead to an intended target. Individual components of a seeker include: a dome or window to allow the IR energy to enter the seeker, an optical system to focus the collected IR energy, a reticle designed to modulate the energy, and a detector(s) which are stimulated by the IR energy, a processer or processers, and a navigation section.

Directed energy weapons

Directed energy weapons (DEW) utilize some similar areas of the EM spectrum as other air defense systems. The main difference between DEW and the other weapons is the magnitude of concentrating the emission. Any emission from audible to gamma rays in the EM spectrum could be used as a weapon given appropriate output power. DEW, as a current concern to aviation, is mainly in the form of lasers.

Laser Uses

Designators

Laser designators are used to illuminate a target for a weapon. The laser is emitted with a pulse type known to the projectile. A laser designator differs from a beam riding missile in that the laser does not provide steering commands to the projectile; rather the projectile provides its own guidance based on the reflected laser energy from the target.

Ranging

Laser range finders are a good way to establish range to an object using the constant speed of light. Laser range finders use the same principle of timing a pulse that radars use. Lasers can provide increased accuracy due to the focusing of the beam. A laser range finder sends a pulse of laser energy, which is reflected from the target back to a detector. The whole process is timed, deriving the range from the round trip laser pulse.

Beam Riding Missiles

Beam riding missiles are not solely directed energy weapons but use a laser for guidance. Beam riders are more often classified as man/ crew portable air defense systems. In addition to the laser guidance, beam riders use electro-optics (EO) for acquisition and tracking. The laser guidance of the system is bore sighted to the EO package. Once the missile has been launched the gunner keeps the target within a specified area in the sight which will provide proper guidance to the missile.

Lasers as Weapons

Lasers use their focused energy as the mechanism for the desired effect. Lasers as weapons can generally be placed into categories based on desired target. As is indicated in their names, anti-sensor and anti-material are indicators of the weapon's intended purpose. The effect of any given laser weapon may not be exclusive to any one category. A laser with the ability to affect the structure of an aircraft will certainly have the ability to affect a person or sensor. The categories below outline the designed or potential effects of a laser in the stated capacity.

Anti-Sensor

Anti-sensor lasers are used to deny an enemy the use of its EO sensors. These lasers are generally spectrally matched to defeat spectral filters of an EO package. Depending on the output power of the laser and duration exposure, anti-sensor lasers could temporarily overwhelm or permanently damage the detector within a forward looking IR or night vision device. Currently fielded laser ranging and target designating systems could function as anti-personnel or anti-sensor lasers. It should be assumed that if a laser possesses the ability to overwhelm or damage an EO sensor, it poses grave danger to individuals.

Anti-Material

Anti-material lasers are those which use the directed energy to physically affect the matter of the target. The transmission of an anti-material laser is composed of laser energy with properties which act in a destructive manner to materials on or in a target. Anti-material lasers require a great deal of power in order to excite enough energy to be destructive at long ranges. Additionally, an anti-material laser requires a beam director and tracking mechanism.

Passive Detection, Jamming and Hacking

Aural Detection

Aural detection calculations are problematic due to the vast amount of variables in emission, propagation, signal strength, aspect, electronic vs. human, and the environment. An aural detection capability can be as simple as a farmer in a field who happens to hear an aircraft to an elaborate array of pressure sensors and microphones integrated into an air defense. While the pinpoint calculations of an aural source can be problematic, the mere knowledge of the presence of an aircraft can be enough to reduce the search area for another system within the air defense network.

While there has been work done to provide aviation with planning tools to reduce helicopter noise profiles, none are currently readily available to Army Aviation.

Passive Coherent Location/ Detection

The concept of passive coherent location (PCL) dates back to British radar experiments in 1935 that used illumination from a British Broadcasting Company transmitter to detect a bomber. Although PCL development was the subject of occasional interest between the 1930s and 1980s, developers could not meet the computing/processing requirements for an operationally useful system. Once those requirements came within reach in the 1990s, a combination of other factors also generated interest in PCL, leading developers to build a foundation of PCL expertise on analog frequency modulation and television between the 1990s and early 2000s.

Jamming

Navigation System Jamming

The jamming of navigation systems is not a new concept. As the world has placed an increased reliance on Global Positioning Systems (GPS) the production and use of GPS jammers has also increased. GPS receivers are susceptible to jammers primarily because the GPS signal from the GPS satellites is so weak near the surface of the earth. Deployed GPS jammers have demonstrated the ability to inject false data or completely disrupt GPS receivers.

The effectiveness of a jammer against GPS receivers depends in large measure on both the design of the receiver and the design of the jammer. GPS satellites transmit both an unencrypted coarse acquisition code for civilian use and an encrypted precision code for military use. At present, both codes have roughly equivalent accuracy as both signals are broadcast over wide bandwidths to aid in their reception. As a result of its wider bandwidth and its encryption, the military code is more jam resistant and better protected from counterfeit or "spoofing" jamming signals.

The identification of GPS jamming is essential to the actions to be taken in order to minimize the effects on the mission. The recognition of inconsistent GPS signal or course to waypoint deviation can be an indicator of GPS jamming.

Communications System Jamming

Communication systems jamming can add additional complication to any mission. The jamming of normal communications frequencies can be accomplished relatively easily and at low cost, making the jamming of communications a viable threat in any location. Communications jamming can be as simple as an individual continuously keying the microphone on a radio tuned to the used frequency or as complicated as high powered broad band jammers targeting a specific frequency range. Communications jammers do not affect the transmitter. These jammers affect the receivers which can only process one incoming signal per frequency.

Hacking

Aircraft Support Systems

Support systems could potentially provide a gateway for access to aircraft systems, providing a means to understand the aircraft internal component communication protocols.

Component communication protocols between aircraft support systems and the aircraft can be a means for a hacker to affect that system or the aircraft itself. These systems include; the planning and mission loading systems, electronic logbooks, system maintenance computers, and diagnostic equipment. Strict adherence to the security protocols put in place is a must in order to minimize this potential risk.

Aircraft

As our aircraft are evolving into systems of systems, an increased awareness of the potential threat to the aircraft and its subsystems must not be overlooked. The subsystems which integrate with other subsystems could be used as the conduit for an attack on another subsystem or a subsystem could be attacked directly.

Hardware attacks can occur whenever an attacker has direct access to any of the aircraft components. An attacker can then corrupt the data stored within on-board components that can corrupt the data flow. These types of attacks could be carried out during the maintenance and storage or during the manufacturing and delivery of the aircraft or subcomponents. If the systems communication protocols are known, an attacker could link directly to the aircraft and input corruption data damaging components or reprogramming components which will give the attacker control over the aircraft, a subsystem, and/or the tactical data collected. Hardware attacks could affect the survivability of the aircraft, compromise control of an unmanned aircraft system or fly-by-wire aircraft, or compromise the tactical data collected by the onboard sensors. Not all systems and subsystems are encrypted. All systems and subsystems with and without encryption should be continuously evaluated for vulnerabilities from all avenues. Direct cyber attacks to an aircraft could come through any system that is able to transfer data.

Conclusion

Presented in layman and unclassified terms, this discussion is merely intended as a review of potential threats to Army Aviation that generally has not been a consideration in the counterinsurgency fight. Facing a more sophisticated and better resourced enemy, all of these capabilities are likely to be brought to bear. Knowing the threat and options available for dealing with them will allow us to effectively plan and survive in this "not so new" threat environment.

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CW3 Robert Olson is currently assigned as an Aviation Combat Forensics Officer, Aviation Survivability Development and Tactics Team (ASDAT), Fort Rucker, AL.

Acronym Reference

DEW - directed energy weapon	**GPS** - Global Positioning System
EM - electromagnetic	**IR** - infrare
EO - electro-optics	**PCL** - passive coherent location

The Dirty Side of the Coin

By MAJ Nicole E. Dean

A Heartfelt Apology

As an attack reconnaissance pilot for the United States Army, I am begrudgingly going to admit why I think my aviation brethren in the assault and cargo community are going to be more crucial in the next war. This is my "next war" manifesto (and my olive branch) to every UH-60 and CH-47 pilot I've ever made professionally disparaging comments about in the past.

You've probably not seen them for some time but I suggest that you dig out your joint service lightweight integrated suit technology ensemble and pro-mask, confirm their serviceability, and re-learn how to wear and use these critical tools in lead of the "next" war. Read on and I will explain why the effort will be worth your while.

The Future of War

I've been thinking about the future of war. I wonder if we are proceeding in the right direction as we move into the combat readiness centers to engage the massed armor forces that occupied so much of our time in the post Vietnam and Cold War era. The more I read and the more I observe activities on the world stage in the nightly news, I am leaning to the strong likelihood of a different kind of war and the part Army Aviation, especially our assault and cargo elements, will play in this war.

Take for instance, three literary works; two offering a less than optimistic view of future warfare and one providing a glance back in history. David Kilcullen's *Out of the Mountains: The Coming of Age of the Urban Guerrilla* has me thinking pretty deeply about the future of Army Aviation. Kilcullen's theory on the urbanization and littoralization of warfare, coupled with a digitally connected insurgency, weighs heavy on my thoughts when it comes to the future of war. Steven Johnson's *The Ghost Map: The Story of London's Most Terrifying Epidemic- and How It Changed Science, Cities, and the Modern World*, tells a chilling history of the 1854 London cholera outbreak that quickly swept through the urban slums of south London due to water contamination and overcrowding. Then a recent article in the recent November/December 2013 issue of *Foreign Affairs* caught my eye: Laurie Garrett's missive titled *Biology's Brave New World, the Promise and Perils of the Synbio Revolution.*

Of course, I confess that I'm also thinking pretty deeply about the future since the Army announced that my future as a scout pilot in the OH-58D is pretty bleak. Coupling this with deep thoughts about the weaponeering of viruses and urban insurgency makes one - sleepless in Seattle.

But to refocus, what do the learned writings of literary giants like Garrett, Johnson, and Kilcullen have to do with my peers in the aviation assault and cargo community digging out their chemical, biological, radiological, and nuclear (CBRN) protective gear? Well, I'm glad you asked. It comes down to lucid imagining of what the next battlefield might hold for Army Aviation. Picture it, if you will: the next enemy as a burgeoning insurgency with transnational financial support and access to digital networks. Visualize the next battlefield as an urban slum in a littoral megacity on the Pacific Rim. The next threat is an outbreak of cholera, caused by a perfect storm of a typhoon or a tsunami and a neglected sewage system. The next coalition force is augmented with representatives from the World Health Organization, residing in the ground brigade combat team's (BCT's) civilian military operations center (CMOC). The next hero of the battle? A well trained assault aviation force that can rapidly respond to the needs of a destabilized population in need of physical security, medical assistance, and biological containment.

As we examine terrain for future conflicts and future enemies, we have to nod at Johnson's proposed demographic that nearly 50% of the world's populace will reside in cities. A cursory glimpse at Google Earth shows us that the earth's mega cities sit comfortably on coast lines, winking provocatively at fate, typhoons, tsunami, and hurricanes. Mega cities beget mega slums. Mega slums beget instability and absentee governance. Absentee governance begets conflict. Mix an antibiotic resistant strain of cholera into the formula and it's only a matter of time before Kilcullen's urban based insurgency takes ahold of the opportunity created by shoddy governance, widespread illness, and the disenfranchised poor.

"Cities are centers of opportunity, tolerance, wealth creation, social networking, health, population control, and creativity," says Steven Johnson. Cities also harbor the human aspects of "conflict, crime, and violence," according to Kilcullen.

So, where do the assault and cargo pilot fit in? Why bother with CBRN gear after all these years of persistent stability operations in war zones without a biological threat? Little diseases, like measles outbreaks in the Midwestern United States, are canaries in the mine shaft. This can just as easily translate to vibrio cholerea in an urban war zone. "[Population] density is the crucial ingredient often left out in discussions of asymmetric warfare," says Johnson. The truth is that insurgencies are won and lost in the support of the local populace, no matter how poor or how disenfranchised. I know it seems trite and predictable to say so, but the massed populace controls the pitch, support, and recruitment of an insurgency. The governing wing of any rising insurgency depends upon that support. In the onslaught of biological threat, he who is fastest to respond to the needs of the dying will win that support.

It's Garrett who takes this threat one step further. We've existed in fear of the mythic vial filled with a dangerous toxin or disease that will lay waste to a city, an army, or a global populace. What if the vial never existed? What if it was genetic coding, cleverly masked in the coding of a webpage or email, born and bred in the autoclave of an urban laboratory? How would we react at the tactical level? We need response teams that are fast to recognize the outbreak of emerging biological threats. Those teams need the swiftness of aircrews to react and quarantine the outbreak, especially when normal means of transport may be unavailable due to natural disasters. Flooded roads, hurricane ravaged coasts, and typhoon-struck cities are not obstacles to the assault aviation community. When pairing these assets with chemical response teams, we increase the mobility of crucial battlefield assets in the CBRN fight. Expanding our vision further to civilian medical professionals who are connected with a BCT's CMOC, we increase the survivability of at-risk civilian populations in the face of biological hazards.

There are some things that only assault and cargo aircrews can do. With good air ground integration and operations, we can empower assault and cargo aviation leaders to do it well!

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Acronym Reference

BCT - brigade combat team

CBRN - chemical, biological, radiological and nuclear

CMOC -civilian military operations center

THREAT

MONTHLY WRITING AWARD

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Aviation Digest
January 1983

The DEW Threat

THE ATTACK TEAM closes to join the battle. An advance scout reports loss of its FLIR (forward looking infrared radar) and television in its mast-mounted sight. Another scout reports his observer experiencing vision problems after using direct view optics in an attempt to identify an unusual hostile vehicle. An attack aircraft moves forward for a better look at the unusual vehicle. As it unmasks, its canopy suddenly is frosted. A mysterious spot of molten metal begins to form on the aircraft's skin. Within seconds, the aircraft crashes. This attack team has just come under an attack from a directed energy weapon (DEW)—in this instance, a laser.

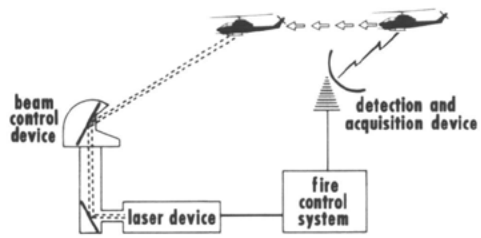
The helicopter that will survive such an attack consists of a reinforced ceramic fuselage to protect against laser attack. Cockpits, per se, are eliminated because of their vulnerability to airborne and ground air defense lasers. Direct view optics are eliminated, forcing pilots to fly completely by instruments to avoid pilots being blinded by lasers. Electromagnetic pulse vulnerabilities in electronics, communications, avionics, fire control systems and weapons guidance force substantial size, weight and cost penalities on the aircraft.

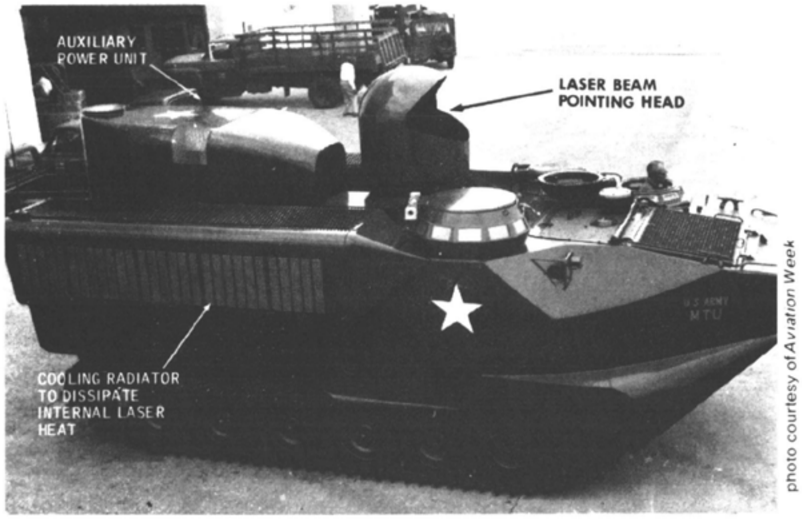
The above scenario may seem to many as farfetched science fiction ramblings. But the fact is, most of what is described below will become a reality much quicker than many soldiers, leaders and combat developers are prepared to accept. This necessity for the soldier to look into technologies that were once confined to the realm of science fiction is being driven by the emergence of a new family of weapons known as directed energy weapons. Today, this generic family contains three major categories: the laser, the nonnuclear electromagnetic pulse/radio frequency weapon (NNEMP/RF) and the particle beam weapon. This article is limited in scope to the discussion of the laser and NNEMP/RF weapons, as those will be the first to have an impact on Army Aviation.

The history of warfare has seen many evolutions in weapons, doctrine and tactics. These changes have sometimes been centuries in coming, others have revolutionized warfare in a single decade. The age of the DEW is rapidly approaching, if not already upon us. Although physically complex, DEWs are similar to conventional weapons in that each causes damage and casualties by depositing energy on the target. Conventional systems use the chemical and kinetic energy of a projectile or fragment to defeat the target. DEWs, on the other hand, depend upon "bullets" of light or electromagnetic waves impacting at or near the speed of light to deposit the necessary energy to achieve the desired damage threshold. It is obvious that the first nation fielding an integrated DEW system will gain a significant advantage on the battlefield. Further scientific developments in miniaturization, electronics, power supply and power switching technology are required to field a tactical DEW system. Such fielding would dramatically alter modern warfare as we know it.

Today's technology in DEWs is difficult to quantify, but there is overwhelming evidence that the Soviets have a viable ongoing program. This point was adequately driven home in the publication *Soviet*

FIGURE 1 (right): Laser Technology Demonstrator.
FIGURE 2 (below): Laser Air Defense Weapon





Military Power. "Over the past years, the Soviet Union is estimated to have taken the lead in the development of high powered lasers and possible radio frequency devices."[1]

The first question asked in many discussions of DEWs is, "What exactly is a DEW and what will be its targets?" First, the targets: Owing primarily to their relatively "soft target" nature, the most likely targets for first generation DEW systems will be aircraft, sophisticated electronics, missiles and their guidance systems, and the human eye. The helicopters on the future battlefield fit into many of these categories. The vision of the pilot, the missiles fired from the helicopter and the aircraft structure or underlying components are all vulnerable to laser weapons damage. All electronics in the aircraft, the fire control systems, avionics and communication equipment, will similarly be vulnerable to NNEMP/RF weapon damage.

Now, to the discussion of what is a DEW. The remainder of this article addresses the laser and the NNEMP/RF weapon.

The Laser

Recognition of the potential of a laser (light amplification by stimulated emission of radiation) device as a weapon was almost synonymous with its inception in the early 1960s. Initial work with a laser weapon produced two major problems for the researcher:

- The ability to generate a laser beam of sufficient power.
- The ability to focus and hold the beam on a specific point on the target long enough.

As research continued much of the initial skepticism gave way to cautious optimism. As power output increased and pointing and tracking accuracies improved, optimism turned to enthusiasm. But many still doubt the ability to produce an effective system within budgetary constraints. If this is true, the logic driving the tremendous outlays for laser weapons research, both Soviet and United States, becomes questionable. The simple fact is that such systems offer capabilities not within the technical parameters of conventional weapons systems, thus justifying a continued research and development effort. For example, the laser spews out billions of tiny "photon bullets" (if you can accept the particulate nature of light as presented by some physicists) at 186,000 miles per second. The "bullets" are of such small mass that destructive power normally is not achievable; however, when propagated in tremendous quantities, destructive powers are generated. The laser weapon has progressed through the feasibility studies and initial engineering design to feasibility demonstrators such as the one in figure 1.

As early as 1973, the Air Force was able to shoot down a winged drone with a laser. In 1976, the Army demonstrated a capability to engage and destroy both fixed and rotary winged drones with a laser weapon. The first test to quiet many of the skeptics occurred when a moderately powered laser destroyed a high-speed antitank missile while in flight.[2] More recently,

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[1] *Soviet Military Power*, Office of the Secretary of Defense, October 1981.

[2] *Aviation Week and Space Technology*, "Laser Weapons," 1978.

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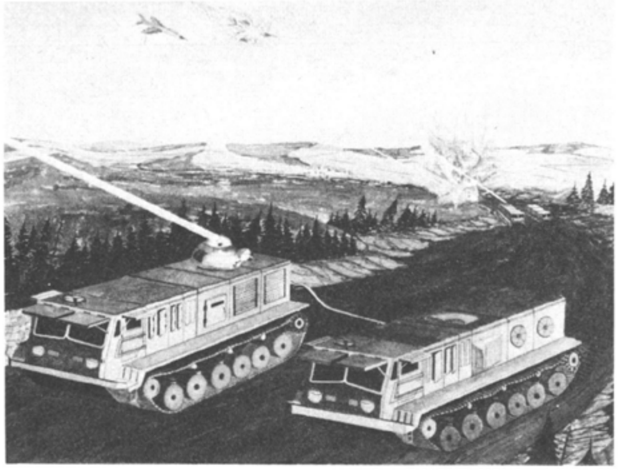

photo courtesy of Soviet Military Power

FIGURE 3: Laser Air Defense Weapon

the Air Force has conducted trials using an airborne laser against aerial targets. Having demonstrated laser feasibility and capability in each of these tests, the laser weapon took major steps toward reality as a tactical weapon.

Before continuing, a brief explanation of exactly what a laser weapon is may be in order. A laser beam is produced by excitation of an "active medium" lasing material to an upper unstable energy level. In returning to the lower, more stable energy level, the material will lase or give off energy in the form of light with constant phase and wavelength. With a focusing mechanism directing this light energy in a specified direction, a laser beam is produced.

A successful laser engagement occurs when a specific target has been engaged, and the desired destructive results are obtained. These engagements could range from the simple blinding of combat crewmembers using a relatively low energy laser, or the crazing of optics and physical destruction of electro-optics and other sensors by a medium energy laser (MEL), to the catastrophic burn-through of the target surfaces—resulting in structural failure, vital component destruction, or ignition of onboard fuel and/or ordnance by a high energy laser. A schematic of a laser weapons system is shown in figure 2.

The laser weapon offers many advantages over the conventional rocket or gun system. "The ability to concentrate beams of energy, moving at the velocity of light, so narrow that they overwhelmingly exceed nuclear bomb energy density delivery capability, should be recognized as a weapon achievement with implications every bit as shattering as the development of monstrous, but uncontrolled energy releases of nuclear bombs themselves."[3] Although the tremendous speed of delivery and destructive potential are the paramount advantages, other advantages such as short reaction time, high rates of fire, large magazine capacity and the ability to engage a single target in a target group make the laser weapon an attractive supplement to conventional systems.

Even with all the advantages cited, the laser alone does not offer the necessary capabilities to replace the conventional systems of today. But the laser looms as a tremendous supplement to conventional systems. To achieve the weapon capability attributed to such a system, the laser must overcome some difficult obstacles.

A successful engagement will require the laser beam to be focused on a vital target surface and held on this point for the time required to produce the destructive results (destroy control surfaces, burn through vital components, detonate fuel or warhead, destroy optics, etc.). This requirement dictates a pointing and tracking ability to not only place the beam on the target, but also on a specific point on the target and then hold it there for seconds, or fractions of seconds, regardless of target movement. This pointing and tracking problem loomed paramount in early laser weapon research, but the successful destruction of an inflight high-speed antitank missile clearly demonstrated that present state of the art in pointing and tracking is compatible with laser weapon development.

Initial laser power outputs were insufficient to obtain effective ranges necessary for weapons applications. But lasers with outputs suitable for weapons application are available today. Though still not sized, hardened or weight reduced to meet a tactical weapons requirement, only packaging the system remains before a viable laser weapon can be fielded.

Another major hurdle the laser weapon must overcome is attenuation by the atmosphere and battlefield turbulence. The laser, like any other light beam, tends to be dispersed by fog, precipitation, dust and other atmospheric conditions. Compensation for decreased intensity must come in either increased power output or increased dwell time on target. Work on laser propagation through air continues with the real utility of a laser weapon dependent upon propagation through fog, rain, smoke, haze, battlefield turbulence and obscurant aerosols.

The Nonnuclear EMP/Radio Frequency Weapon

For many years, electromagnetic pulse (EMP) has been recognized as a phenomenon associated with a nuclear detonation. The destructive potential of nuclear EMP warranted research into use of nuclear weapons primarily for the EMP associated damage. The research continued for many years in the use of nuclear EMP against enemy electronics with simultaneous efforts focused on hardening friendly systems to make them less susceptible to EMP damage. The EMP weapon

[3] *Aviation Week and Space Technology*, 16 October 1978.

receiving all the publicity today is similar in effects to the EMP generated by nuclear blast, but with one major difference—it is generated without a nuclear detonation, thus nonnuclear EMP or NNEMP/RF.

EMP is a short-lived, intense, electromagnetic wave consisting of a single or multiple oscillation. It may enter a system through numerous entry points such as antennas, aircraft skin, air vents, cables or defective shielding. In fact, any metallic object immersed in a strong transient electromagnetic field will have electrical currents and charges induced on its surface.

Component damage results when these induced transient currents are transmitted into internal circuits. Circuit upset, defined as a generation of erroneous data or loss of memory or logic as a direct result of a reversible response to EMP transients, occurs at relatively low induced energy levels with permanent damage occurring at higher levels.

As aircraft electronic devices become more sensitive and sophisticated and packaged in lighter weight materials, the more susceptible such circuits are to EMP damage. This damage is manifested in either temporary circuit upset, tripping circuit breakers, erasing computer memory, error inducement, or permanent circuit damage due to component burn-off.

The NNEMP/RF weapon, as other DEWs, offers numerous advantages over conventional munitions. The major advantage being the ability to severely degrade the enemy fighting capability without the requirement to actually physically destroy his aircraft, tanks and ships. The NNEMP/RF weapon offers speed about the same as a laser, a broader beam encompassing larger target areas, longer and less weather dependent range, and frequency option to complicate countermeasures.

On the disadvantage side, the NNEMP/RF weapon poses three primary challenges to the user. These include limiting damage to friendly systems, accurate damage assessment, and the possibility of effective countermeasures being developed.

The physical nature of an NNEMP/RF beam endangers all systems along its path. Any friendly systems in the way of the beam, or located in the hazard area of the antenna's side or back lobe, are susceptible to unintentional damage.

Accurate damage assessment will be difficult to impossible. Unlike explosive weapons, the NNEMP/RF weapon could have critically damaged a system without causing any visible external results. The notable exception would be in the case of an NNEMP/RF weapon engaging an inflight missile. Success in destroying the missile guidance or seeker could be assessed by the behavior of the missile subsequent to engagement.

The capability to field DEWs has been hotly debated within the U. S. intelligence community. The evidence is overwhelming that the Soviets are expending tremendous efforts in the development of the necessary technologies to field DEW systems. The Soviets' purpose in fielding such weapons is not clearly defined, but Secretary of the Navy John Lehman stated it this way: "The purpose, beyond capitalizing on the value of Clausewitz's 'Element of Surprise,' is to enhance relative advantage and increase the enemy's uncertainty. Throughout history, unpredictability and a novel approach have played decisive roles in myriad events. It is a potential that we can ill afford to ignore."[*]

It is clear that the Soviets have created uncertainty in the intelligence community and apparently have gained a relative advantage in the DEW field. The time is at hand where we must take the necessary steps to begin developing the countermeasure to ensure survivability on the future battlefield.

It is obvious that today, more than ever before, it is an absolute necessity that leaders, planners and decisionmakers at all levels have an accurate appreciation and understanding of what directed energy is and what it is not. The future battlefield will require sufficient knowledge of the theory and application of DEWs to properly employ the helicopter as described in the opening scenario, train the pilot that flies it, develop defensive countermeasures, and employ offensive DEWs. The task is not as awesome as it may seem, provided the process is started now.

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NATO Helicopter Standardization

By COL Jayson A. Altieri

Why Standardize?

The ability to work together is becoming more and more important since the North Atlantic Treaty Organization (NATO) Alliance began mounting out-of-area expeditionary operations with force contributions of partners who have different backgrounds. These operations include Partnership for Peace - a NATO program with the goal of creating trust between NATO, other states in Europe, and the former Soviet Union; Mediterranean Dialogue – a forum of cooperation between NATO and seven countries of the Mediterranean; and Istanbul Cooperation – an extension of the Mediterranean Dialogue that included select countries within the broader Middle East. Recent examples of these out-of-area operations include Afghanistan, The Balkans, and Libya. An alliance of 28 nations together with more than 30 Partners can only work effectively together, especially on the military side, when there is a common set of standards to execute joint and combined operations. This is achieved by three specific NATO Standardization Agency (NSA) products, which include the Standardization Agreement (STANAG), Standardization Requirements (STANRECs), and their supporting Allied Publications (AP). The creation of standards in NATO is not an easy or routine task, but a task that has a long history of success, both militarily and commercially, dating back to the days of early 19th century railroads.[1] Developing standards requires expertise, dedication, vision, responsibility, an innovative attitude, wisdom, friendship, teamwork, and the spirit of the alliance. This concept is especially true with regards to NATO helicopter procedures and doctrine.

Standardization is the main tool used to achieve interoperability because it provides, particularly in the area of operational standardization, common doctrine and procedures required for joint and combined operations. The NSA is committed to support NATO's drive to reach interoperability, and thus improve efficiency in the use of available resources. This is especially important at a time of economic restraint.

History

Shortly after the establishment of NATO in 1947, it was recognized that the coordinated development of policies, procedures, and equipment of the member nations held great potential for enhancing the military effectiveness and efficiency of the fledgling Alliance. As a result, the Military Agency for Standardization (MAS) was established in London in January 1951 for the purpose of fostering the standardization of operational and administrative practices and war material. In 1971 the MAS moved to NATO Headquarters in Brussels, Belgium, where, following the 1998-2000 review of the NATO standardization process, the MAS was combined with the Office of NATO Standardization (which addressed broader standardization issues such as identifying overall alliance standardization goals and coordination between operational and material activities). NSA's Charter, approved in August 2001, gave the NSA expanded responsibilities for the coordination of standardization activities within NATO. As a result, the NSA is the oldest agency in NATO.

Mission and Organization

The NSA is the central NATO authority for standardization management. It is a single, integrated body composed of military and civilian staff with the authority to coordinate issues between all fields of standardization as part of the integrated structure of the alliance. It is responsible for coordination and support of all operational (doctrinal and procedural), materiel, and administrative standardization efforts on behalf of the Military Committee (MC) and, respectively, the Committee for Standardization. The NSA coordinates military standardization among all NATO bodies involved in standardization and it administers all NATO terminology activities as well as standardization efforts in the area of civil standards.

The NSA supports the Joint, Naval, Land, Air, and Medical Standardization Boards each of which acts as a Delegated Tasking Authority (DTA) for operational standardization, including doctrine, as delegated by the MC. The standardization boards are responsible for the development of operational and procedural standards among member countries. Like other DTAs, they do this by developing STANAGs, STANRECs, and APs with the member countries and NATO military commands. The NSA also supports the Office of NATO Terminology Coordination. The Director of the NSA is responsible for the day-to-day work of six branches of the agency, namely a Policy and Coordination, Joint, Naval, Army, and Air Branches and an Information and Knowledge Management Branch. The service branches provide staff support to their related boards and their associated working groups and panels and are responsible for monitoring and harmonizing standardization activities in their areas of responsibility. The NSA supports around 40 workings groups and more than 100 panels. The NSA also works closely with NATO Headquarters' subordinate commands such as the Allied Command for Transformation, International Security Assistance Force, and various NATO Joint Forces Commands.

United States (U.S.) military members assigned to the NSA consist of one field grade officer (major through colonel or service equivalent) from the Air Force, Army, and Navy/Marine Corps. While there are no specific background or language requirements for an assignment to the NSA, an officer should have the ability to work in the complex joint/multi-national environment of NATO and its various agencies and commands.[2] Duty for U.S. officers assigned to the NSA is at NATO headquarters in Brussels.

NATO Helicopter Standardization

To standardize NATO helicopter procedures and terms, the Helicopter Inter-Service (HIS) Working Group (WG) was established by the MC Land Standardization Board (MCLSB) to initiate and develop standardization procedures for helicopter operations related to land warfare, excluding amphibious operations, to improve the effectiveness of NATO forces. The HIS WG consists of delegates and representatives from NATO commands, agencies, and organizations (non-voting participants) of those NATO nations that agree to participate. In addition to current NATO signatory members, the HIS WG also involves Partnership Cooperation Menu (PCM) nations.[3] The HIS WG also promotes cooperation with civil standardization organizations and their interested parties within the guidance provided by the council and in accordance with NATO documents, on a case-by-case basis, and subject to the approval of the MCLSB.

When submitting a STANAG for ratification, the WG includes a short statement of applicability addressing the operational imperative, the type of equipment or capability affected, and any other supporting rationale that the WG deems necessary to document their request. Additionally, the HIS WG reviews, at least once every three years, the promulgated STANAGs and APs for which they have been allocated responsibility to determine their continued validity and recommend amendment, consolidation, transfer of information to APs or cancellation where appropriate. The WG also reviews the STANAGs and APs of interest to the HIS WG. All STANAGs and APs are produced in both official NATO languages – English and French.

Twice a year, at various locations within the NATO community, the HIS WG also serves as forum for NATO and PCM nations to review lessons learned from recent operations exercises and experimentation for their potential for new or amended standardization proposals to enhance interoperability. Additionally, the HIS WG also exchanges information and/or equipment, fosters joint research and test programs, considers the adoption of any suitable civilian standards, and integrates PCM nations, when possible, into all appropriate NATO activities.

Examples of HIS WG Activities

Examples of the areas of focus for the HIS WG include: (1) contribute to the identification of the military requirements for helicopters; (2) promote the standardization of essential elements of equipment of future design so that, as a minimum, their compatibility and/or interoperability can be established; (3) contribute to the standardization of assemblies, components, spare parts and materials; (4) foster tests/trials, the object of which is to test the compatibility (or interchangeability) of existing and future equipment and the possibility of standardization; and (5) encourage the exchange of information on techniques and materials and equipment between the participating nations.

The HIS WG is responsible for eight NATO STANAGs which include: 2286 (Technical Criteria for External Cargo Carrying Slings, Nets, and Strops/Pendants), 2407 (Helicopter Operations Expedient and Battle Damage Repair), 2445 (Criteria for Clearance of Underslung Loads and Helicopter Underslung Load Equipment (HUSLE)), 2608 (Aviation LNO Handbook, Allied Tactical Publication-75), 2621 (Minimum Core Competence Levels and Proficiency of Skills for Helicopter Crew for NATO Land Operations, Allied Technical Publication-90), 2970 (Aerial Recovery Equipment and Techniques for Helicopters), 2999 (Use of Helicopters in Land Operations – Doctrine – Allied Tactical Publication-49, Volume I and II), and 3542 (Technical Criteria for the Transport of Cargo by Helicopter).

Other Areas of Interest

Besides the HIS WG subcommittees, the

WG also sends liaisons to other NSA WGs and organizations outside of NATO such as the Air and Space Interoperability Council; the Australia, Britain, Canada, and America (ABCA) Council; The Land Operations WG; Search and Rescue WG; Combat Service Support Working Group; Special Operations Force WG; and the Air Operations WG.

Access

All work done by the NSA and the subordinate WGs is unclassified, with few exceptions. Comprehensive information and access to the NATO Standardization Documents Database are provided on the NSA website: http://nsa.nato.int. The website is open to any military or civilian with need to access standardization products.

Relevance for NATO and Partners

Combined NATO operations, reinforced by forces of non-NATO-nations (partners and other nations), are not efficient without common standards. Coalition operations in Afghanistan using U.S., Western European, and Eastern European helicopter platforms, highlight how NATO standardization is a useful tool for reaching our national and coalition operational and strategic objectives. Partners' force contributions to NATO-led-operations can only succeed by using the Alliances' well proven portfolio of standards in all three fields of standardization – operational, material/technical, and administrative. NSA products ensure that the armed forces of the Alliance and their forces contributors can operate efficiently together in a synergy to achieve the high level of professionalism required. The end state of NATO standardization allows nations to leverage diverse systems in a common operating environment.

Glossary

As with any organization, standardized terminology is a vital element to success. Some key terms to understand when working within the NATO environment include:

Interoperability - The ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational, and strategic objectives.

NATO standardization - The development and implementation of concepts, doctrines, procedures, and designs in order to achieve and maintain the compatibility, interchangeability, or commonality which are necessary to attain the required level of interoperability, or to optimize the use of resources, in the fields of operations, materiel, and administration.

Standard (STD) - A document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.[4]

NATO Standardization Agreement (STANAG) - A NATO standardization document that specifies the agreement of member nations to implement a standard, in whole or in part, with or without reservation, in order to meet an interoperability requirement.[5]

NATO Standardization Recommendation (STANREC) - A NATO standardization document used exclusively in the materiel field of standardization, that lists one or several NATO or non-NATO standards relevant to a specific Alliance activity unrelated to interoperability.[6]

Allied publications (AP) - The name given to both standards and standards-related documents published by NATO as outlined in the NSA own standardization document – Allied Administrative Publication-32.

1 The gauge of a railroad tracks being the most common example of standardization. The standard track gage is the distance between the inside vertical surfaces of the head of the rail. Standard gauge is 4 feet, 8-1/2 inches. This is the gauge with which steam railroading began, and it became the common gauge of Britain, North America, and Western Europe except for Spain, Portugal, and Ireland. Legend has it that this standardization of track gages was based on the distance between the wheels of Roman military chariots. Hilton, George W., "A history of track gage." Trains. 7 February 2014. http://trn.trains.com/sitecore/content/Home/Railroad%20Reference/Railroad%20History/2006/05/A%20history%20of%20track%20gauge.aspx?sc_lang=en.
2 In the NATO environment, it is important to remember the mantra, "Ask, not Task" when interacting with partner nations.
3 Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.
4 A NATO standardization agreement is distinct from the standard(s) it covers.
5 It is important to note that a NATO standardization recommendation does not commit the nations to implement the standards listed in it, nor is a NATO standardization recommendation subject to the ratification procedure (meaning all nations, with some procedural exceptions, have to agree).
6 In 2010 NATO endorsed a new partnership format, a uniform Partnership Cooperation Menu (with approximately 1,600 activities), to strengthen already existing military cooperation programs and to expand its network of military partnerships throughout the world. As the PCM's name implies, the programme has no geographical boundaries.

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Acronym Reference

ABCA - Australia, Britain, Canada, and America
AP - allied publication
DTA - Delegated Tasking Authority
HIS - Helicopter Inter-Service
MAS - Military Agency for Standardization
MC - military committee
MCLSB - Military Committee Land Standardization Board
NATO - North Atlantic Treaty Organization
NSA - NATO Standardization Agreement
PCM - Partnership Cooperation Menu
STANAG - Standardization Agreement
STANREC - Standardization Recommendation
U.S. - United States
WG - working group

Improving Combat Readiness Through the Brigade Behavioral Health Team

By CPT Rebecca Blood, Ph. D.

Aviators and flight crews often cringe or run in the opposite direction when they hear the words "behavioral health" or "psychologist." It is a misconception that behavioral health issues or resolution equates to being "grounded" or being assigned to duties not involving flying (DNIF) within the aviation community. Despite a belief held by many within the aviation community, this is not always the case. There are times when temporary DNIF is warranted, particularly subsequent to a stressful event. When this occurs, the process can be extremely simple – temporary DNIF, treatment for a month or two, and immediate return to flying duties. Alternatively, left untreated, an issue that may have resulted in DNIF for a month or two may become more serious and result in a more severe diagnosis, as well as a longer grounding period. More significantly, a behavioral issue left untreated may result in a potential catastrophic flight event due to lack of focus on in-flight duties. Genuinely, the goal is to preserve flying status, while administering applicable treatment to the aviator and preserving combat resources by preventing accidents.

For many years, combat aviation brigades (CABs) have successfully operated without an assigned behavioral health team. Only during deployments did CABs receive a temporary "organic" behavioral health team through the Army Medical Department Professional Filler System. Infantry and Stryker brigade combat teams (BCT) have been allotted garrison behavioral health teams for many years. Due to their success within these organizations, CABs have recently received authorizations for behavioral health assets and in April 2013, the 1st Air Cavalry Brigade (1ACB) received the first aviation brigade behavioral health team. These teams include one aeromedically trained clinical psychologist, one clinical social worker, and three behavioral health specialists.

The 1ACB is composed of five battalions and more than 3,300 Soldiers. Compared to their BCT counterparts, aviation brigades face unique challenges and are comprised of a distinct Soldier population. Establishing an initial behavioral health presence within the brigade was accompanied by its own challenges. Creating relationships with brigade and battalion level staff members, chaplains, brigade and battalion medical providers, the brigade judge advocate, and other elements of the command team was the first step in implementing a behavioral health presence within the brigade.

Presently, medical providers for the 1ACB establish primary care at the Troop Medical Clinic #12 (TMC) on the airfield. The behavioral health team has augmented the well-established medical team and joined ranks at TMC 12. It was believed that working at TMC 12 would provide maximum accessibility for the Soldiers and also place the behavioral health team in the Soldier's working environment where individual daily work performance and behaviors could be more readily observed. While medical providers often refer Soldiers to the behavioral health team, Soldiers also seek voluntary services and are actively monitored by the behavioral health team as well. The behavioral health specialists initially meet with Soldiers, provide administrative services, and triage walk-in Soldiers, while the licensed providers conduct therapy and evaluations. Members of the 1ACB Behavioral Health Team are an active part of the unit and have deployed to Operation Enduring Freedom and have also attended training events at the National Training Center at Fort Irwin, CA in support of aviation activities.

Aeromedical psychology focuses on applying clinical psychology principles

to address both individual and group issues within the aviation community. Specifically, aeromedical psychologists provide consultation and support to both flight surgeons and commanders regarding the assessment, treatment, readiness, and retention of aviation personnel. This includes providing education and training to aviation personnel on human factors, stress and fatigue, and other safety issues related to the psychological status of aircrew members. Aeromedical psychologists are eligible to obtain flight status. Observing aircrews fulfilling their duties in flight is one of the best methods of monitoring performance.

CPT Rebecca Blood, 1ACB Clinical Psychologist advises LTC Blevins, Commander 2-227 Aviation Regiment on the welfare of Soldiers within the battalion during a command advisory meeting at TMC 12 on Hood Army Airfield.

Special attention must be provided to aviators and crewmembers, as flight status constitutes a specific set of individuals. The standard behavioral health treatments and specialty aeromedical psychological evaluations are offered to Soldiers. Ultimately, the focus of the behavioral health team is to maintain the fighting force and promote a psychologically fit and healthy brigade. Confidentiality is maintained at all times, unless there is concern about safety to self or others. In those instances, commanders are notified in order to coordinate the best medical care to the Soldier.

Given that the brigade was accustomed to having a behavioral health team assigned only during deployments, many wondered, "What is the purpose of behavioral health when we are not downrange?" The simple answer: to identify and mitigate any behavioral health concerns prior to those issues becoming a greater problem. As an example, a flight medic recently suffered the loss of a parent. Despite experiencing prior deployments and treating countless Soldiers needing immediate medical attention, he was understandably having difficulty dealing with this unexpected loss. Treatment was discussed, and the flight medic agreed that he would benefit from temporary grounding so that he could center his energy on his family and the grieving process. Three months later, the flight medic was able to overcome his personal grief. His overall functioning improved and he supported the addition of flight duties to his schedule. Following an aeromedical psychological evaluation, return to flying duties was recommended and the flight medic was with his crew within the week.

While some may expect a Soldier to simply "deal" with such losses, unresolved personal issues have the potential to detract from the intense focus required to perform flight duties. The Combat Readiness Center's Flightfax is replete with Class A, B, and C accidents caused by momentary lapse of attentiveness. Aviation personnel are expected to purge their minds of anything unrelated to the mission at hand, which can be a particularly challenging task when additional external stressors are influencing their lives. Compartmentalizing can be a positive skill, but it can also result in ensuring that underlying problems continually go unaddressed.

In another case, an aviator self-referred to therapy due to marital issues. Although he was experiencing some anxiety during flying duties, his symptoms remained sub-clinical and were not severe enough to warrant temporary grounding. During treatment, potential causes for his increased anxiety were discussed, and he was able to gain insight and manage his symptoms in flight. Additionally, he addressed several marital issues and worked to increase communication prior to deploying. This case demonstrates an aviator who took a proactive approach to his mild symptoms. He was able to resolve these mild symptoms without being grounded and prior to the development of more severe symptomatology.

Although the 1ACB is the first behavioral health team in any CAB, leadership and Soldiers have welcomed and supported this addition. Leaders have advocated for Soldiers to take advantage of the services offered, and commanders consider the behavioral health team to be a valuable resource to the brigade. Together, commanders and the behavioral health team can make significant changes and contributions to maintain and promote the psychological fitness of the 1ACB Soldiers.

CPT Rebecca Blood is from Buffalo, NY. She obtained her undergraduate degree from State University of New York at Buffalo, Master's degree from Towson University, and her Ph.D. from Georgia State University. CPT Blood completed her clinical psychology internship at Walter Reed National Military Medical Center and attended the Aeromedical Psychology Course at Fort Rucker, Alabama. Following internship, she arrived at her first duty station at Fort Hood, has earned non-crewmember aviation status, and assumed her position as the Brigade Psychologist at 1st Air Cavalry Brigade.

Acronym Reference

1ACB - 1st Air Cavalry Brigade
BCT - brigade combat teams
CAB - combat aviation brigade
DNIF - duty not involving flying
TMC - troop medical clinic

Aviation Targeting:

2CAB Uses the 2013 War Fighter Exercise to Get Back to Basics

By COL Walter T. Rugen,
MAJ Marcus Evans,
and MAJ Joseph Mukes

Army Aviation's flexibility and lethality were recently demonstrated during the 2nd Infantry Division's Combined Joint Task Force – 2 (CJTF-2) and 2nd Combat Aviation Brigade's (2CAB) recent War Fighter Exercise (WAR PATH III) conducted in Korea. Operating within the traditional decide, detect, deliver and assess (D3A) targeting process, the CJTF maximized 2CABs employment during the successful conduct of the emerging weapons of mass destruction – elimination (WMD-E) mission.

Regardless of the operating environment (OE), the enemy retains a powerful voting bloc. Targeting timelines must remain fluid and focused. For example, during counterinsurgency operations, the targeting cycle may extend for days, weeks, or even months. Conversely, in the decisive action environment, targets may present themselves for immediate action requiring an abbreviated timeline. Army Aviation, specifically the diverse capabilities found within the CAB, is uniquely organized to tackle complex problem sets regardless of the OE.

During the War Fighter WMD-E planning process, the CJTF Commander, Major General Thomas Vandal, directed several essential tasks. Mission analysis and subsequent course of action (COA) development identified the importance of sensor to shooter linkage, rapid response, employment of effects, collateral damage estimate (CDE) support, and rapid battle damage assessment (BDA) to support those essential tasks. Subsequently, 2CAB task organized its MQ-1C Gray Eagle company under its attack helicopter battalion to maximize manned-unmanned teaming (MUMT) tactics, techniques, and procedures. The Gray Eagle operators and their attack battalion teammates provided the CJTF and CAB with multiple sensor payload options and organic autonomous and remote precision missile capability. The CAB employed these assets to conduct reconnaissance, surveillance, and target acquisition (RSTA) and other directed essential tasks. Additionally, the CJTF cross-queued or "tied" the unmanned aircraft systems (UAS) assets to additional CJTF collection assets across the OE to condense the D3A timeline. Throughout the duration of the exercise when targets of opportunity presented themselves, the CJTF was able to quickly deliver desired effects while retaining the flexibility to support ongoing operations.

To address the detect and deliver functions of the D3A process, UAS assets operated like rotary wing teams by working in tandem with the addition of integrated attack and in some areas reconnaissance rotary wing platforms. Depending on mission, equipment, terrain and weather, troops available, time, and civil considerations (METT-TC), one Gray Eagle provided RSTA support and remote delivery capability through organic full motion video (FMV), moving target indicator, synthetic aperture radar, and electro-infrared collection packages while its crews received additional target queuing from other CJTF RSTA assets. The second Gray Eagle, armed with Hellfire missiles, provided autonomous and remote delivery capability and FMV BDA while providing alternate RSTA functions. The AH-64 Attack Weapons Teams and in some cases its OH-58D teams provided additional RSTA, security, and attack capability.

Staff innovation and synchronization was paramount to success. During the exercise, the CJTF G-2 Section provided focused collection plans, advanced product exploitation, and information dissemination to the CAB. In return, the CAB provided the CJTF with priority intelligence requirement (PIR) confirmation, target acquisition and effect delivery, and rapid BDA used to determine re-attack guidance or alternate effect application.

The WMD-E mission required much more than focused and responsive RSTA operations. The CJTF used the D3A process and the CAB during WMD-E shaping operations at multiple echelons. When potential WMD sites were identified, the CJTF rapidly introduced security and exploitation forces onto them. When lines of communication security were required to sustain the force, the CAB employed multiple capabilities to ensure the CJTF commander's desired effects were achieved. RSTA, suppression of enemy air defenses, air assault operations, security operations, and logistical resupply operations became staple menu items to be used at the CJTF commander's discretion. Throughout all operations, the CAB continued to employ its UAS and rotary wing assets as RSTA teams.

The CAB provided its full complement of capabilities early in the planning and development process and confirmed the presence of enemy radar, air defense artillery (ADA), and enemy security forces on the objectives. Its Gray Eagle, AH-64, and OH-58D teams surgically engaged and destroyed high payoff targets such as radar clusters, ADA systems, and armored vehicles. In several scenarios, the deliver function of the D3A was accomplished through MUMT. The commander's PIR were answered and enemy forces were reduced though the combination of CAB RSTA teams and other CJTF assets. Enemy forces identified outside of identified influence or collateral damage zones were targeted through the coordination of the CAB with CJTF and Republic of Korea Army field artillery units. CAB assets exercised the abbreviated or dynamic targeting process during the RSTA and security phases to clear fires and eliminate targets of opportunity with precision fires as those threats materialized.

The CJTF successfully employed its CAB to enable CDE, BDA, force introduction, and follow on logistical resupply operations. Multiple aviation platforms performed BDA by transmitting FMV providing the access function of the D3A. CAB lift and assault assets provided ground force sustainment by simply maneuvering clear of confirmed enemy locations and high threat areas. In this exercise, Army Aviation was a key element in the execution of the WMD-E mission and a critical executor of the D3A process.

The War Fighter Exercise demonstrated that regardless of the environment, the D3A process still works.

The challenge 2CAB discovered during the exercise was not what it expected. The introduction of and understanding of new technology and its tactical value was quickly assimilated by the staff. However, the staff process and mechanism required to plan, prioritize, and synchronize those assets took time to refine. Ultimately, 2CAB relied on the D3A process, dedicated time to refresh its staff on the process, and by exercise culmination, used the D3A process effectively to meet the commander's intent. During the War Fighter 2013, War Path III Exercise, the CAB demonstrated that its UAS assets did not change or impede the traditional D3A process but rather enhanced it. The application of MUMT principles within traditional processes and the close integration of staff functions at multiple echelons produced timely and lethal results. In the case of 2CAB during War Path III, the lessons learned or in some cases "re-discovered," proved that targeting basics still work. The War Fighter Exercise provided an excellent opportunity to reinforce the fact that Army Aviation continues to provide flexibility and that technological advancements do not always require doctrinal or procedural adjustments.

COL Walter T. Rugen is presently the Commander, 2nd Combat Aviation Brigade. COL Rugen was designated an Army Fellow in 2011 and served at the Center for Strategic and International Studies in Washington, DC. Other assignments include the Army Aviation Directorate on the Army Staff at the Pentagon; strategic plans officer in the J-5 at the U.S. Special Operations Command, McDill Air Force Base, FL; Platoon Leader, Company Operations Officer, Company Commander, Battalion Adjutant, Battalion Operations Officer, and Battalion Commander in the 1st, 4th, and 3rd Battalions, 160th Special Operations Aviation Regiment (SOAR). He also served as Platoon Leader, Brigade Aviation Element, and Company Commander in the 9- 101st at Fort Campbell, KY. He has multiple deployments with the 160th SOAR to both Iraq and Afghanistan. COL Rugen has 25 years service. Aircraft qualifications include the UH-60L and MH-60K.

MAJ Marcus Evans received a commission in the Field Artillery from Ohio State University in 2002. As a branch detail officer MAJ Evans transitioned to Military Intelligence and served as an Intelligence Advisor in 2006 to the Iraqi Army in Dyiala province. Subsequently, MAJ Evans served as the Assistant Brigade S-2 for 2nd Brigade 4th Infantry Division in Basra Iraq. MAJ Evans has also served as the Brigade Intelligence trainer and S-2 for Operations Group at the Joint Multinational Readiness Center in Hohenfels Germany. Currently he serves as the 2nd Combat Aviation Brigade S-2.

MAJ Joseph Mukes was commissioned from the University of Southern Mississippi as a Field Artillery Officer in 2001. He served as Fire Platoon leader and deployed in support of Operation Iraqi Freedom in 2003. In 2005, he deployed again as Military Transition Team member to Iraq. After his deployment he completed two battery commands at Fort Sill, OK and was later assigned to 8th Army Operational Fires Directorate, Republic of Korea. MAJ Mukes completed two additional deployments to Iraq and Afghanistan as a part of the 4th Battlefield Coordination Detachment. He currently serves as the Brigade Fire Support Officer and Assistant S-3 for the 2nd Combat Aviation Brigade.

Acronym Reference

ADA - air defense artillery
BDA - battle damage assessment
CAB - combat aviation brigade
CDE - collateral damage estimate
CJTF - combined joint task force
COA - course of action
D3A - decide, detect, deliver and assess
FMV - full motion video
METT-TC - mission, equipment, terrain and weather, troops available, time, and civil considerations
MUMT - manned-unmanned teaming
OE - operating environment
RSTA - reconnaissance, surveillance, and target acquisition
WMD-E - weapons of mass destruction – elimination
UAS - unmanned aircraft systems

Making Composite Risk Management Analysis Useful for the Commander

By LTC George Hodge, USA, Ret

Many times over the years, I've watched students in the U. S. Army Command and General Staff Officer's Course conduct their mission analysis briefing only to breeze through composite risk management (CRM) and not give it very much thought. Often their entries are clear statements of the obvious ("The enemy has a formidable air defense network that is a threat to our helicopters."), to clearly including items that are holdovers from our non-tactical experiences ("All vehicles must have an assistant driver.") While both of these entries are true, they do very little to help the commander and staff appreciate the scope and complexity of the risks associated with the problems they are facing. This article will attempt to outline a more useful and streamlined approach to assist the staff in helping the commander identify and manage the risks associated with accomplishing the mission.

Chapter 4 of Army Field Manual (FM) 5-19, Composite Risk Management, does a good job of outlining how the CRM process is applied to the military decision making process (MDMP). The CRM is a five-step process:

- **Step 1** – Identify hazards.
- **Step 2** – Assess hazards to determine risk.
- **Step 3** – Develop controls and make risk decisions.
- **Step 4** – Implement controls.
- **Step 5** – Supervise and evaluate.

Figure 4-2 from FM 5-19 displays a matrix that simplifies the relationship of the five steps of CRM to the MDMP.

Note that during the mission analysis process, the requirement is for the appropriate staff sections to identify and assess hazards (steps 1 and 2 of the CRM process) appropriate to their area of expertise/warfighting function.

Military Decision-Making Process	Risk Assessment Steps				
	STEP 1 Identify Hazards	STEP 2 Assess Hazards	STEP 3 Develop Controls (+) Decision	STEP 4 Implement Controls	STEP 5 Supervise (+) Evaluate
Mission Receipt	X				
Mission Analysis	X	X			
COA Development	X	X	X		
COA Analysis	X	X	X		
COA Comparison			X		
COA Approval			X		
Orders Production			X	X	
Rehearsal	X	X	X	X	X
Execution/Assessment	X	X	X	X	X

Figure 4 -2. CRM aligned with the MDMP

Chapter 4 describes, based on information received during Step 1, Receipt of mission, analysis of higher headquarters' orders, and the initial intelligence preparation of the battlefield. All these are to be considered when beginning to formulate the initial identification of hazards. So what constitutes a "hazard?" FM 5-19 defines a hazard as:

"…a condition with the potential to cause injury, illness, or death of personnel; damage to or loss of equipment or property; or mission degradation. A hazard may also be a situation or event that can result in degradation of capabilities or mission failure."

Simply put, any man made or natural event/action, or the absence of a resource that has a reasonable chance of directly or indirectly promoting mission failure. So how does the staff sort through all the possible hazards and identify the ones that have the greatest possibility of interfering with the mission? The factors of mission, enemy, terrain, troops available, time, and civil considerations make for a good framework to think through likely hazards.

While the list could be extensive, the staff member should think critically about those areas that should be brought to the attention of the commander. The reason for doing this is not just to make

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Risk Assessment Matrix

SEVERITY		Probability				
		Frequently A	Likely B	Occasional C	Seldom D	Unlikely E
Catastrophic	I	E	E	H	H	M
Critical	II	E	H	H	M	L
Marginal	III	H	M	M	L	L
Negligible	IV	M	L	L	L	L

E - Extremely H - High M - Moderate L - Low

Figure 1-4. Risk assessment matrix

the commander aware, but to help him make a decision about prioritizing the unit's limited time and resources in order to prevent the action from contributing to mission failure. Likewise, the staff member should articulate some form of assessment to the identified risk. FM 5-19, Figure 1-4, outlines a framework for assessing hazards. It assesses them using the likelihood of occurrence (probability) as: frequent, likely, occasional, seldom, or unlikely. It also addresses the expected result (degree of severity) as: catastrophic, critical, marginal, or negligible. It then combines them in a matrix and assigns them a specified level of risk: extremely high, high, moderate, or low.

As a note of caution, the risk assessment matrix is not intended to be a substitute for good judgment. Experience and common sense each have a vote.

As a practical example of the assessment process, assume that an infantry brigade combat team (IBCT) has deployed to an island nation at the request of the host nation government in response to a recent natural disaster. The infrastructure sustained heavy damage; a large number of the population is unaccounted for; the survivors need food, medicine, water; and communications with the outside world are limited. The joint task force headquarters has determined that the IBCT's mission is to secure key facilities (the deep water port, airfield, water purification plant, and some key government buildings) to enable international relief aid agencies to begin recovery operations.

As the IBCT staff begins its mission analysis, the various staff sections complete their portions, including making a composite risk assessment of the mission from their staff area of expertise/warfighting function. Each section brings to the commander's attention their specialty area risk assessment, the likelihood of occurrence, and the estimated degree of severity it would have on mission accomplishment.

Examples of risk assessment that the staff might bring to the commander's attention include:

- ***S-1 (Personnel) Risks***
  Lack of certified language speakers. Frequent + Critical = Extremely High Risk.
- ***S-2 (Intelligence) Risks***
  Disease outbreak as a result of the disaster (unsanitary conditions). Frequent + Catastrophic=Extremely High Risk.
- ***S-3 (Operations / Movement, Maneuver, Fires, Protection) Risks***
  With extensive damage to the infrastructure, Soldier mobility will likely be dangerous, difficult, and very slow. Frequent + Critical = Extremely High Risk.
- ***S-4 (Logistics / Sustainment) Risks***
  With extensive damage to the infrastructure and likely prevalence of unsanitary conditions, potable water and field sanitation supplies will be in high demand. Frequent + Catastrophic = Extremely High Risk.
- ***S-6 (Signal, Communications, Computers) Risks***
  a) Limited power sources available to run all our equipment. Generators and gasoline will be in high demand. Frequent + Critical = Extremely High Risk.
  b) It is very probable that all the host nation and international relief agencies will not have compatible "mission command" systems, thereby preventing us from having timely, effective and efficient communications with them. Frequent + Critical = Extremely High Risk.

The next step is to suggest control measures to address the identified areas of risk. Though the establishment of the control measures is part of the course of action (COA) development, identifying tentative control measures will help build a suitable, feasible, and acceptable COA from the beginning. Going back to the initial hazards identified by the staff earlier, the appropriate staff member might suggest the control measures requested of the division shown in bold type face below:

- ***S-1 (Personnel) Risks***
  Lack of certified language speakers. Frequent + Critical = Extremely High Risk. **Ask the Division G1 to reassign qualified language speakers to our BCT for this operation.**
- ***S-2 (Intelligence) Risks***
  Disease outbreak as a result of the disaster (unsanitary conditions). Frequent + Catastrophic=Extremely High Risk. **Ask the Division to attach a Preventive Medicine Team to the BCT.**
- ***S-3 (Operations / Movement, Maneuver, Fires, Protection) Risks***
  With extensive damage to the infrastructure, Soldier mobility will likely be dangerous, difficult, and very slow. Frequent + Critical = Extremely High Risk. **Ask the Division to augment the BCT with additional Material Handling Equipment/Mobility Equipment, operators, and equipment contact teams.**
- ***S-4 (Logistics / Sustainment) Risks***
  With extensive damage to the infrastructure and likely prevalence of unsanitary conditions, potable water and field sanitation supplies will be in high demand. Frequent + Catastrophic = Extremely High Risk. **Ask the Division to augment us with additional water trailers, water purification supplies, and sanitation supplies.**

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- ***S-6 (Signal, Communications, Computers) Risks***

a) Limited power sources available to run all our equipment. Generators and gasoline will be in high demand. Frequent + Critical = Extremely High Risk. **Ask the Division to augment us with additional generators, and fuel storage capacity.**

b) It is very probable that all the host nation and international relief agencies will not have compatible "mission command" systems, thereby preventing us from having timely, effective and efficient communications with them. Frequent + Critical = Extremely High Risk. **Ask the Division to augment us with additional radios, computers, and operators of appropriate grade and skill to serve as liaison officers to the various relief agencies.**

In these examples, all the identified hazards were assessed as extremely high risk. While it is likely many hazards could be assessed as moderate, or even low, it is probable those would not make the briefing because commanders are primarily interested in those items that would have the potential of interfering with or preventing them from accomplishing the mission. This does not mean the staff should dismiss them; rather they have been assessed as moderate or low and therefore did not make the cut for the briefing. The items accessed as moderate and low still need to be addressed but probably do not need to be brought to the attention of the commander during the initial mission analysis briefing. Many of the moderate and low areas will probably get addressed automatically with good unit standard operating procedures (SOPs), discipline, and junior leader initiative.

At this point the staff members are ready to brief the commander on Step 7 of mission analysis. The staff SOP should address the particular briefing format and presentation style (PowerPoint® slide, "quad" chart, etc.). The risk assessment information should be presented by the staff in a way that it clearly and succinctly tells the commander:

- The identified hazard
- An assessment of the hazard (probability + severity = specified risk level)
- Suggested control measures or (possible action necessary to mitigate the impact).

After the approved mission analysis briefing the staff would carry the commander's approval into developing a detailed COA and then completing the last three steps of the CRM:

- **Step 3** – Develop controls and make risk decisions.
- **Step 4** – Implement controls.
- **Step 5** – Supervise and evaluate.

These final three steps would be developed during the remaining steps of the MDMP.

A Seabee assigned to Amphibious Construction Battalion 2 removes rubble near Toussaint Louverture International Airport in Port-au-Prince, Haiti. ACB-2 is conducting construction, humanitarian and disaster relief operations as part of Operation Unified Response after a 7.0 magnitude earthquake caused severe damage in and around Port-au-Prince, Haiti, Jan. 12, 2010. (U.S. Navy photo/Petty Officer 2nd Class Kim Williams)

George Hodge, LTC, USA (Retired) is currently serving as an instructor in the Department of Army Tactics at the US Army Command and General Staff College, Fort Leavenworth, KS. He served on active duty from 1980-2002 as an Armor officer then as an Army aviator. Rated aircraft include the UH-1, OH-58, AH-1, and UH-60. He has over 21 years of teaching in various TRADOC schools including serving as a small group instructor at the Aviation Officer's Advanced Course (1988-1990) and multiple assignments at CGSC, including Director of the School for Command Preparation. Operational assignments include Executive Officer 2nd Battalion 229th Attack Helicopter Regiment with the 101st Airborne Division (Air Assault) during Operation Desert Shield / Storm, and Executive Officer for the Aviation Brigade, 1st Infantry Division during Operation Joint Guard in Bosnia (1997). He also teaches a course in risk management for a local college in Leavenworth, KS.

Acronym Reference

IBCT - infantry brigade combat team	**FM** - field manual
COA - course of action	**MDMP** - military decision making process
CRM - composite risk management	**SOP** - standard operating procedure

Integrating Air Traffic Services into a Decisive Action Environment

By SFC Eric K. Drabenstot,
CW2 Takia T. Allen,
and MAJ Leah C. Shubin

Most air traffic service (ATS) units deploying to the National Training Center (NTC) are not organic assets to the multifunctional aviation task force (MFATF) to which they are assigned. However, the ATS section is typically from the same combat aviation brigade which allows for some level of integration prior to deploying. Successful integration begins early in the planning process. Once the task organization is approved by the commander, it is imperative that the MFATF receiving ATS support immediately begins integrating the section in order to learn the limits and capabilities and to capitalize on the benefits the section brings to the fight. ATS requirements need to be considered in the military decision making process, as early as mission analysis, but most importantly during the course of action development phase, as mentioned in Field Manual 3-52, *Airspace Control*. These operational considerations determine equipment requirements, back-up capabilities, communications connectivity, and the areas which may require air traffic coverage. Operational considerations should include a two-way line of communication between the ATS section leadership and the S-3. A lack of proper integration generally leads to many MFATFs and brigade combat teams (BCT) underutilizing the value-added capabilities ATS can provide across the entire operating environment. The integration and understanding of ATS limits and capabilities will not only benefit MFATF operations, but it will also allow the MFATF Commander to share the capabilities with the BCT they are assigned to support.

Army Aviation plays a crucial role in land operations. The requirement to provide simultaneous air traffic services to aviation as well as all airspace users is highly likely to occur in a decisive action (DA) environment. Decisive action is defined as "the continuous, simultaneous combinations of offensive, defensive, and stability or defense support of civil authorities' tasks." Unlike counterinsurgency operations with which today's Army has become so familiar, a DA fight consists of a fluid, ever-changing battlefield and requires the execution of simultaneous operations throughout all phases of operations.

The most commonly deployed tactical ATS system at the NTC is the AN/TSQ-198A, Tactical Terminal Control System. The team assigned to perform ATS functions using the tactical terminal control system is the tactical air control team (TACT). The TACTs are employed as initial entry forces at auxiliary areas in remote and austere locations. The mobility of the TACT allows commanders flexibility during all stages of force projection and provides aviation units with immediate advisory capabilities in any environment. The TACT provides terminal and airspace information services where air assets require coordinated movement, and they are best suited for operations such as forward assembly areas, landing zone and pickup zone operations, as well as forward arming and refueling point operations. TACTs are capable of providing non-precision navigational aid; positive and procedural air traffic services; secure ultra-high frequency, very high frequency, frequency modulation, satellite communication, and high frequency radio communications; and limited meteorological information within one hour of arrival and set up.

Although the TACT is the most easily deployed ATS asset, use of other systems described below should be considered to supplement ATS operations and provide the BCT commander the ability to perform ATS functions at multiple locations throughout the operating environment.

Airspace users are not limited to rotary-wing assets and include unmanned aerial vehicles, fixed-wing, and fire support assets. In anticipation of this potential requirement, MFATFs with an ATS section deploying in support of DA operations should consider the use of the AN/TSW-7A, Air Traffic Control Center or the AN/MSQ-135, Mobile Tower System, in addition to use of the TACT. When considering deployment of these systems, it is imperative that the control tower team manning these facilities is also included in the planning process. With all of these systems and personnel employed, the TACT will assume initial control of the airspace by deploying with the quartering party, while the control tower team follows, deploying with the main body of the task force. Once the control tower team is completely set up and assumes control of the airspace from the TACT, the TACT now has the capability to tear down and be prepared to jump to an alternate site as the MFATF or BCT commander dictates.

Integration of outbound fires is an additional function that ATS units are capable of performing for both planned and immediate fires. When collocated with fires assets, ATS, through positive control, are able to quickly ensure that friendly aircraft are clear of the gun target line of outbound fires and provide battle damage assessments if targets are within the tower's line of sight. The key to integrating fires within controlled airspace is rapid deconfliction and synchronization due to the time-critical nature of counter-fire missions. In order to achieve this, ATS units should establish communications with the BCT's fires and effects coordination cell either directly or via their aviation task force fire support officer, the air defense airspace management (ADAM) cell when collocated, or the maneuver unit's fire support element (FSE) or fire direction center, for a battalion fires element. All communications regarding fires should occur on the brigade or battalion fires net. Direct communications not only reduce coordination time, but also increase situational awareness since all fire elements (artillery and mortars) under the unit's FSE monitor this net. The brigade aviation element (BAE) provides valuable insight and support regarding the planning and utilization of aviation assets. In accordance with Training Circular 1-400, *Brigade Aviation Element Handbook*, one of the vital tenants included in the BAE's mission is to provide "Army airspace command and control (A2C2) planning, coordination, and airspace deconfliction for combined arms and joint, interagency, and multinational (JIM) operations."* When properly integrated with air traffic services, the BAE can greatly impact the involvement of aviation in the BCT's scheme of maneuver.

When used appropriately, ATS will serve as a valuable asset and combat multiplier for all maneuver, fires, and effects units outside of aviation. While it is ultimately the responsibility of the MFATF to ensure the full integration of ATS assets into the fight – to include operational and planning considerations and the complete understanding of concept of operations – components of the ADAM cell and BAE also have an important role in ATS synchronization. Likewise, the ATS level leadership is responsible to inform their supported aviation task force of ATS system and personnel capabilities and limitations, which in turn should be shared with the brigade leadership. By working to achieve this common goal, ATS can play a pivotal role in the integration and synchronization of airspace management, all airspace users, and air traffic operations in a DA operational environment.

* A2C2 is no longer used in FM 3-52 as of Feb 2013. The term is now Airspace Control. However, A2C2 may be seen in older manuals (pre-2013) until changes can be made and published.

REFERENCES:
FM 3-52, Airspace Control, February 2013
TC 1-400, Brigade Aviation Element Handbook, April 2006

SFC Eric K. Drabenstot is currently assigned as the 2ID G-3 Aviation Airspace Non-Commissioned Officer in Charge (NCOIC) at Camp Red Cloud, ROK. When SFC Drabenstot co-authored this article, he was an Air Traffic Services Observer-Coach/Trainer (OC/T) at the National Training Center (NTC), Fort Irwin, CA. He has deployed in support of Operation Iraqi Freedom and Operation New Dawn serving as an air defense airspace management/brigade aviation element NCOIC. SFC Drabenstot has 10 years experience in air traffic control and airspace control. Based on his experience, SFC Drabenstot has been selected for assignment to 8th Army, G-3 Air Personnel Recovery Section.

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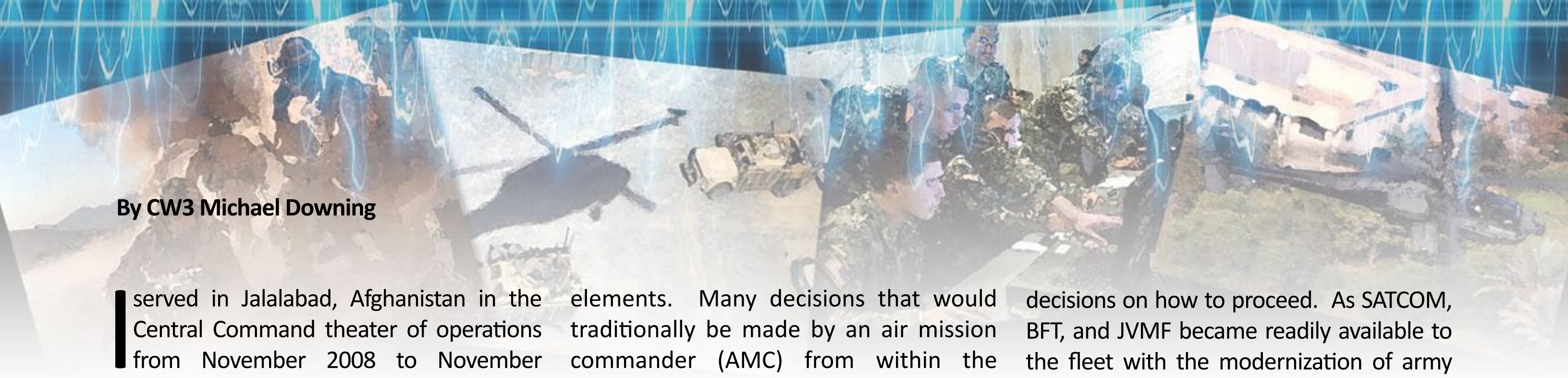
MAJ Leah C. Shubin will graduate the Command and General Staff College this summer and will also receive her Master's Degree from Kansas State University. Her most recent assignment includes the Senior Battle Staff Analyst and the Operations Group G-3 Air at the National Training Center. Previously, she has deployed three separate times with the 159th Combat Aviation Brigade, 101st Airborne Division as an Air Assault platoon leader, the HHC BDE Commander, and an Air Assault Company Commander, in support of Operations Iraqi Freedom and Enduring Freedom. She currently has over 11 years of service and will be returning to the 101st Airborne Division at Fort Campbell, summer 2014.

Acronym Reference

ATS – air traffic services	TACT – tactical air control team
NTC – National Training Center	ADAM – air defense and airspace management
MFATF – multifunctional aviation task force	FSE – fire support element
BCT – brigade combat team	BAE – brigade aviation element
DA – decisive action	JIM – joint, interagency, and multi-national

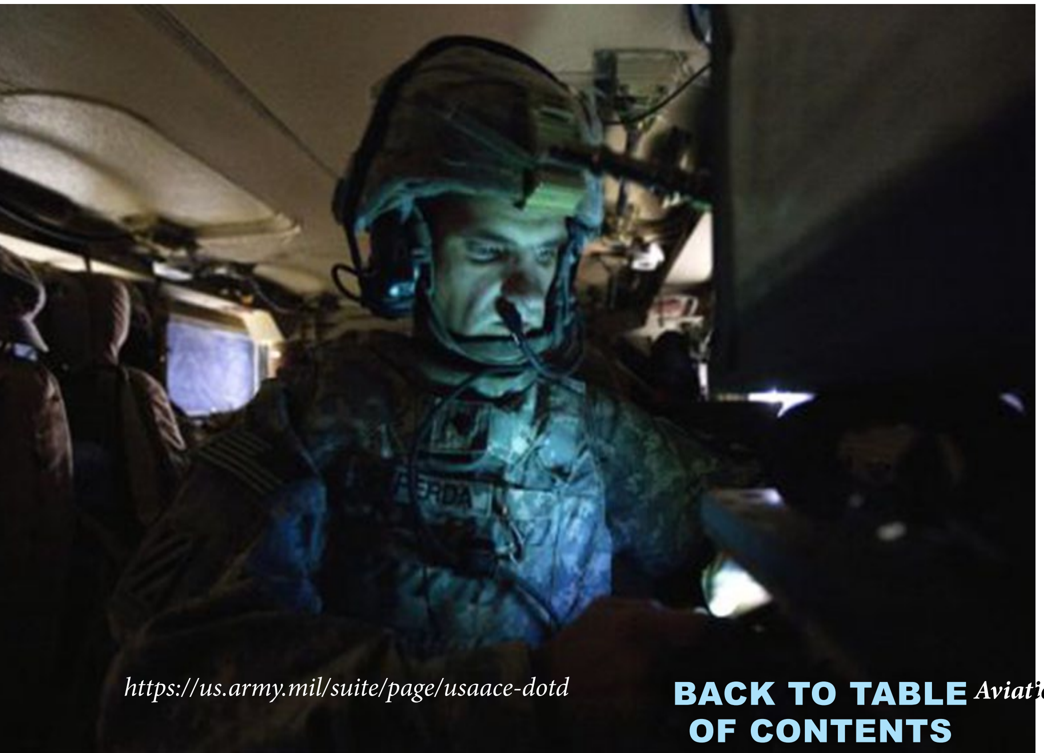
COMMAND, CONTROL, & CONFUSION on the Battlefield



By CW3 Michael Downing

I served in Jalalabad, Afghanistan in the Central Command theater of operations from November 2008 to November 2009 during Operation Enduring Freedom with Task Force Palehorse, 7-17 Cavalry Squadron, 159th Aviation Brigade, 101st Airborne Division. This was the first deployment of the Army's new UH-60M helicopter to a combat theater. During the deployment, we relied heavily on emerging cockpit technologies to communicate with our tactical operations center (TOC) and supported elements. Communication methods included satellite communication (SATCOM), Blue Force Tracker (BFT), and joint variable message format (JVMF – "text messaging"). These technologies enabled command teams who were miles away from tactical operations to remain engaged and informed as dynamic events unfolded within their battle space. At times, however, these technologies provided a false sense of situational awareness to these decision makers. As real-time communications technologies improve, commanders tend to retain additional tactical control of their elements. Many decisions that would traditionally be made by an air mission commander (AMC) from within the tactical element are now deferred to the TOC, or higher. These fundamental changes to command and control can be beneficial in that high risk decisions are made at the appropriate level; but conversely, they can lead to confusion and inefficiency on the battlefield.

Blue Force Tracker, SATCOM, and the ability to text message between tactical and command elements have fundamentally changed warfare. Prior to over-the-horizon radio communication, aviation commanders had no ability to monitor and control their battle space once aircraft departed line-of-sight radio range. At that time, the AMC had total command authority within the confines of the mission flight. Typically, AMC decisions fell within the breadth of their mission brief, but when unplanned contingencies and mission changes occurred, an AMC, as the on-scene commander, made final decisions on how to proceed. As SATCOM, BFT, and JVMF became readily available to the fleet with the modernization of army aircraft, commanders in the rear finally had a tool to monitor and control their forward elements in real time. As unplanned and potentially higher risk events unfolded, rear commanders were able to keep risk decisions at their level. Technology has shifted the AMC role to that of a command advisor versus a mission commander.



For Better or Worse

Communications technology will continue to advance and be utilized in Army combat systems, to include aircraft. Higher headquarters will be increasingly able to manage tactical operations that have traditionally been commanded at the tactical/maneuver level. This is an indispensable tool, enabling appropriate levels of command to purposefully assume risk during dynamic operations, versus being advised of the risk they assumed due to the independent decisions of their subordinate commands, to include flight crews. It does, however, present the often irresistible temptation to micromanage the battlefield, robbing subordinate leaders of critical decision making experience, while training them to defer to senior leadership when any decision is required.

In what way is the capability of instant communications going to affect leader development within Army Aviation? Is this the path that we want technology to take us?

Who is Directing the Operation?

Text messaging opens the door for lower ranking TOC members, such as radio operators, to redirect and command aviation assets on the battlefield. Text messaging between the TOC and aircrews in Afghanistan created several instances where mission retaskings were delivered via text to the cockpit. At times, these messages were contrary to the aircrew's understanding of their mission tasking. The ability to text is an excellent tool in areas with poor SATCOM voice coverage and reduces frequency congestion. In its implementation on our deployment, we were often unclear as to the source of a message from within the TOC, raising security and authenticity concerns. Was the lower enlisted radio operator redirecting us based on his understanding or opinion of what we should do, or was it the clear intent of the battle captain to exercise a specific course of action? More than once, we were forced to resort to other means of communication to clarify who was actually issuing the order.

Standardized procedures for using text in communicating between elements regarding mission changes and retaskings would greatly reduce confusion and alleviate doubts amongst aircrews as to the source and intent of a TOC directed mission change. There should be no anonymity in messaging between elements. A message must have behind it a person with appropriate authority to direct its implementation. Standardized procedures and simple abbreviated call signs for texting would eliminate confusion.

The Armchair Quarterback

In high stress dynamic situations, decisions made from the safety of the TOC are often based on incomplete information. Critical moments can be lost while basic information is restated and clarified between elements.

During our time in Eastern Afghanistan there were multiple occasions where outposts were under attack and no one had a clear idea of what was happening until aircraft were overhead. For example, an outpost had been attacked and overrun; some personnel were killed inside the compound and several Americans had escaped down the mountainside to the village below. We arrived at the nearest forward operating base (FOB) and prepared to insert reinforcements and assist the wounded as required.

While the Black Hawks were on the ground awaiting reinforcements, the attack helicopter element had established overhead fire superiority at the outpost and the surrounding terrain. They could see several bodies scattered about the outpost and it was unclear if any were alive. At a critical juncture, the AMC determined that if the assault aircraft were going to action the target, the time was now, due to the lull in ground fire. We then advised the TOC over SATCOM of our intention to infill reinforcements, who would then reestablish control and assist any wounded. We were ordered to stand down and wait.

Our command was unwilling to commit potentially vulnerable assault aircraft to the landing zone at the outpost while it was still under fire. To add to the confusion, the ground force commander (GFC) at the small FOB where we were staged had kitted up for combat and was aboard one of the Black Hawks yelling at the crew asking them what was going on and why they weren't taking off. The aviation TOC's refusal to allow the maneuver team AMC to act within his best judgment, and seize the moment was potentially affecting lives at the outpost. Additionally, the GFC could have better communicated his intent had he been directing his assets and requesting specific helicopter support from his TOC rather than isolating himself from his strategic responsibilities aboard a grounded helicopter in a noble attempt to assist his men. After much delay and confusion, the Black Hawks were finally allowed by our command to depart for the outpost. It is not known if an earlier infill would have resulted in any saved lives. Several Afghanis and Americans were killed in the attack.

The Army must train and then trust subordinate leaders to make good decisions and have tactical control of their maneuver teams. This is especially critical when lives potentially hang in the balance. It is unthinkable that a GFC leader would require rear-echelon approval for his every action during a fire-fight. He is expected to make decisions and execute his duties. Aviation assets are extremely expensive and difficult to replace both in terms of men and equipment, which results in the aviation community being very risk conscious and at times risk adverse. It is understandable why commanders are hesitant to relinquish control over their assets to the on-scene AMC when high risk contingencies arise. An AMC is selected by the commander for each mission for all of the reasons stated in Army Regulation 95-1, paragraph 4-20. The AMC must be in a position to make command decisions for a flight; otherwise his position is largely symbolic.

The Time to Decide is Now

Overall, the implementation of modern communications technology is indispensable on the battlefield, improving situational awareness and allowing critical information to be passed in a timely manner. At times, however, it becomes a hindrance to mission success, with rear echelon command elements or their subordinates making mission decisions that are best left to AMCs who are actually in the fight. The time to consider the implications of this advanced technology is before it arrives in the unit as an AH-64E, UH-60M, CH-47F, or OH-58D (R). The time to decide whether the AMC is capable of performing the function as assigned is when he is appointed for the mission.

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Acronym Reference

AMC – air mission commander	**JVMF** – joint variable message format
BFT – Blue Force Tracker	**TOC** – tactical operations center
GFC – ground force commander	**SATCOM** – satellite communications

CH-47F Operations in an Evolving Contemporary Operating Environment

Driving the Need for Improved AMC Development Training

By CPT Gabriel Lucero
and MAJ Jason Raub

CH-47F air mission commanders (AMCs) face increased complexity in today's contemporary operating environment (COE). This increased complexity requires an improved approach to train AMCs prior to operational deployments. In Afghanistan, the CH-47F has quickly become the ground force commanders' ideal air assault and movement platform. The COE in Southern Afghanistan has CH-47Fs simultaneously performing three distinct, complex missions. The first mission is direct support to highly trained special operations forces (SOF). The second is two-ship deliberate operations with conventional units often utilizing high local-national partnership ratios. The third is air movements (general resupply, troops movements and retrogrades). Aviation unit AMC training programs need to evolve to account for today's COE. The 2nd Battalion, 3rd General Support Aviation Regiment (Task Force Knighthawk), 3rd Combat Aviation Brigade (CAB), 3rd Infantry Division uses mission command as the framework for developing and certifying AMCs. This has proven to ensure the appropriate level of command presence, nested commander's intent, and trusted decentralized execution of today's complex aviation missions.

Company and battalion AMC training programs need to place the same level of emphasis on developing future AMCs as is placed on developing platoon leaders and junior non-commissioned officers. In today's COE, CH-47F companies must be fully prepared to launch eight aircraft per day. Typically, half will support general support mission with multiple lifts in support of forward operating bases. Two aircraft will support an infiltration/exfiltration of a group of Soldiers in deteriorating weather conditions and an evolving ground tactical plan due to actions on the objective. The last two aircraft will support a SOF team to prosecute a time-sensitive-target on an extremely short planning timeline. Meanwhile, two aircrews will conduct an air mission coordination meeting for a two-ship air assault 72-hours prior to execution. These simultaneous operations require competent AMCs who can execute the mission safely and meet the commander's intent.

The 3rd CAB describes the responsibility of AMC in this way, "AMCs exercise mission command as an extension of the BN/SQDN [battalion/squadron] Commander's authority. Therefore, it is essential the manner in which our AMCs operate is thoroughly nested in the BN/SQDN Commander's intent, and is in keeping with how the BN/SQDN Commander visualizes the Operating Environment." Additionally, every aspiring AMC must complete a checklist of training requirements prior to consideration for the position.

Army Regulation 95-1 is less prescriptive, "When two or more aircraft are operating as one flight, the unit commander will designate one of the rated crewmembers of the flight as an air mission commander to be in command of all aircraft in the flight. The designation of air mission commander is an assignment of command responsibility and is not an aircrew duty assignment. AMCs will be chosen based upon recent aviation experience, maturity, judgment, [and] their abilities for mission situational awareness, the understanding of the commander's intent and not necessarily upon rank/grade."

The key concepts in both of the descriptions of an AMC are how the commander "visualizes the operating environment" and that AMCs "understand the commander's intent." Commanders at every level from CAB commanders to AMCs must have a common vision, and that vision must be over-communicated in order to leverage every possible form of communication. However, AMCs must receive training before a mutually shared common vision can occur.

AMC training programs need to take a two-step approach that includes mission command academics and application of AMC theory. The first step, mission command academics, should emphasize

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the tenants of mission command and a detailed explanation of Army Doctrine Publication 6-0, *Mission Command*. The second step, application of AMC theory, should emphasize mission command in practice by way of live, virtual, and constructive (LVC) training scenarios. The scenario design should reinforce the theory of mission command and provoke situations where AMCs must display a thorough understanding of commander's intent.

The most effective way to teaching mission command theory is by holding a series of informal seminars. This style invokes dialogue between the commander and AMC. The goal of each seminar is to lay the fundamental groundwork, increase understanding of doctrine, and provide AMCs a common and codified language for continued discussion. Commanders must consider the fact that many AMCs are instructor pilots, senior pilots-in-command, and leaders within the organization who will be busy with pilot progressions and leading the unit. Scheduling and de-confliction are critical since this training requires all AMCs and prospective AMCs attendance.

The second step to training AMCs is mission-based scenarios with a focus on application. The most effective method to teach AMC application is LVC training and roundtable discussions. LVC training serves as a great opportunity to conduct AMC training and is time and cost-effective. Aviation units can easily use the Aviation Combined Arms Tactical Trainer or Virtual Battle Space 2 to construct the LVC scenarios. These virtual systems allow for maximum flexibility, unlimited customization, and record/playback functions for after action reviews (AARs).

AARs are the most important aspect of teaching AMC application. The AAR should focus on how AMCs visualize the commander's intent at each decision point during mission execution. Commanders should confirm if the decisions made by the AMCs meet their intent and use the decisions as teaching tools shared with all AMCs. The output of AARs conducted in this manner is twofold, AMCs feel empowered to exercise disciplined initiative in future mission execution and commanders gain trust in their AMCs. The final step following the exercise and AAR is to establish a feedback loop between the commander and AMC; consequently, this also establishes a culture of trust and learning within the organization.

Task Force Knighthawk accomplishes this by conducting monthly AMC "round table" council meetings. These meetings use archived scenarios from actual missions to serve as topics of discussion. The scenarios describe difficult AMC-level decisions and provoke analysis and in-depth dialogue among all battalion AMCs, company commanders, and the battalion commander. This reinforces continual growth, empowerment, and trust while ensuring unity of command and company and battalion intent. Armed with a clear understanding of the commander's intent and empowered with command authority to accomplish their assigned mission, AMCs are fully prepared to fulfill their duties in future missions.

The current COE is complex, decentralized, and the decisions made by AMCs often have strategic implications with little margin for error. Using mission command as a framework for training AMCs is an effective way to prepare AMCs for exercising command authority in today's fight. Commanders must view AMCs as an echelon of command and thus put the same amount of leader development in them as they do with platoon leaders and NCOs. This will produce thinking AMCs that plan and conduct missions within the commander's intent while exercising a common vision. Aviation leaders must increase emphasis on AMC development as the COE becomes increasingly more complex.

[1] 3rd CAB Standard Operating Procedure
[2] AR 95-1

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MAJ Jason Raub is the 3rd CAB Executive Officer at 3ID, Hunter Army Airfield, Georgia. He recently served as the 2-3 General Support Aviation Battalion Executive Officer and Operations Officer in the 3rd CAB. Additionally, he served as an exchange officer in the Canadian Air Force. He has 18 years of service, three deployments to Afghanistan and one deployment to Iraq. He has logged over 1500 flight hours and is a qualified CH-47D/F Instructor Pilot and qualified in the CH-146 Griffon..

Acronym Reference

AMC - air mission commander
COE – contemporary operating environment
SOF – special operations forces
CAB – combat aviation brigade
BN – battalion
SQDN – squadron
AR – Army regulation
LVC – live, virtual, and constructive
ADP – Army doctrine publication

DEVELOPING ADAPTIVE AIR MISSION COMMANDERS

"Adaptability is an effective response to an altered situation." - John Tillson[1]

By LTC Scott Halter

It's Friday afternoon on an Army post and Soldiers are filing into the battalion classroom for what they expect to be another few hours of power point briefings to comply with more of the many Army training requirements. These training events may be part of our environment that is too frequently focused on inputs.[2] Often the driving question becomes, Was the "training" conducted and documented? We track metrics of completion, but in the process we may be missing the point of the training requirement. More importantly, we could be failing to develop the Soldiers and future leaders of our Army.

There is a better way of meeting training requirements – focus on achieving outcomes during training events. What is it we expect our Soldiers and leaders to be able to do and why? How do we know when they have achieved that outcome? In some cases, tasks, such as base task list maneuvers for Army aviators are easy to define and measure. These are structured tasks that are simple and controlled. Whether it is an emergency procedure or entering a holding pattern, these events can generally only be accomplished one correct way. To make things easy for our aviators, we have developed checklists so that they do not have to memorize critical steps in the procedure. However, many of our training requirements are more complex, and thus should be more challenging. As a practical example for those in Army Aviation, developing air mission commanders (AMCs) is a defined requirement. Army Regulation 95-1 states "When two or more aircraft are operating as one flight, the unit commander will designate one of the rated crewmembers of the flight as an air mission commander to be in command of all aircraft in the flight. The designation of air mission commander is an assignment of command responsibility and is not an aircrew duty assignment. AMCs will be chosen based upon recent aviation experience, maturity, judgment, and their abilities for mission situational awareness, the understanding of the commander's intent and not necessarily upon rank/grade." Developing leaders with good judgment, acute situational awareness, and understanding of intent is slightly more challenging than teaching an aviator to conduct a day visual approach.

There are many avenues for growing great AMCs in an Army with an uncertain future. When our more senior aviators are instructing, they often model competence for junior pilots-in-command to emulate. Another method is to design larger training events with specific AMC development opportunities woven into realistic tactical scenarios to build leaders. There are, of course, the dreaded classroom power point briefings on the assortment of topics all professional aviators are required to know. These briefings do nothing to develop current or future AMCs with the adaptive decision making abilities needed in combat. Briefings simply do not change behavior or habits. There is another alternative, among many others, that is neither unique nor original – tactical decision exercises (TDEs).

Theory Behind Tactical Decision Exercises

The genesis behind the AMC TDE concept detailed below was gathered from two primary sources. First and foremost is Don Vandergriff's exceptional work on developing an Adaptive Leader Methodology in his book "Raising the Bar - Creating and Nurturing Adaptability to Deal with the Changing Face of War."[3] This seminal work is being used throughout the Army today, as well as in many other institutions. Applying Vandergriff's concepts, Major Chad Foster then successfully developed and used TDEs as an instructor at West Point.[4] His work informed the design of the AMC TDE.

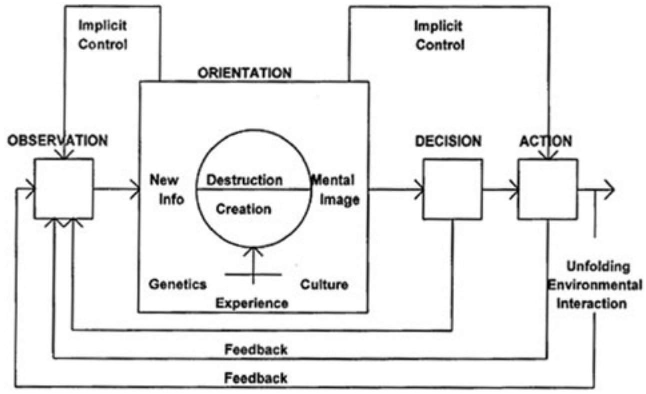
AMCs are chosen for their sound judgment under pressure in a time-constrained environment. Checklists and long analytical processes serve little purpose to these leaders in flight. AMCs must possess the ability to see the battlefield, size up the situation in the blink of an eye, and make the best decision in the given circumstances. This is what Clausewitz referred to as coup d'oeil or what we know as intuitive decision making.[5] The training challenge for aviation leaders is to develop an individual with this intuitive judgment – an adaptive AMC who can "experience the situation in a changing context, recognize the pattern of the problem from personal knowledge and experience, and implement a solution."[6]

Intuitive or adaptive leaders make choices based on two primary factors. The first is knowledge. This is a combination of self-development and received information. AMCs' study of their airframe, other aircraft and supporting systems, aviation related rules and regulations, doctrine, and other factors on the battlefield is never-ending. Their inquisitiveness is supported by an aggressive staff that seeks to paint the evolving picture of the operational environment. Good staffs provide detailed context to an often vague situation. Combined self-development and supporting data and analysis support a leader's ability to make a sound, informed decision. But information and study alone are insufficient to improve AMC decision making abilities. What is needed is an ability to identify a problem and link it to possible solutions.

Personal experience drives decision making. Some experiences are more formative and some are more relevant than others. Our experiences in aviation create frames of reference for what could be, should be, or would be based on the situation presented. The sum of our experiences informs every decision we make.[7] As leaders in aviation, we rely greatly on our previous events, particularly our early formative ones, to orient our judgment in the cockpit. Our intuition is based on this. The goal of AMC TDEs is to provide experience—good, sound experience—as a reference when the time comes to make a decision when lives are on the line.

But good experience is not enough if the context changes. We do not want AMCs that can just apply solutions to problems. We want AMCs that can identify problems within a new context and develop a new and appropriate answer. This is an important point particularly as the Army attempts to rebuild our combined arms maneuver capabilities. Providing the experience via the TDE is a tool to reach the training outcomes. No one experience will ever perfectly repeat itself – our world is too complex. The TDE exercises the student's decision cycle neurons to build the connections necessary for intuition to work at a high rate of speed in the future.

TDEs are tactical scenarios that force AMCs through decision cycles that they may encounter during future combat operations. Understanding the basic observe, orient, decide, and act (OODA) loop, as articulated by John Boyd, is a critical aspect of the TDE, because it allows AMCs to experience multiple iterations in a safe environment – to fail without failure. AMCs in-training first make an Observation by receiving the context of the situation verbally and visually. Next, they Orient on the situation by attempting to determine the problem within the given situation. Here, the student is identifying patterns from previous experience (if any) and tries to make sense of the situation. Finally, the AMC must make a Decision and then Act on what they decided. Implicit in this model is the feedback loop in which the AMC must constantly re-observe the situation and continue the cycle. Each OODA loop experience provides a mental model for reference in future decisions. Additionally, the OODA loop provides the outline for the AMC TDE.



COL John Boyd's (USA, Ret) OODA Loop

Sample AMC Training Outcomes and Measures of Effectiveness

For TDE mentors to lead the training well and for the overall success of the AMC TDEs, careful thought must go into developing the desired outcomes. Just as important to each outcome is determining how you will identify if an outcome is being reached. When dealing with the intangibles of leadership, this can be a daunting task. Below is a list of three outcomes and their associated measures of effectiveness for AMC training.[9]

Outcome #1: AMCs are able to effectively analyze the problem – the threat and other risks for an operation.

- AMCs can assess enemy capability based on the given context as well as their own understanding of the operational environment.
- AMCs take opportunities to exploit enemy weaknesses while evading enemy strengths and can explain why.
- AMCs can articulate plans that identify and consider the capability and limitations of all airframes - demonstrating an understanding of the effects of terrain, weather, power, range, speed, and all other pertinent aviation factors and why they matter.

Outcome #2: AMCs are able to make decisions that account for the context of the situation, adhere to commander's intent, and can communicate that decision to their flight.

- AMCs can clearly define a successful end-state for an operation that aligns with the higher headquarters commander's intent.
- AMCs can assign tasks that make sense in terms of accomplishing their intended end-state for the operation.
- AMCs can identify, request, and integrate supporting assets to assist in safely completing the mission.

Outcome #3: AMCs are adaptive thinking tactical leaders that understand strategic effects.

- AMCs understand, and can explain, why a decision is a starting point to adjust from as the context evolves.
- AMCs can quickly develop and successfully communicate changes to their flight based on an evolving context.
- AMCs can connect tactical decisions to potential strategic consequences.

Sample Scenario

- **MISSION:** You are operating as the AMC for a flight of four aircraft (2 x Mi-17 and 2 x AH-64D) conducting a daytime post-mission extraction of an un-partnered Afghan Army platoon. You are tasked to escort the Mi-17s to the extraction location and return the platoon to Combat Outpost (COP) Walker. Your threat assessment from the S-2 is moderate with the primary threat being small arms surface-to-air fire directed against aircraft. Weather is forecast as skies clear with unlimited visibility and wind calm. After extracting the platoon and while enroute to the COP, you receive an update from the task force command post that a human intelligence source has reported an enemy force will attempt to conduct a large scale attack on COP Walker in order to take advantage of the absence of the Afghan Army platoon. You, as the AMC, have 2 minutes to decide what action to take.

- **FRAGO:** Upon arrival you confirm that COP Walker is under attack. You observe heavy enemy machine gun, rocket propelled grenade, and mortar fire against COP Walker. You are able to clearly identify the locations for the sources of these fires. You also see red smoke on the Mi-17 landing zone. No aircraft in your flight can establish communication with the Afghan Army elements on the ground. You, as the AMC, have 30 seconds to decide what action to take.

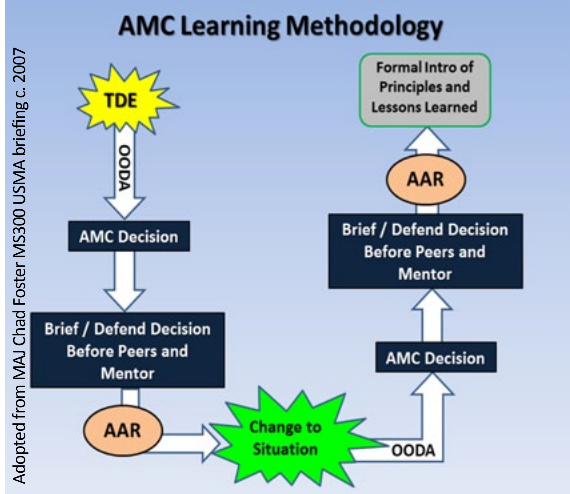
Executing the AMC TDE

The basic methodology of this training is outlined below.[10] The two key elements of this training are the mentor and the creation of the TDE. The mentors are our most senior AMCs that understand the learning methodology to ensure outcomes are reached. All AMCs are not equal and these senior AMC "Mentors" are distinguished by their wealth of operational experience, a keen understanding of the operational environment, and demonstrated fluency in combined arms maneuver and wide area security. The AMC Mentors have a working knowledge of the capabilities of all types of aircraft, as well as other systems employed on the battlefield. Additionally, an AMC Mentor consistently demonstrates an exceptional level of maturity and judgment, earning the trust of the formation. Mentors must be more than just the best AMCs. They must completely buy into the TDE design and application. They must have a clear understanding of how decisions are made and how to shape the learning experience through the Socratic Method to reach the outcomes needing to be practiced and validated. If this is not done, then the TDE may fall flat and not reach the appropriate level of depth to build the connective tissue for future reference.

Mentors brief the TDE to the junior AMCs and AMCs in-training, facilitate learning during, and most importantly, after the TDE with the after action review (AAR). Additionally, each TDE is designed to meet the desired outcomes with the learning principles that are embedded within each measure of effectiveness. This requires time and careful crafting of the scenarios to provide enough realistic context to drive the learning experience. Rehearsals between the AMC Mentors are necessary to ensure clarity of delivery, identify gaps of information, verify that the necessary visual aids are useful, and develop the proper probing questions.

When executing this training, it is extremely beneficial to divide the formation into small groups of aviators with a variety of qualifications and backgrounds (no more than eight per group). The Mentor begins by choosing an AMC for the TDE and reads the situation to the group. The situation includes the context of the situation (enemy situation, to include weather and terrain, friendly situation, and the commander's intent for the mission given) and a visual aid (small sand table, map, or concept sketch). Then, the Mentor gives the student, and only the student, two minutes to ask questions and develop a course of action. What questions the student asks are key to the learning experience. At the end of the allotted time, the student must answer the question - What are you going to do?

The next step is when the learning really begins. After providing a course of action, the student must explain why he made such a decision and defend it with his peers, who, in addition to the Mentor, also provide their critical perspective. As the discussion evolves, the Mentor guides the students toward the outcome as needed. Following a productive discussion, the Mentor injects a significant change to the situation that alters the decision made by the student. Given just 30 seconds, the student must develop and again defend his decision. At the end of this 15-20 minute exercise, the Mentor wraps up the discussion with a review of the principles (measures of effectiveness) that the student applied during the training. These experiences are learning events where students truly begin to understand tactical concepts and principles.



Conclusion

As the Army transitions from a continually deploying force to a force of rotating readiness, while also adjusting budgets from unconstrained to austere, we must find ways to effectively develop the next generation of leaders. We must define what we want to accomplish with our limited time and money and design training to support those outcomes. By defining how we will know when we reach those outcomes, we are actually investing in our leaders. The proposed AMC TDEs outlined above are an example of what can be done for any training objective. It is inexpensive with a high payoff. The payoff in this case is adaptive Air Mission Commanders.

Back at that same Army installation later on that same Friday afternoon, after 90 minutes in the classroom, the training is complete, but the aviation leaders are not quick to file out. They are energized from the six separate TDEs they just experienced with their peers and AMC Mentors. There was no power point presentation, just discussion in which everyone gained knowledge and new frames of reference for their upcoming deployment. They appreciated the opportunity to participate, collaborate, and learn. They also take with them a dynamic training example to emulate at future assignments.

ENDNOTES:

1. As quoted by Donald E. Vandergriff, Raising the Bar - Creating and Nurturing Adaptability to Deal with the Changing Face of War, World Security Institute's Center for Defense Information, 2006, Washington, D.C., page 43.
2. Leonard Wong, "Stifled Innovation? Developing Tomorrow's Leaders Today," Strategic Studies Institute (April 2002), Carlisle, PA, pages 6-19.
3. Donald E. Vandergriff, Raising the Bar - Creating and Nurturing Adaptability to Deal with the Changing Face of War, World Security Institute's Center for Defense Information, 2006, Washington, D.C.
4. Chad Foster, "Military Science S300: Course Overview," United States Military Academy, Department of Military Instruction, c. 2007.
5. Carl Von Clausewitz, On War, Michael Howard and Peter Paret, eds. and trans., Princeton, NJ: Princeton University Press, 1984, p. 102.
6. Vandergriff, page 45.
7. Stephen J. Gerras and Leonard Wong, "Changing the Minds in the Army: Why it is so difficult and what to do about it," (October 2013), Strategic Studies Institute, Carlisle, PA. page 16.
8. David S. Fadok, "John Boyd and John Warden: Air Power's Quest for Strategic Paralysis," School of Advanced Airpower Studies, Air University Press, Alabama, page 16.
9. These outcomes and measures of effectiveness were developed with the help of Major Chad Fosters original work for the MS S300 course at USMA referenced above.
10. This TDE design was modeled after the work by Donald E. Vandergriff, "From Swift to Swiss: Tactical Decision Games and Their Place in Military Education and Performance Improvement," www.ispi.org February 2006

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The Continuous Adaptive Learning Model in Army Aviation

By DAC Shannon Stewart

It was nice to have a break between classes due to the government shutdown which resulted in sending all of the UH-60M Instructor Pilot Course (IPC-M), Class 14-001 students back to their home installations for the months of October and November. There was plenty of time to design and order graphic training aids for our classrooms, draft the next significant change to the Flight Training Guide, restructure the student computer and docking station configurations for optimal productivity, and to implement some long overdue changes to the way we distribute training materials and share knowledge with students in and outside the classroom. The additional two weeks of Christmas Exodus provided even more time for reflection and anticipation for the possibilities of progress in the year to come.

I started reading TRADOC Pam 525-8-2, The U.S. Army Learning Concept (ALC) for 2015 on several occasions in the previous year. I was able to retain and regurgitate a reference to 21st Century Soldier Competencies but had never actually read the text to a productive level of comprehension. The very problem, in fact, with the way the Army has approached institutional learning in the past and one of the problems that ALC 2015 was written to address.

We, as instructor pilots, have always sat across from our students and have attempted to reinforce the knowledge that they bring with them from the academic branches in our programs of instruction and, for graduate students, the additional knowledge that comes with them from their experiences in the operational Army. We use the Aviation Instructor's Handbook, FAA-H-8083-9A, and we're expected to possess a basic understanding of a number of topics ranging from Human Behavior to Learning and from Teaching Methods to Higher Order Thinking Skills. I would submit, however, that as a group of professionals our own mastery of instructing fundamentals rests at the most basic level of learning.

There is a significant problem with the "leading change" mentality that has taken over at the higher echelons of training development in Army Aviation. All the developers and staffing mechanisms that are currently in place do not have any chance of producing "effective change" until these mechanisms are manifested inside the classrooms and on the flight line with the end user - the instructor and the student. This implies that instructors across the entire spectrum of aviation training need to be educated on the intent of the Army Learning Model and their own course content needs to be regulated to guarantee compliance. An example that comes to mind is my current organizations' digitization initiative. As if it was a knee-jerk reaction to a command directive to use Army Knowledge Online (AKO), we all attended the mandatory 3 hour block and made sure that we signed a roster to prove it. Although digital literacy is an important component of the 21st Century Soldier Competencies cited in the concept, our classroom training consisted of approximately 3 hours of hands-on familiarization without a single practical application pertaining to our roles as instructor pilots, our students, or our course content. As a result, the year concluded without any change or effect on training at the student/instructor level.

I would never have taken the time to read ALC 2015 if it had not been recommended from a DOTD insider. As an instructor at the flight line, I had no idea that this publication even existed. Furthermore, I had absolutely no incentive for reading the publication outside of my own curiosity and desire for improvement as a flight instructor in TRADOC. I would never have had the time to study, assimilate, and find application for the concept without several hours of downtime, I will add, courtesy of IPC-M 14-001 (non-conduct). Even having read the document, it was obvious to me that it didn't exactly provide the clearest picture of the Continuous Adaptive Learning Model in itself. I searched and found the source of ALC 2015 in TRADOC Pam 525-3-0, The U.S. Army Capstone Concept; and TRADOC Pam 525-3-1, The U.S. Army Operating Concept.

I was already looking for ways to improve IPC-M by ordering updated graphic aids from the Training Support Center. Other areas of modernization included a request for Wi-Fi in the classrooms and on the flight line to facilitate the use of mobile devices; a request for an Apple TV to enable academic interaction in the classroom that would allow instructors and students to use engaging technology for academic training without logging in to a briefing computer or fumbling with the controls on a projector; and establishing folders for key training

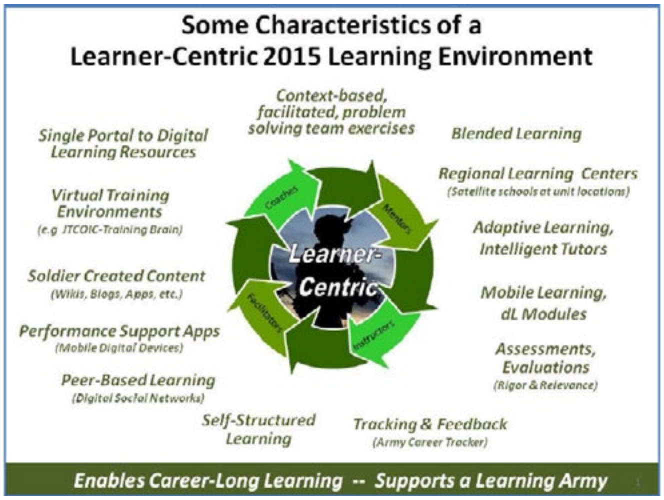
events containing digital push notifications for the timely and relevant distribution of information. As I continued to search for application in the main points in the Continuous Adaptive Learning Model, I relooked at the Hip-Pocket Training topics for IPC students and decided to allow them to control the content on specific training days now designated for Observations, Insights, and Lessons Learned. I established a collaborative learning exercise in which students would delve deeper into our standard common references, augmented with their unique operational experiences, to develop training plans for notional deployable aviation units.

When I asked each student from our most recent IPC class, 14-002, for an email address none of them provided an AKO address. When I ask each of the students if they use AKO personally or if they use it in their units I hear a resounding “No.” The reason they give is the convoluted nature of the system which is further inhibited by a lack of training in their units and throughout their military careers. Army e-learning is becoming a part of the “blended norm” and I’m sure that professional military education will continue to adapt and correct these training oversights as part of the broader implementation of technology-delivered instruction. I have, however, found relevance for many AKO applications that we are using now. For instance, we provide a briefing for students to educate them on the features of AKO and milSuite and we provide them with suggestions for applying those features not only in and outside the classroom, but as a platform that contributes to their career-long learning as well. Students are required to create a working group on AKO and list the other students as users/authors. Each student can use AKO for its intended purpose as a medium for collaborating and sharing FOUO documents and information. The end result with the instructors and students in IPC-M is that our digitization initiative is capitalized upon and “effective change” and modernized, adaptive learning is taking place. This approach is far more desirable than the information hoarding “knowledge is power” attitude that permeates our community.

One of the biggest obstacles to The Continuous Adaptive Learning Model is the non-adaptive cadre of both institutional and operational flight instructors. The “my way or the highway” approach will not always work for graduate level flight training and does not support the Learner-Centric Environment prescribed by TRADOC. A huge effort is under way, prescribed by the Army’s Framework of Concepts, to “blur the lines distinguishing the operational army from the institutional army.” Generational and Learner Differences as well as Technology Opportunities are specified in the list of Learning Environment Factors that need to be addressed. I suggest, for those who have not done so already, that they all go out and buy an iPad and learn how to use it in their individual training delivery methods. That’s how we are communicating with our students these days. That’s how our students now learn!

From the ALC 2015

The continuous adaptive learning model provides a comprehensive framework that transforms the current learning model into one that supports the development of adaptable Soldiers and leaders, provides an adaptive development and delivery system that will meet Soldiers’ learning requirements at the point of need, and can sustain adaptation during an era of persistent conflict and exponential change. It will require coordinated efforts across the Army to build a sustainable learning environment that is essential to support operational adaptability.



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Integrating ALM2015 into Flight School XXI

By CW4 Scott Morgan
and MAJ Lee Ambrose

Many centers of excellence have already begun to integrate the Army Learning Model (ALM2015) training concepts into their student curriculums. And true to its motto, "Above the Best," the Aviation Center of Excellence (USAACE) is leading the way in engaging, interactive, and self-paced courseware ahead of the 2015 deadline. One of the instructional guidelines for ALM2015 is to incorporate virtual and constructive simulations, gaming technology, or other technology into instructional plans. USAACE's 110th Aviation Brigade (AB) is on the digital forefront of this guideline and has taken lead on the development of mobile applications which are already available through the Army Aviation Interactive Multimedia Instruction (AAIMI) application portal on Army Knowledge Online (https://www.us.army.mil/suite/page/690282). But before we get too deep on how the 110th AB is integrating ALM2015 into Flight School XXI (FSXXI), let's take a quick look back to where we came from, and how we got here.

The Digital Age

Conceived in the late seventies, it was still in its infancy in the early eighties, years before many of today's Soldiers were even born. But because the digital age grew and matured quickly, many of the Army's trainees today have never even heard the rich, warm tones and distinctive pops and cracks that an analog LP makes (that stands for long play album for those born after 1980). Today's recruits, most of which belong to the millennial generation, only know the crisp, clean sound of translated strings of 1s and 0s, known as binary, or digital, code.

The sharing of that code and the information it contained during the digital age's pre-teen years wasn't easy. Disseminating information to a broad section of society remained limited to analogous means. Radio and TV, or hard copy print such as newspapers or magazines could reach large audiences; however, these mediums were rarely used for any type of training. Training occurred only in the classroom through conventional means. Teachers and trainers used blackboards with real chalk, giant transparencies with overhead projectors, or 35mm slides (not the PowerPoint kind) carefully arranged in trays sitting atop projectors tethered to a wired remote to convey ideas and concepts to their students; and only to the students in their immediate classroom. The term 'distance learning' for soldiers meant getting in their car, driving off post and an hour across town to the local junior college to attend a night class.

Of course some classrooms in the mid-eighties contained computers, but they weren't connected to anything other than the electrical wall outlet that gave them power and they sure couldn't communicate between each other, although the technology did exist. The Army, not surprisingly, was lagging behind the digital forefront. Computer use in the classroom was limited to teaching word processing, manipulating cumbersome spreadsheets, and designing complicated databases. Sharing digital information between these behemoths, for most Soldiers, required the time consuming task of exchanging floppy disks between machines, albeit never in real time, and the data was never in sync. By the late eighties, the modulator-demodulator (modem) began to take a mainstream foot-hold in the communications market. Initially, the modem was the gadget of geeks and hacks that exchanged software programs, binary images, and news articles through the use of bulletin board systems. These bulletin boards were text based systems and required certain knowledge of command line code to communicate rather than the point and click interface we enjoy today. Although the transfer of information was slow, we were finally connected. The spigot was on!

Despite some claims to the contrary by some politicians, the Internet wasn't invented at all. It was, in fact, created by the Defense Advanced Research Projects Agency (DARPA) as a fail-proof network of connected computers which has actually existed since 1969. The World Wide Web, on the other hand, which uses the Internet as its medium of conveyance, was invented by British scientist Tim Berners-Lee, and saw its introduction to the world in 1991, though network capacity and available bandwidth were very limited at the time. But the hunger for more data, along with the free exchange of ideas, and the desire for greater knowledge fed this now rapidly growing digital generation like it was on a high protein, low carb diet of 1s and 0s. Thus, in accordance with Butters' Law of

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Photonics regarding network capacity and in concert with Moore's Law regarding computing power, the information age has grown exponentially ever since.

Which brings us back to the digital present in a 4G LTE (that's Long Term Evolution, not loss of tail rotor effectiveness) age where what just happened is so 30 seconds ago. The Army, after years of lagging behind and playing catch up, has finally come of age – it's reached digital adulthood. FSXXI's embrace, rather its exploitation of the ever growing capabilities of the digital age and the rapid and efficient exchange of ideas and knowledge is what has launched its integration into ALM2015.

In short, ALM2015 (TRADOC Pam 525-8-2) is an education framework of continuous and adaptive concepts which are a radical departure from the linear military classrooms of old where the sage on the stage and death by PowerPoint ruled the day. Where students received what seemed like endless lectures from foot stomping (you're going to see that on the test) instructors followed by pages and pages of non-interactive programmed texts and practical exercises. Where the cycle of Train-Test-Retrain (if necessary)-Retest is re-ordered to a process where we test first, train if necessary, then test again, thereby sharply reducing the need to retrain-retest.

The foundation of the Army Learning Model 2015 is built upon three concepts: 1) Operational Factors, 2) Learning Environment Factors, and 3) Key Implications.

From an operational standpoint, ALM2015 seeks to decentralize training where learning modules are accessible at anytime, anywhere from any mobile device. The majority of the population already owns a tablet or smart phone, so having the ability to access unclassified mobile device friendly course material that's adaptive in real time will challenge the student to master the fundamentals of the course more quickly, with greater understanding. Then, once in the classroom, all participants will be able to capitalize on individual experiences by applying what they've learned so far through facilitator led instruction. Students will no longer be expected to depend solely on rote memorization to pass a test. Instead, by using adult learning instructional methods and self-paced instructional aids, students will be able to climb the learning pyramid quickly so they can correlate the full-spectrum of their knowledge to pass a course exam.

Learning environment factors deal primarily with generational and learner differences as well as available technology opportunities. Differences that exist for students entering FSXXI initial entry can vary from 'high school to flight school' or 'street to seat' to a West Point graduate or an E6 crew chief with years of crewmember experience to civilian rated certified flight instructors. ALM 2015 is designed to be learner centric (training that is tailored to individual needs) using learning science to recognize these generational and learner differences, and then use those disparities to everyone's advantage through technology opportunities and the operational training strategies mentioned above.

With the big shift towards training that is learner centric, the teaching focus is no longer dependent on instructor lectures but rather facilitators that guide students through the learning experience. ALM 2015 allows the facilitator to take pre-testing data, experience, and prior education, then integrate those elements into a tailored, non-linear learning environment that's both engaging and challenging. This model is adaptive, meaning it takes feedback not only from student experiences, but from operational forces so curriculums can be updated as a matter of routine, rather than a long, drawn out process.

We may never know who exactly our next enemy will be. So the key implications of ALM2015 is ensuring that our newly minted professional combat aviators are not only tactically and technically proficient, but that they can use critical thinking to act decisively across any culture in any environment; that they can exploit information technology in a rapidly evolving, mobile environment. We can do this by seizing and integrating the expertise of our seasoned professionals into mobile apps and courseware. This is a great way to engage and challenge millennials with the types of technology to which they're already familiar. And it's a sure way for them to remain competitive against any adversary in the future battlespace.

Whether students are in the initial entry phase of flight school flying the TH-67, or have moved on to their advanced track aircraft, they already have access to a variety of mobile apps across the three major mobile operating systems: iOS, Windows, or Android. The first series of mobile apps, developed for the 110th AB, is the bane of nearly every flight student: Limits and EPs. Often Referred to as '5 & 9' for the respective chapters of each aircraft's operator's manual concerning operating limits and emergency procedures, these mobile apps are more than just digital flash cards. They're interactive and engaging training aids that challenge each student through a series of exercises based on prior performance. This allows the student to build upon their previous knowledge more quickly, bypassing what they already know, and concentrating on the items they're having trouble with.

Next up is the interactive pre-flight/3-D systems modeling app. This app will allow the student to study by pre-flighting their aircraft right from their tablet device, interactively opening doors and cowlings as they move through the checklist. Then, when they get to the engine compartment or a flight control system, they'll be able to interact with that system through a 3-D model, examining components to see how the systems actually work. But wait, there's more on the future development front. Let's say a component of that system fails. The student would be able to view the appropriate cockpit indicators on their tablet, and then correlate those indicators with the failure and the corresponding emergency procedure. Did I say "correlate"? Yes, the highest level of learning. Engaged. Challenging. Self-paced. All that's left is for the facilitator or the instructor pilot to fill in whatever gaps remain in the student's learning through their own experience, or through the sharing of experience of others in the classroom.

This is just the beginning for FSXXI, ALM2015, and the 110th AB's mobile app development program. Soon, students will be engaged in planning instrument flights for training purposes through their apps or conducting route recons on their tablets through dedicated gaming apps. And we're not stopping there. With support from the USAACE Chief Information Officer (G-6), the 110th AB's goal is an all paperless cockpit. While a tactically hardened, milspec device capable of performing in austere environments may be several years off, the 110th AB, along with the USAACE Directorate of Training and Doctrine is looking at a bridging strategy that will allow the use of both privately owned and government issued tablet devices with commercial off-the-shelf apps such as Foreflight or WingX in the cockpit. Being able to carry all your maps, approach plates, Department of Defense Flight Information Publications, and checklists on a mobile device instead of lugging around bulky pubs bags is the ultimate goal. And ALM2015 is the catalyst that will help to get us there, in the digital age.

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CW4 Scott Morgan is currently assigned as the Chief of Future Operations for the 110th Aviation Brigade. He has previously served as the Executive Officer for HHC, 1-223rd Aviation Regiment and the Standardization Officer for Flatiron at Fort Rucker, AL. During his last deployment to Iraq in 2009-2010, CW4 Morgan served as both the 1st Corps and 3rd Corps Standardization Officer. During his 32 years of service, he has performed duties as an IP/SP/IE and maintenance test pilot. CW4 Morgan is qualified in the UH-60A/L, UH-1H/V, OH-58A/C, TH-67, and TH-55.

Acronym Reference

AAIMI - Army Aviation Interactive Multimedia Instruction
AB - aviation brigade
ALM2015 - Army Learning Model
DARPA - Defense Advanced Research Projects Agency
FSXXI - Flight School XXI
LTE - long term evolution
modem - modulator-demodulator
USAACE - United States Army Aviation Center of Excellence

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Additional Aviation Training Courses Pay Off Big In Afghanistan

By CSM Grant Stange

Sometimes a plan works out better than expected. With a pending deployment to Afghanistan and the anticipated combat maintenance requirements, the 603rd Aviation Support Battalion (ASB), 3rd Combat Aviation Brigade (CAB) sought to develop a plan to enhance their aviation component repair capabilities. Their plan hinged on leveraging the vast training opportunities within the Army Aviation Enterprise at Corpus Christi Army Depot (CCAD) and Logistics Assistance Representative University (LAR-U). CCAD and LAR-U epitomize the best practices within aviation maintenance as they execute depot-level repairs and prepare logistic assistance representatives for world-wide deployment. For this same reason CCAD and LAR-U are the ideal partners to develop an ASB's field maintenance component repair capabilities.

In August 2011, LTC Andy Gignilliat, Commander 603rd ASB, visited CCAD and LAR-U with a vision of establishing a battalion-internal enhanced component repair program for power plant, power train, technical inspectors, avionics repairers, and airframe mechanics. To fund his vision, LTC Gignilliat planned to use unit funds. Justifying the expense was easy. One UH-60L engine replacement would cost $456 thousand while the temporary duty cost of sending four Soldiers to CCAD and LAR-U was only an estimated $11 thousand. Using this example, leaders quickly realized the potential return on investment as multiple engines, rotor blades, and aviation components could be repaired internally while still producing quality components for Army aviators. The concept of developing a relatively small group of Soldiers to a high level of proficiency as a "train-the-trainer" cadre within their shop could save millions of dollars in flying hour program costs while enhancing Soldier technical proficiency across the aviation community.

The LAR-U Engine Course in Corpus Christi spans two weeks of academic and hands on training to develop Soldiers to a master craftsman level of expertise on the functional operation and maintenance of the T55-GA-714 and GE-T-700 series engines used on CH-47, AH-64, and UH-60 model helicopters. Soldiers learned to disassemble the engines while inspecting, replacing, or repairing subcomponents through a capability that often exceeds normal Soldier proficiency levels found within power plant component repair shops assigned to field maintenance units. The current advanced individual training course at Fort Eustis, Virginia generally provides apprentice and journeyman level maintenance to inexperienced Soldiers while the LAR-U develops experienced Soldiers with a demonstrated ability for higher learning into a skilled tradesman or master craftsman. This higher level training develops more accurate troubleshooting techniques while instilling confidence and heightened mechanical expertise. The end result for an ASB is an enhanced component repair capability with highly skilled power plant repairmen capable of training fellow Soldiers to troubleshoot and repair faults, negating the need to return aircraft engines to a depot facility. Over the course of 12 years of operations in Afghanistan, many engines were erroneously tagged as non-repairable at field level maintenance, as Soldiers became accustomed to simply replacing old engines through an ample supply of new engines within the supply system. The result, as reinforced by MG Lynn A. Collyar, Commander, U.S. Army Aviation and Missile Command (AMCOM), during his visit with 3rd CAB in May 2013, was the vast majority of engines returned for sustainment level repairs from Afghanistan over the recent years had no evidence of faults found, yet were often tagged as non-repairable due to low power. The 603rd ASB vowed early to not make these mistakes, and their early investment in training would pay huge dividends as they deployed to Regional Command-South in Afghanistan.

After arriving in theater, the 603rd took charge of maintaining a fleet of helicopters that was flown exceedingly

hard over thirty months in one of the harshest combat environments. Correspondingly, the power plant repair shop quickly capitalized on their training by diagnosing and troubleshooting engine problems across their brigade task force. The non-standard training enabled Soldiers to detect and repair deficiencies that would have previously been returned to CCAD. The repairs made during major maintenance services reduced engine-related deficiency rates and garnered the attention of the General Electric Field Service Representatives (FSR). The 603rd quickly became the prime solution to fix engines from other sources across Operation Enduring Freedom's area of responsibility. As per the 12 year norm, most of these engines were designated for return to depot repair as other units deemed them non-repairable at field level maintenance. In just over eight months the 603rd ASB disassembled, inspected and repaired 48 different engines from across the theater. If these same engines were returned to CCAD, the cost to the Army would have been more than $22 million. The unit repaired these engines at a total cost of $3.6 million: a cost saving of $19 million to the US Army.

Eventually, the 3rd CAB adjusted their on-hand stockage of engines and completely retrograded six newly repaired GE-T-701 engines to Kuwait for return to the Army supply system. Equally impressive was the fact that throughout a nine month rotation, the 603rd ASB ordered only engine subcomponents and identified zero requirements for new engine requisitions from the Army. In these times of budget constraints, these savings are astounding and serve to reinforce a sense of fiscal stewardship through quality training and technical excellence. As the 603rd ASB's efforts gained visibility within AMCOM and the FSR community, the General Electric Corporation chose to reinforce our success by rewarding the power plant mechanics the General Electric T700 Engine Maintenance Excellence Award for outstanding maintenance performance.

While budget constraints will undoubtedly remain a part of our Army's environment, focused technical training provides measurable cost savings while enhancing Soldier competence and mission readiness. The enhanced component repair training opportunities available at CCAD and LAR-U epitomize the best use of our nation's funding and ultimately cost the Army "pennies on the dollar" as the investment is realized by a well-trained group of component repair "master craftsmen." Sending select personnel to specialized courses proves to be a cost effective method of protecting a flying hour program budget while fostering the technical capabilities of an ASB.

So, was the additional training valuable? I believe the answer is an astounding YES! Looking back, the cost savings isn't only measured in dollars; it's measured through the technical excellence realized by Soldiers and those they train in the future. This is the true meaning of "priceless" as junior Soldiers carry the experience gained throughout their careers, enhancing every organization and Soldier along their path.

CSM Grant Stange is currently serving as the 603rd Aviation Support Battalion, 3rd Combat Aviation Brigade Command Sergeant Major. Previous assignments include troop/company first sergeant, platoon sergeant, U.S. Army Aviation Logistics School maintenance platform instructor and UH-60A/L and MH-60L/K crew chief. CSM Stange has deployed to Mogadishu, Somalia with the 1-160th Special Operations Aviation Regiment. He has also one deployment to Operation Iraqi Freedom and three deployments in support of Operation Enduring Freedom. CSM Stange has 25 years service.

Acronym Reference

ASB - aviation support battalion
AMCOM - Army Aviation and Missile Command
CAB - combat aviation brigade
CCAD - Corpus Christi Army Depot
LAR-U - Logistics Assistance Representative University

Aviation Tactical Assembly Area

Safety in a Decisive Action Environment

By CW3 Mark Leung

For the past 13 years of counter-insurgency operations, Army Aviation has generally conducted flight operations from an improved airfield or a large forward operating base. As the Army transitions to the decisive action training environment, units must re-learn how to establish and work out of a tactical assembly area (TAA). As intuitive and simplistic as it may first appear – it is not. Unless your unit has completed a recent combat training center rotation, TAA planning, occupying and sustaining operations are a lost art with which most of our current force is not familiar. The December 2007 version of Field Manual (FM) 3-04.111, *Aviation Brigades*, does not provide in depth doctrinal references for TAA tactics, techniques, and procedures (TTP). Until the Army Techniques Publication 3-04.14 *Aviation Tactical Employment* becomes available, an earlier version of FM 3-04.111 (dated August 2003) offers detailed TTP on TAA operations. Unit leaders are advised to review after action reviews, all available lessons learned, and best practices on TAA operations before being introduced or re-introduced to this challenging and unforgiving operational environment as it relates specifically to aircraft operations and movements.

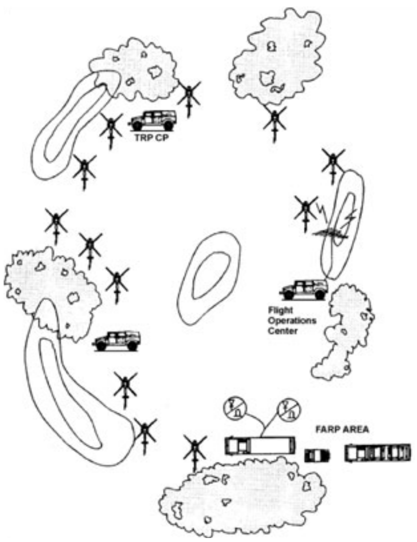
The unit aviation safety officer (ASO) must be involved with TAA planning from the outset. Starting with a map/photo reconnaissance of the desired area, a recommended initial planning size for aviation TAA should be approximately 2 kilometers by 2 kilometers. This size allows adequate space for three flight companies and three ground support companies. While this appears to be an overly large area to defend, aviation has unique needs that other types of units do not have such as forward arming refueling points, maintenance areas, aircraft (rotary-wing and unmanned aerial vehicle) parking, and adequate space for the ground movement (ground taxi or hovering) of aircraft to/from landing and take-off locations.

Parking plans should be based on the tactical threat, TAA orientation, and layout. Some units use a hexagram as a template for the TAA layout, with the flight companies making up one triangle, the ground support companies forming the other triangle, and all assets orienting outward from the center of the TAA. Initial layout of the TAA is critical. It is essential that the unit ASO be on the quartering or advance party to ensure that the selected terrain is suitable for the TAA aircraft parking and movements plan from an aviation safety perspective. The ASO should check for the following during the reconnaissance:

Tactical Situation - The TAA is a high payoff target for the enemy commander and must be protected as such. Aircraft weapon systems should be oriented outward from the TAA to provide for clear fields of fire and the ASO should verify that potential fields of fire are clear.

Slope - The proposed TAA should be relatively level. The aircraft must be able to land without exceeding aircraft operating manual slope limitations.

Surface - An area with a minimal amount of dust is preferred to reduce the possibility of brownouts, the visual signature created by blowing dust generated by aircraft rotors, and foreign object damage and contamination. Some vegetation, even in a desert environment will assist with keeping the dust down. If vegetation must be cut, leave the roots in place to "grip" the soil when possible.



Obstacles - Identify obstacles and remove or mark them accordingly.

Weather - ASOs should coordinate with supporting Air Force staff weather

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officers to determine the direction of the prevailing winds in the area, the potential of excessive run off or flooding, and consider power limiting factors (temperature and density/ pressure altitudes) when planning approach and departure routes.

Once a suitable area has been selected, the ASO must ensure the aircraft parking, maintenance, aircraft movement area within the TAA, and the landing/departure points/ procedures have been briefed to crews and, if feasible, marked for both day and night operations. Measurements of these critical distances should not be estimated and tools such as hand-held global positioning system devices or measuring tapes should be used to confirm separation between aircraft parking, reaming points, and refueling pads. If available to the unit, pathfinders offer an invaluable service to coordinating the arrival and disposition of aircraft upon landing. If pathfinders are unavailable, Soldiers detailed to the advanced party will be required to perform this function.

The frequently referenced aircraft parking distances detailed in *Unified Facilities Criteria* 3-260-01 *Airfield and Heliport Planning and Design* are not suitable for operation at a TAA. The minimum mast-to-mast distances recommended in unimproved parking areas are correctly referenced in FM 3-21.38 *Pathfinder Operations*. These are:

OH-58D	25m
AH-64/UH-60	50m
CH-47	80m

It is important that these distances be recognized as minimum separation and should be increased based on crew proficiency, environmental conditions, and illumination.

If possible, the landing and take-off area should be marked for both day and night operations providing aircrews a specific location known to be free of obstacles and providing clearance from dust and debris sensitive areas such as maintenance, mess, living facilities (tents), and operations.

Once the TAA is established, air traffic should be configured for separate arrival and departure routes controlled by a series of concentric tactical rings or common checkpoints at tactical flight profiles. Allowance for movement into and out of the rearm and refuel points must also be considered – possibly requiring departure from the TAA and re-entry on established checkpoints. All TAA traffic should be able to operate with little to no radio communication to minimize the signals footprint in the vicinity of the TAA. Flights over the TAA should be avoided to reduce the possibility of damage to or from tents, antennas, camouflage netting, and unnecessarily dusting out the TAA.

If the unit mission requires sling load operations, specific areas should be set up and marked well away from sensitive areas and away from inbound and outbound corridors, arming and refueling points, and maintenance areas. Similarly, a separate area should be established for medical evacuation missions if those tasks fall within the unit's mission essential task list.

Once the TAA is secured and operational and the unit moves into a steady state posture, the area must be continuously improved by everyone in the unit. A fighter management policy must be established with day and night cycle sleeping area considerations applied as effectively as possible in a field environment. A pre-accident plan (PAP) must be prepared and tested since the PAP that the unit uses at home station in all likelihood will not meet the litmus test in the field. A unit will likely have little to no outside support if an accident occurs, so it should look at what internal assets it has available for first responders. The PAP should include provisions for a severe weather plan and require aircraft field mooring kits to be mandatory load-out equipment. An effective field expedient to reduce the effect of the wind on parked aircraft is to use larger vehicles parked perpendicular to the aircraft as a wind break to slow the velocity of the wind prior to reaching the aircraft.

As a final note, an emergency displacement (scatter) plan should also be developed in the event of a surprise attack on the TAA. This plan will provide the opportunity to protect some aircraft from damage or destruction from ground attack and get armed aircraft into the air where they may possibly assist in countering the ground attack.

Every member of the unit must know the pre-accident, severe weather, and scatter plans. As contingencies, they may never be used, but if it becomes necessary to employ, there will be little time to react.

Planning and then occupying a TAA is not a task to be taken lightly. The initial movement into a TAA can lead to a great deal of confusion and delays in meeting mission requirements if an appropriate level of planning and preparation is not accomplished beforehand. Research of lessons learned and after action reviews, creation of a detailed standard operating procedure, and some rehearsal of components that go into planning and occupying a TAA will go far to reduce the effect of a poorly planned occupation. TAA occupation will likely be a recurring task for some time into the future. Leaders at all levels should be taking notes during each iteration and constantly working toward improving efficiencies on this critical task.

REFERENCES:

- FM 3-21.83, *Pathfinder Operations*
- FM 3-04.111, *Aviation Brigades*, Appendix D, August 2003

CW3 Mark Leung is presently serving as the Aviation Safety Officer for 2nd Squadron 6th Cavalry 25th Combat Aviation Battalion. Previous assignments include Aviation Safety Observer Controller/Trainer at the National Training Center, Fort Irwin, CA and Troop Aviation Safety Officer for 2nd Squadron 17th Cavalry, Fort Campbell, KY. CW3 Leung deployed once for Operation Iraqi Freedom and twice for Operation Enduring Freedom. He has 16 years service. CW3 Leung is qualified as an instructor Pilot in the OH-58A/C and is also qualified in the OH-58D

Combat Aviation Gunnery

By CW3 Frank D. Capri

The next generation Army Aviation gunnery training and qualification standards have been published. The legacy Field Manual 3-04.140 (1-140) has been replaced with Training Circular (TC) 3-04.45, *Combat Aviation Gunnery*. This new reference is the culmination of years of development and collaboration with commanders, standardization instructor pilots, and master gunners (MG) throughout the Active, Reserve, and National Guard components. TC 3-04.45 details a program that will increase and maintain the proficiency of all rated, non-rated crewmembers, and unmanned aircraft system (UAS) operators to effectively deliver munitions in support of a ground maneuver element.

Combat Aviation Gunnery has been developed to fully support the unit mission essential task list and the commander's intent. The gunnery program can now be tailored to effectively train and qualify aviation units thus enabling the most relevant and worthwhile gunnery training and qualification tables. This equates to a higher level of confidence for commanders and aircrews to accomplish mission essential tasks. TC 3-04.45 applies to all Active, Reserve, and National Guard aviation units.

The goal of the aviation gunnery program is to train qualified, combat-ready crews, teams, platoons, and companies/troops to engage targets while adhering to the rules of engagement, avoiding collateral damage, and preventing fratricide. Essential to these objectives are proper weapon/munitions selection, proficient employment, and accurate combat assessment. To fully realize the potential of this program, brigade and battalion commanders are challenged to fully employ their commanders, MGs, and staff to create realistic, challenging, and meaningful training and qualification events. Individual gunnery tasks are referenced from the related aircrew training manuals while collective tasks can be found in the unit mission training plans and other sources.

Commanders and MGs need to closely manage their gunnery program and the limited resources available for crew qualification to achieve target effect within the standards permitted for training and qualification engagements. This is determined by the type of weapon employed, type and size of target, and desired damage criteria (destruction, neutralization, or suppression). Tasks, conditions, and standards listed in the gunnery tables (GT) are based on a thorough analysis of gunnery engagement factors, actual suppression, neutralization, and/or kill probabilities of U.S. Army Aviation weapons systems against a wide variety of threat targets.

A major change in this version of the TC 3-04.45 is the alignment of GT with the Maneuver Center of Excellence Gunnery Standards found in FM 3-20.21, Heavy Brigade Combat Team Gunnery, and TC 3-09.8, Field Artillery Gunnery. This alignment standardizes gunnery terminology, interpretation, and execution between Army Aviation and ground components and enhances the relationship between aviation, maneuver, and fires element GT qualification events. It also standardizes gunnery qualification and sets the stage for increased inter-operability for air and ground systems across the Army.

Gunnery tables discussed in TC 3-04.45 detail requirements for individual, aircrew, and collective training and qualification for the AH-64, OH-58D, UH-60, CH-47, and UAS. Commanders are given the leeway to adapt their training plans to accommodate realistic gunnery scenarios. Some operations will require aviation units to operate independently at a team level. These task organizations may include, AH/OH/UH/CH/UAS pure teams or mixed mission design series aircraft.

Live fire prerequisite testing begins with individual weapon systems qualification and progresses through crew qualification and finally to unit collective gunnery. The unit gunnery program is progressive and continuous. It should integrate new personnel while maintaining qualified crews. This provides the commander, MG, and staff with guidance and information

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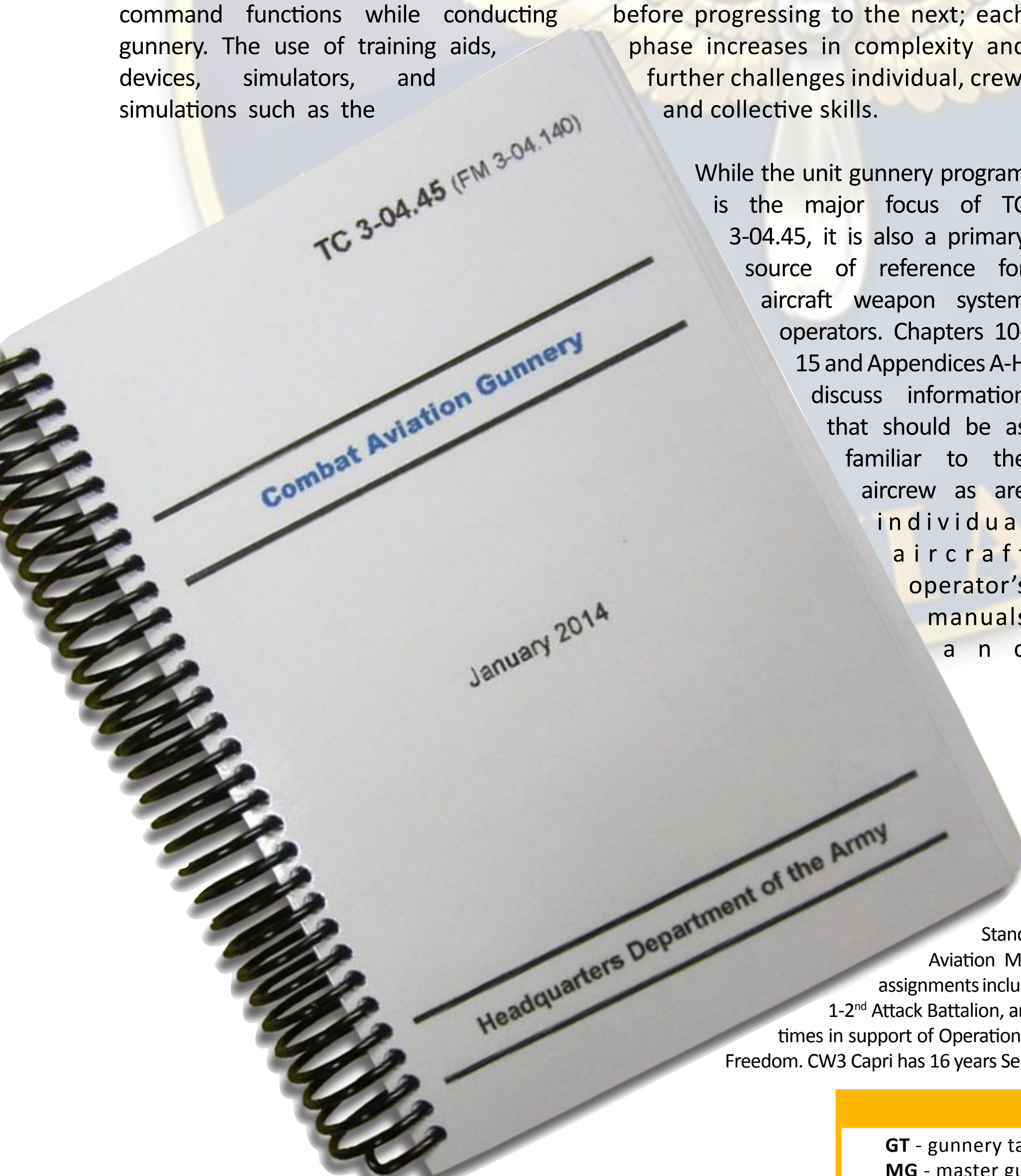
to develop and incorporate gunnery training into the aircrew training program and meet the standards in Department of the Army Pamphlet 350-38, Standards in Training Commission.

Aviation gunnery programs provide individuals, crews, teams, platoons, and companies/troops necessary training to meet weapons proficiency standards and validate the operational readiness of unit aerial weapons systems. Team qualification occurs upon completion of GT-IX, which is the benchmark qualification of the annual gunnery program. The advanced training tables (GT-X thru GT-XII) are progressively focused on the culmination of collective weapons employment and air-ground operations.

The commander exercises mission command functions while conducting gunnery. The use of training aids, devices, simulators, and simulations such as the Multiple Integrated Laser Engagement System/Air-Ground Engagement System, the Tactical Engagement Simulation Software, the Man Portable Aircraft Survivability Trainer, and the Aviation Combined Arms Tactical Trainer will enhance the collective training program and allow units to conduct realistic training that will enhance overall training and qualification value. The commander should tailor the advanced tables to meet specific unit mission and training requirements.

The program consists of a three-phase progression: individual, aircrew, and collective. This phased approach to gunnery will allow the commander to efficiently manage, train, and evaluate his gunnery program. In addition, clear determination of unit readiness can be attained for more complex training. Each phase must be performed to standard before progressing to the next; each phase increases in complexity and further challenges individual, crew, and collective skills.



While the unit gunnery program is the major focus of TC 3-04.45, it is also a primary source of reference for aircraft weapon system operators. Chapters 10-15 and Appendices A-H discuss information that should be as familiar to the aircrew as are individual aircraft operator's manuals and aircrew training manuals. Fratricide prevention, the engagement process (detect, identify, decide, engage, and assess), aircraft weapon status readiness, and fire commands are discussed to ensure critical information is available to the aircrew so that they are prepared to deliver or coordinate lethal fires and then determine the effectiveness of their actions. Further, information on weapon employment techniques and ballistic characteristics of each of the weapon munitions in the Army Aviation inventory are discussed to enhance operator skill to place first rounds on target.

Commanders are expected to approach gunnery collective training and qualification with realistic scenarios that reflect their unit mission essential task lists. A major change from previous gunnery qualifications and a significant move toward reality and the “train as you expect to fight” philosophy, these scenarios may require a mix of mission design series aircraft to complete the mission. Preceding GT XII (company/troop qualification), the unit will conduct simulation based battle drills emphasizing maneuver, weapon selection, fire distribution, and mission/battle command in GT X and then practice and reinforce those exercises in dry-fire and live-fire events in GT XI. Culmination of the unit gunnery program is with GT X, XI, and XII complete and the unit gunnery qualified.

Years in the making, *Combat Aviation Gunnery* represents the most significant move to maximize ever shrinking resources while making giant strides toward realism in gunnery training operations. Implementation of this program allows Army Aviation to truly embrace the “train as we fight” philosophy and open the doors to combined arms operations with the first steps of achieving commonality with the Maneuver and Fires Centers of Excellence.

CW3 Frank Capri is currently assigned to the United States Army Aviation Center of Excellence Directorate of Training and Doctrine's Gunnery Branch as the Aviation Master Gunner Course Chief. He has served as Standardization Instructor Pilot, Instrument Flight Examiner, Aviation Mission Survivability Officer and Master Gunner. Previous assignments include 10th Combat Aviation Brigade, 1-337th Aviation Regiment, 1-2nd Attack Battalion, and 2-101st Aviation Regiment. CW3 Capri has deployed two times in support of Operation Iraqi Freedom and once in support of Operation Enduring Freedom. CW3 Capri has 16 years Service. He is qualified in the AH-64D.

Acronym Reference

GT - gunnery tables	**TC** - training circular
MG - master gunner	**UAS** - unmanned aircraft system

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feedback FORUM

Your Articles and Feedback Compel Thoughts and Actions

Aviation Digest's Feedback Forum is where readers can see the results of author contributions, USAACE collection efforts, and the professional discussions that followed. It is an essential part of our commitment to the continuous advancement of the Aviation Branch.

Feedback Forum
Volume 1/ Issue 4 Aviation Digest
(Oct-Dec 2013 pg 45)

Army Aviation is moving in parallel with sister services in developing tactics, techniques, and procedures (TTP) based on lessons learned from other units to support maritime operations.

Aviation Branch Response:

The United States Army Aviation Center of Excellence (USAACE) Directorate of Training and Doctrine (DOTD) is continuing to develop a training support package (TSP) to help guide the training of units tasked to conduct maritime operations. DOTD envisions the TSP to be an off-the-shelf-training package that commanders can use in order to plan, train, and execute a maritime support mission. The TSP will contain academic classes for aviators, planners, maintainers, and support staff on the particular difficulties and the nuances of operating in a maritime environment. The TSP will also contain information on who, when, and how to contact the Navy to schedule assets and training. It is not intended to be a regulatory document, nor is it intended to 'qualify' aviators in a maritime environment. It is solely intended to help a commander and staff plan, train, and execute a maritime mission.

DOTD has collected input from multiple units with recent experience in the maritime environment. We are revising and editing our material to ensure we include the hard learned lessons from the field. We are also reviewing all source documents including joint publications, Navy manuals, memorandums of understanding, and Army publications to ensure only the most recent and relevant information is included. DOTD is making significant progress towards completing the TSP and expect it to be ready for unit validation by late-summer 2014.

Aviation Branch Response to the question "What is MUMT?":

The proposed definition of manned-unmanned teaming (MUMT) is "the synchronized employment of Soldiers, manned and unmanned air and ground vehicles, robotics, and sensors to achieve enhanced situational understanding, greater lethality, and improved survivability. The concept of MUMT is to combine the inherent strengths of manned and unmanned platforms to produce synergy and overmatch with asymmetric advantages." Over the last several years strategies were developed, articles written, demonstrations conducted, and numerous briefings devoted to describing the fundamental concepts of MUMT. These concepts have been employed at different levels during the last 12 years in two theaters of war and in the last three combat aviation brigade (CAB) umbrella weeks (post deployment after action reviews facilitated by USAACE) with 101st, 3rd, and 10th CABs, we have received several observations, insights and lessons (OIL) with regard to MUMT. We have also had the opportunity to observe MUMT integration at the combat training centers and mission command training programs. All of this OIL can be found in the lessons learned repository at https://www.us.army.mil/suite/page/usaace-dotd.

DOTD is currently working on the new Field Manual (FM) 3-04 Army Aviation. This manual will describe the different levels of MUMT, allocation of systems at different organizational levels, and the different types of mission tasks (reconnaissance, surveillance, convoy security, target acquisition, and battle damage assessment) for supporting the ground tactical plan. Army Techniques Publication (ATP) 3-04.14 Aviation Tactical Employment (scheduled for publication in 2015) will also contain additional MUMT information. The Training and Doctrine Command (TRADOC) Capability Manager (TCM) for Unmanned Aircraft Systems (UAS) is also leading a UAS holistic review. As part of the review, they intend to capture all lessons learned and TTP and get them back out to you in a handbook in September 2014.

Umbrella Week OIL regarding the Spyder cranes:

The widely accepted, minimum essential wartime needs for an expeditionary crane should be required and authorized on tables of organization and equipment. The Project Manager (PM) for Aviation Ground Support Equipment (AGSE) has purchased 16 cranes like the Maeda or Spyder crane and provided a support package in response to operational needs statements supporting combat deployments. The expeditionary cranes are designed to support day-to-day maintenance and be able to conduct airmobile (via CH-47) operations for downed aircraft recovery team, split-based operations, and help perform maintenance in austere locations on unimproved terrain. Units not in theater which have acquired these expeditionary cranes are struggling to keep them maintained without an approved support package.

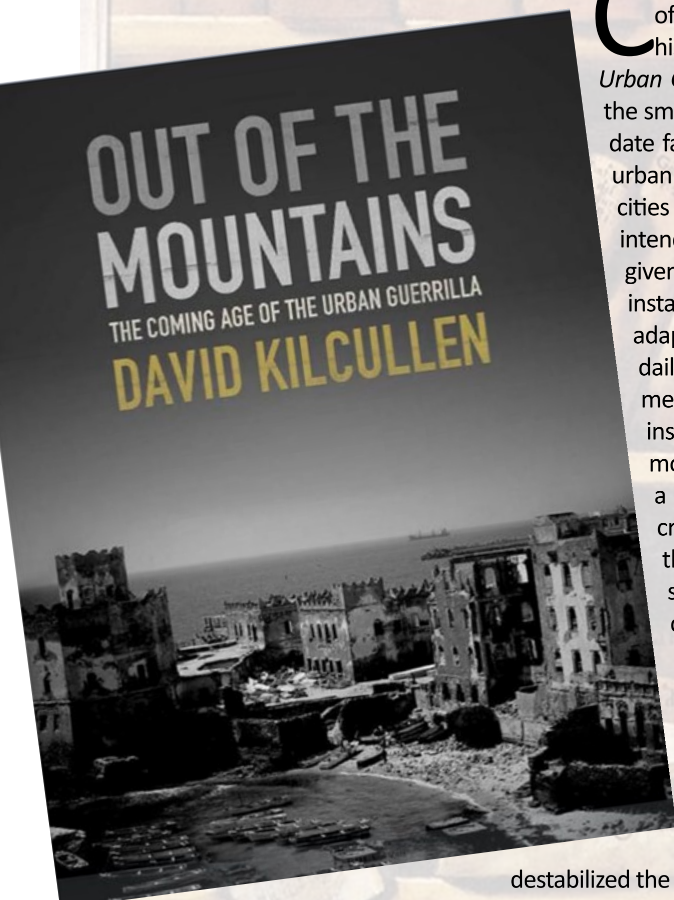
Aviation Branch Response:

TRADOC Program Office – Aviation Brigades (TPO-AB) acknowledges the need for an expeditionary crane as a required capability. The capability production document (CPD) completed world-wide staffing on March 3, 2014. The CPD includes requirements for a flightline crane (Type I [the original SCAMP or the Lorain 7.5 ton crane that has been issued in lieu of the SCAMP]) and the airmobile, unimproved surface crane (Type II [expeditionary crane e.g. Spyder crane]). TPO-AB in coordination with PM- AGSE continues to drive the SCAMP type II through the acquisition process. The expeditionary crane is projected for fielding in late FY17 or early FY18.

Out of the Mountains:
The Coming Age of the Urban Guerrilla

By David Kilcullen. Out of the Mountains: The Coming age of the Urban Guerrilla. University of Oxford: Oxford University Press, 2013.
ISBN 978-0-19-973750-5 (hardback). http://www.amazon.com/Out-Mountains-Coming-Urban-Guerrilla/dp/0199737509

A book review by MAJ Nicole E. Dean



Crowded, coastal, connected cities fighting counterinsurgencies: that's the future of combat operations according to author and veteran Dr. David Kilcullen in his recently published missive *Out of the Mountains: The Coming Age of the Urban Guerrilla*. The danger of fighting "the last war" is becoming too focused on the small towns and rural pockets of habitants in Afghani mountain valleys and Iraqi date farms, according to Kilcullen. More importantly, our failure to learn from the urban experiences of the surge in Operation Iraqi Freedom has set us up to choke cities in an effort to squeeze the insurgency, often killing the very city we were intending to protect. A city breathes, adapts, and dies like a living organism. At any given time, an urban environment will experience dynamic disequilibrium. Urban instability manifests with conflict. The best cities, the urban greats, resiliently adapt to conflicts, seeking stability for survival. The predictable ebb and flow of daily life is crucial to that resilient adaptation and survival. The drastic security measures taken, the constriction of an urban environment when battling an insurgency, often stifles the recovery process and hinders predictability. It denies movement of vital commerce and urban life-support, and it often encourages a populace to seek alternate means of stability from the insurgent leadership, creating dangerous shadow governance. All of this has led Kilcullen to examine the future of urban conflict based on his experiences in Baghdad during the surge of 2007. More importantly, he examines the future from the most likely course of enemy action: seeking a guerrilla fight in crowded, coastal cities with growing digital connectivity and burgeoning instability.

If this truly is the future of modern warfare for ground tactical and operational leaders, what does this mean to Army Aviation? How does an Attack Reconnaissance Squadron or Assault Battalion develop a standard operating procedure or company commander's task list that reflects fighting an adaptable insurgent force that is rapid-fire Tweeting from a littoral megaslum in a Pacific Rim nation, following a massive tsunami that has destabilized the legitimate government?

If nothing else, Kilcullen's theories on future urban conflict are a wake up call for Army Aviation. As we prepare to reach back to the annals of large scale conflict to prepare for enemy armor formations or brigade-scale air assaults, the lessons learned from the past decade of persistent stability operations cannot be dismissed. In fact, we must adapt our flying formations and planning staffs to think about fighting the T-72 in open terrain, as well as battling potential non-state insurgents in urban environments. The ability to plan for rapid port opening and expansion for contingency airfields, which includes deconfliction of civil and military aviation operations, will be vital to rapidly meeting the needs of a disenfranchised urban populace. The necessity of air mobility will keep friendly forces well supplied and responsive to urban civil needs, preventing further decay of stability in the wake of natural disaster or man-made conflict. The understanding and management of social media and digital connectivity will prevent leaked attack aircraft gun tape from becoming a hindrance on the World Wide Web, rather than a crucial learning tool for aerial gunnery. How will aviation planners and leaders become aware of competitive control organizations attempting to undermine legitimate governance, like gangs or warlords, in an urban environment through the insertion of surreptitious normative systems in megaslums? The closer the ties to ground forces facing urban enemies and urban fights, the better the mutual situational understanding of ground and air forces will be in an urban, littoral conflict.

Out of the Mountains offers a unique perspective on the future of conflict. Aviation's greatest skill has always been adaptability to meet the needs of a ground force commander. If nothing else, David Kilcullen provides a glimpse at a problem set for future warfare that the Army's ground leaders may face. Army Aviation would do well to read and take note.

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Ultramarine blue and golden orange the colors traditionally used by Aviation units. The wings represent the unit's Aviation mission, while the 16 feathers of each wing denote the numerical designation of the Brigade. The seven stars of the Big Dipper, part of the constellation Ursa Major, indicate the night flying capability significant of the unit owning the night. The dagger implies combat readiness and swift strike capability. The shoulder sleeve insignia was approved on 3 December 2009.

16TH COMBAT AVIATION BRIGADE

The falcon's head symbolizes the strong combat flying capabilities of the unit. The purple mountains refer to those in the northern most part of South Vietnam where the unit was activated. The three mountain peaks symbolize the threefold effort of the U.S., Army of the Republic of Vietnam, and the Free World Military Forces to win freedom and secure peace. The black area in base alludes to a helipad. The gold and red bars refer to the flares and flashes of battle, also gold and red are the national colors of the Republic of Vietnam. The blue annulet stands for the continuous and courageous efforts of the unit in the sky. The motto "Born in Battle" alludes to the activation of the unit in a war zone.

The distinctive unit insignia was originally approved for the 16th Aviation Group on 18 June 1968. It was re-designated effective 16 October 2009, for the 16th Aviation Brigade and amended to update the description and symbolism.

The 16th Combat Aviation Brigade was activated in the Republic of South Vietnam by U.S. Army Pacific General Order number 131 dated 14 December 1967. It was formed under the 1st Aviation Brigade as the 16th Combat Aviation Group on 23 January 1968. At the time of its activation, the 16th Combat Aviation Group consisted of the 14th Combat Aviation Battalion and the 212th Combat Support Aviation Battalion with approximately 3,300 personnel assigned for duty. The 16th Combat Aviation Group provided direct aviation assault capabilities to the ground elements of 101st Airborne Division and the U.S. Marine Corps in I Corps Tactical Zone.

The 16th Combat Aviation Group left the republic of Vietnam in November and was inactivated at Fort Lewis, Washington on 14 November 1971.

The 16th Combat Aviation Group was reorganized and re-designated as the 16th Combat Aviation Brigade and reactivated on 16 October 2009 at Fort Wainwright, Alaska. Task Force 49, established in 2006 to maintain aviation assets for U.S. Army Alaska was concurrently inactivated and its personnel reflagged as Headquarters and Headquarters Company, 16th Combat Aviation Brigade.

In March, the Department of Defense announced the movement of the 16th Combat Aviation Brigade from Fort Wainwright, Alaska to Joint Base Lewis-McCord, Washington. The unit cased its colors at Fort Wainwright on 15 June 2011 and completed the move to Joint Base Lewis-McCord on 1 August 2011.

The 16th Combat Aviation Brigade has a long and proud history of providing aviation support to the U.S. Army. The brigade served four continuous years of combat in Vietnam. Units of the 16th Combat Aviation Brigade have provided combat support to operations in Iraq and Afghanistan and flown humanitarian relief missions in Pakistan.

Campaign Participation Credit

VIETNAM
- Counteroffensive, Phase III
- Tet Counteroffensive
- Counteroffensive, Phase IV
- Counteroffensive, Phase V
- Counteroffensive, Phase VI
- Tet 69/ Counteroffensive
- Summer-Fall 1969
- Winter-Spring 1970
- Sanctuary Counteroffensive
- Counteroffensive, Phase VII
- Consolidation I

DECORATIONS

Valorous Unit Award, Streamer embroidered QUANG TIN PROVINCE

Republic of Vietnam Cross of Gallantry with Palm, Streamer embroidered VIETNAM 1967-1968

Republic of Vietnam Cross of Gallantry with Palm, Streamer embroidered VIETNAM 1969-1970

Republic of Vietnam Cross of Gallantry with Palm, Streamer embroidered VIETNAM FEB-MAR 1971

Republic of Vietnam Cross of Gallantry with Palm, Streamer embroidered VIETNAM APR-JUN 1971

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