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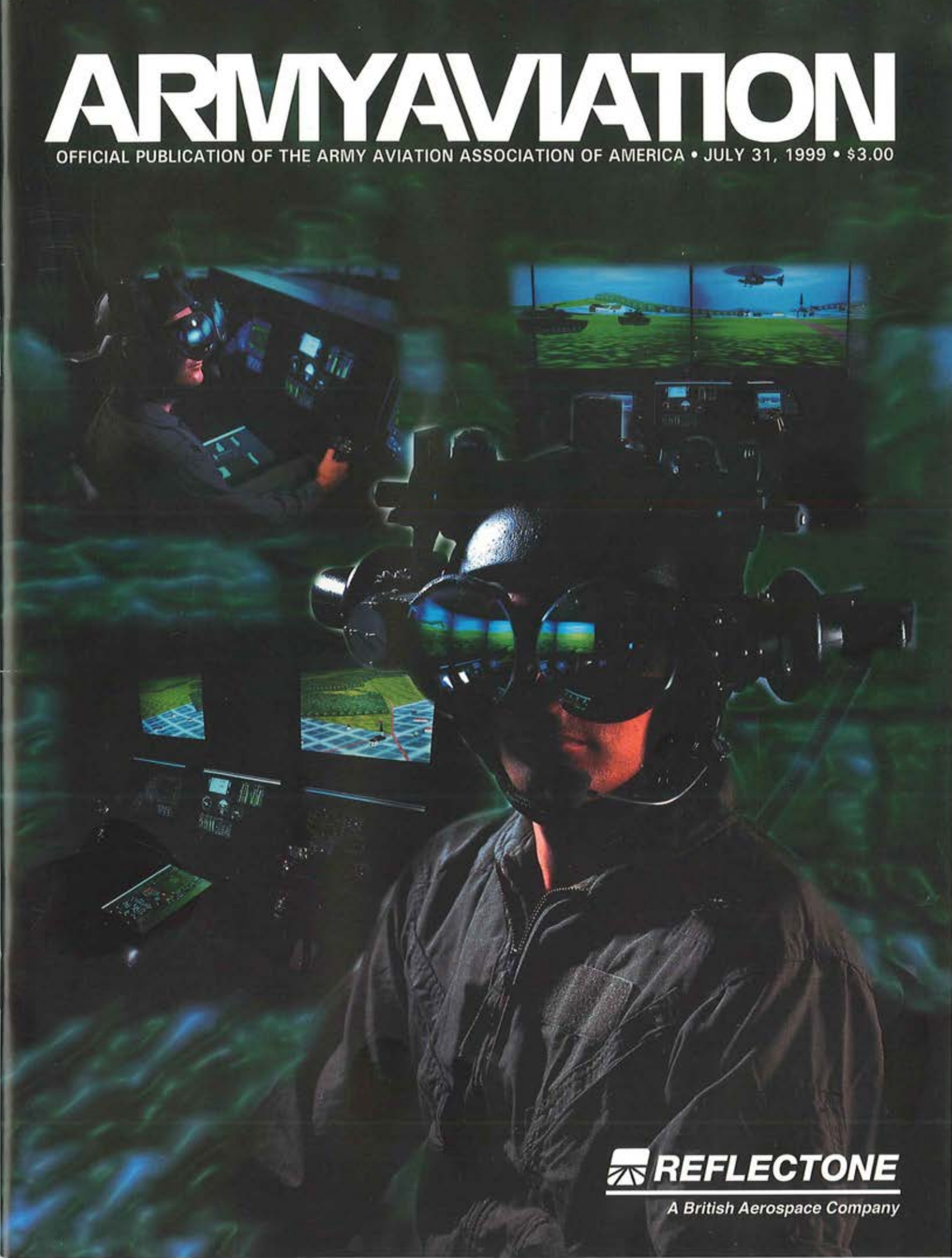

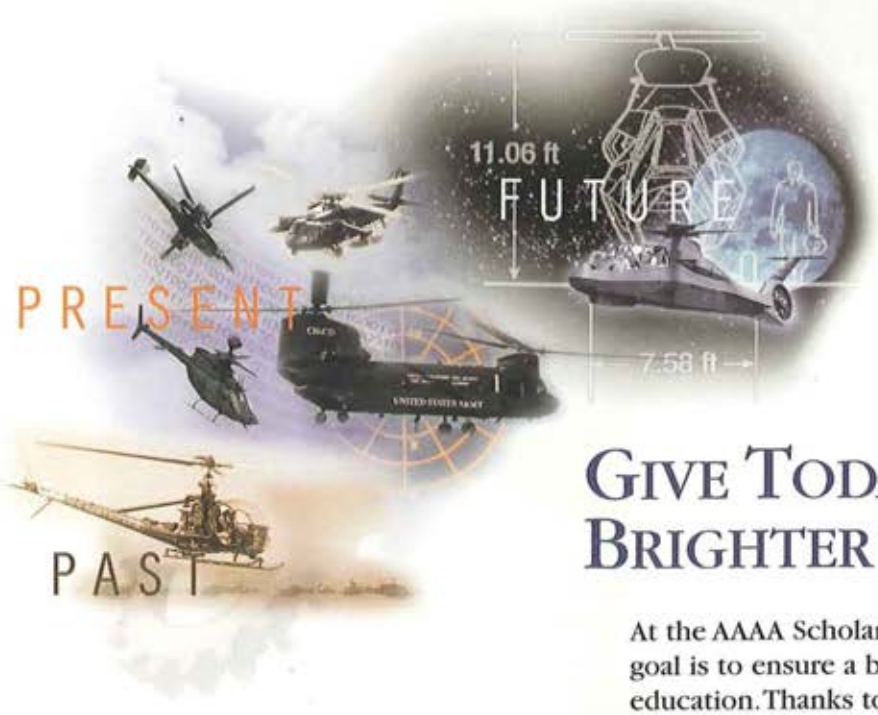

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briefings

The U.S. Army Communications-Electronics Command has awarded the **Sanders Company** an indefinite delivery/indefinite quantity contract, with a not-to-exceed value of $30 million, for the firm's AN/ALQ-144A(V)1/3/5 countermeasure set. The initial phase of the firm-fixed-price contract covers 133 units with a value of $4.8 million. Other units will be provided during the course of the contract, which runs through February 2002.

The Army-sponsored Rotorcraft Aircrew Systems Concepts **Airborne Laboratory**, administered and operated by NASA's Ames Research Center in San Jose, Calif., has begun flight qualifications of a programmable, full-authority, high-bandwidth Research Flight Control System. Developed by the Boeing Co. from 1994 to 1997 on an Army/NASA research and development contract, the new system will be used to test flight-control software design systems that may generate significant reductions in advanced flight-control development costs for current and future aircraft.

Following an extensive evaluation the Air Force has judged the **MART Corporation's** EQ-1 wastewater treatment system to have performed extremely well in treating waste water generated by aqueous parts washers. The EQ-1 system was judged to have reduced generation of hazardous wastewater by removing and encapsulating contaminants, then recycling clarified solution to parts washers for reuse. The encapsulated waste forms a solid dough- or concrete-like material for disposal.

The June arrival at **Fort Rucker, Ala.**, of the first two AH-64D Apache Longbows signaled the debut of Longbow training at the home of Army aviation. AH-64D pilot training is moving from the Boeing Company's Mesa, Ariz., facility to Fort Rucker, where training is scheduled to begin in January. Apache Longbow maintenance courses will soon move from Mesa to Fort Eustis, Va.

BARCO Display Systems has been selected to provide the 160th Special Operations Aviation Regiment (SOAR) at Fort Campbell, Ky., with 12 MPRD 126 color displays for use in the MH-60 Black Hawk. The 10.4-inch displays will be integrated into the 160th SOAR's Black Hawk Special Operations Command SOF C2 console.

The first WAH-64 Apache Longbow for the British Army has arrived at the **GKN Westland Helicopters** facility in Yeovil, England. The aircraft, one of 67 ordered by the United Kingdom, is the third of eight WAH-64s that will be produced by the Boeing Company's Mesa, Ariz., facility. The remaining 59 aircraft will be shipped to Westland in kit form for assembly, flight testing and delivery through 2003.

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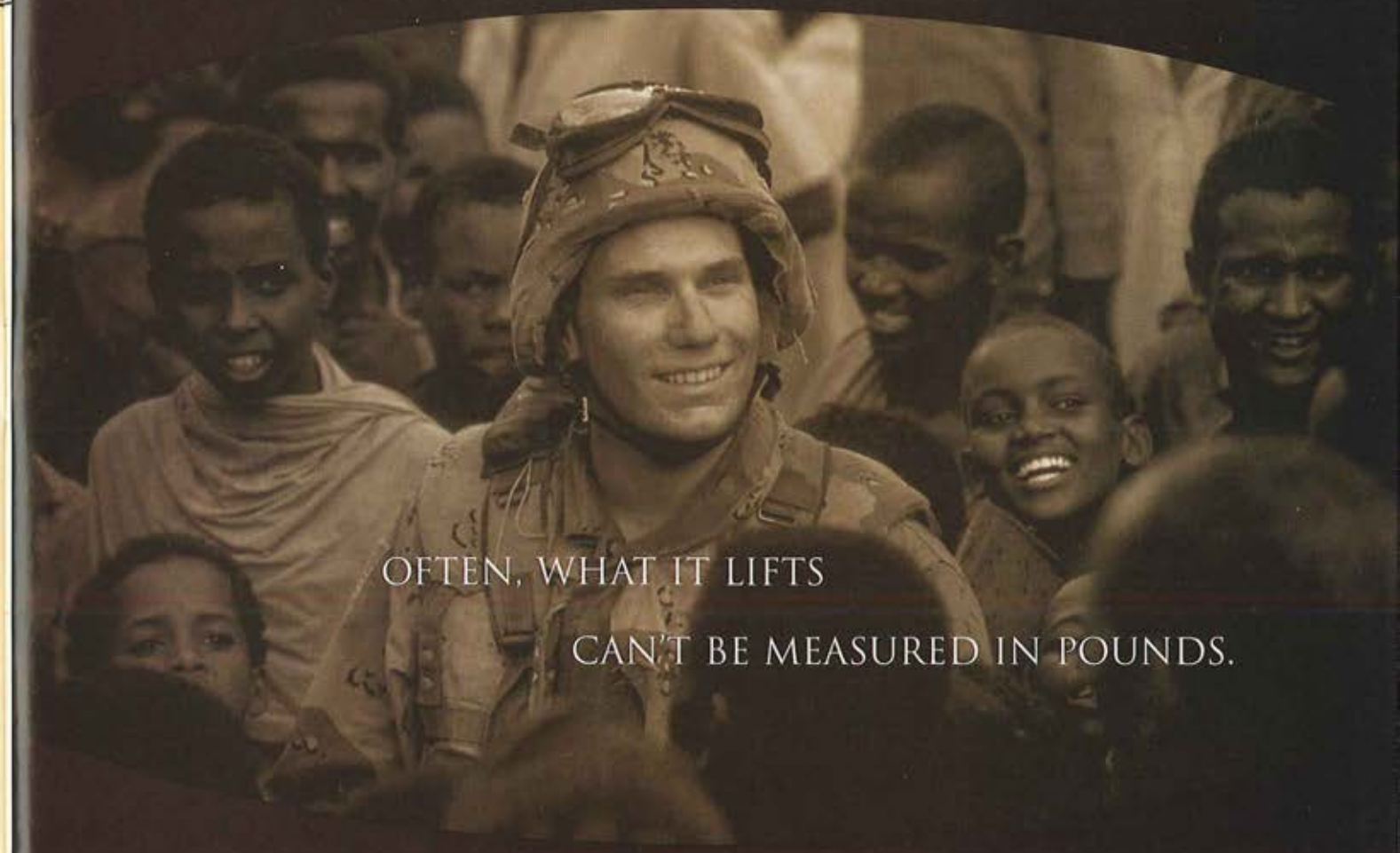

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SIMULATION & TRAINING: ATX VI

By Maj. Gen. Anthony Jones

As more and more Army Reserve and National Guard units activate to augment Stability and Support Operations (SASO), the need for a challenging and realistic train-up of their key leaders, staff and aircrews increases. Led by the Directorate of Training, Doctrine and Simulation (DOTDS), and assisted by the staffs of the Aviation Test Bed (AVTB) and the Aviation Warfighting Simulation Center (AWSC), the Aviation Center has proven it can meet this challenge, as demonstrated during Aviation Training Exercise VI (ATX VI).

Today's force structure and contingency planning call for the close integration of the active-component forces with those of the Reserve and Guard. The 10th Mountain Division will soon deploy to Bosnia with its Aviation Brigade (Task Force Falcon) comprised of:

- TF 1-10
- 1st Bn., 10th Avn. Regt. (OH-58D)
- Co. A, 2nd Bn., 10th Avn. (UH-60)
- 8th Bn., 229th Avn., (AH-64), USAR, Fort Knox, Ky.
- 112th Medical Co. (UH-60), Maine ARNG

Although other Reserve/Guard units have deployed to the Balkans before, this aviation package truly reflects the concept of the Total Army. It immediately raised the question: "How can the 8-229 and 112th Med. complete their pre-deployment certification requirements and integrate into the 10th Mtn. Div. in their remaining active training days?"

Pre-deployment certification is a tiered system of evaluations that starts with basic soldier skills training and culminates with a Mission Readiness Exercise (MRE) capstone event at the Joint Readiness Training Center (JRTC) at Fort Polk, La. The III Corps commander and U.S. Army Forces Command then validate units that successfully complete this individual training and the MRE as ready to deploy. The challenge for 8-229th Atk. Bn. and 112th Md. Co was finding the training days to accomplish everything required.

If necessity is the mother of invention, then simulation training is its brainchild. The Aviation Center has long been working with simulation exercises as a training enhancer. To date, the Center has conducted six separate Aviation Training Exercises (ATXs) for aviation units preparing for Bosnia. Indeed, FORSCOM identified the ATX as one of the requirements that aviation units must complete prior to deployment. To facilitate the train-up of TF Falcon, III Corps approved conducting both an ATX at Fort Rucker and an MRE, at Fort Polk, simultaneously.

WHAT IS ATX VI

Simply put, ATX VI was a collective training exercise that allowed the commanders and staff to plan and battle-track various Bosnia-unique missions in a virtual simulation environment. A recent AAAA magazine article detailed the specifics of an ATX by recounting the training of the 4th Avn. Bde, 1st Cavalry Div., at Fort Rucker prior to deploying to Bosnia. During that exercise, a small staff cell, called a "white cell," replicated 1st Cav. Div. staff who passed orders to the 4th Avn. Bde. for the assault and attack battalions to execute.

For staff officers from brigade through company level, operations and procedures are consistent with those in a field environment. The pilots, however, have to actually execute all missions real-time using virtual collective training simulators. They flew all of their missions on a Bosnia database and were faced with true-to-life scenarios that tested their ability to think and operate in the stability and support operations environment.

Specific exercise objectives included:

- Execution of Military Decision Making Process (MDMP) in an SFOR environment.

- Application of country specific Rules of Engagement (ROE) IAW the Graduated Response Matrix (GRM).

- Staff team building and development of SFOR mission SOP's.

- Replication of the Bosnian environment in virtual simulation.

- Practice coordinated fire control exercises and Joint Air Attack Team (JAAT) procedures.

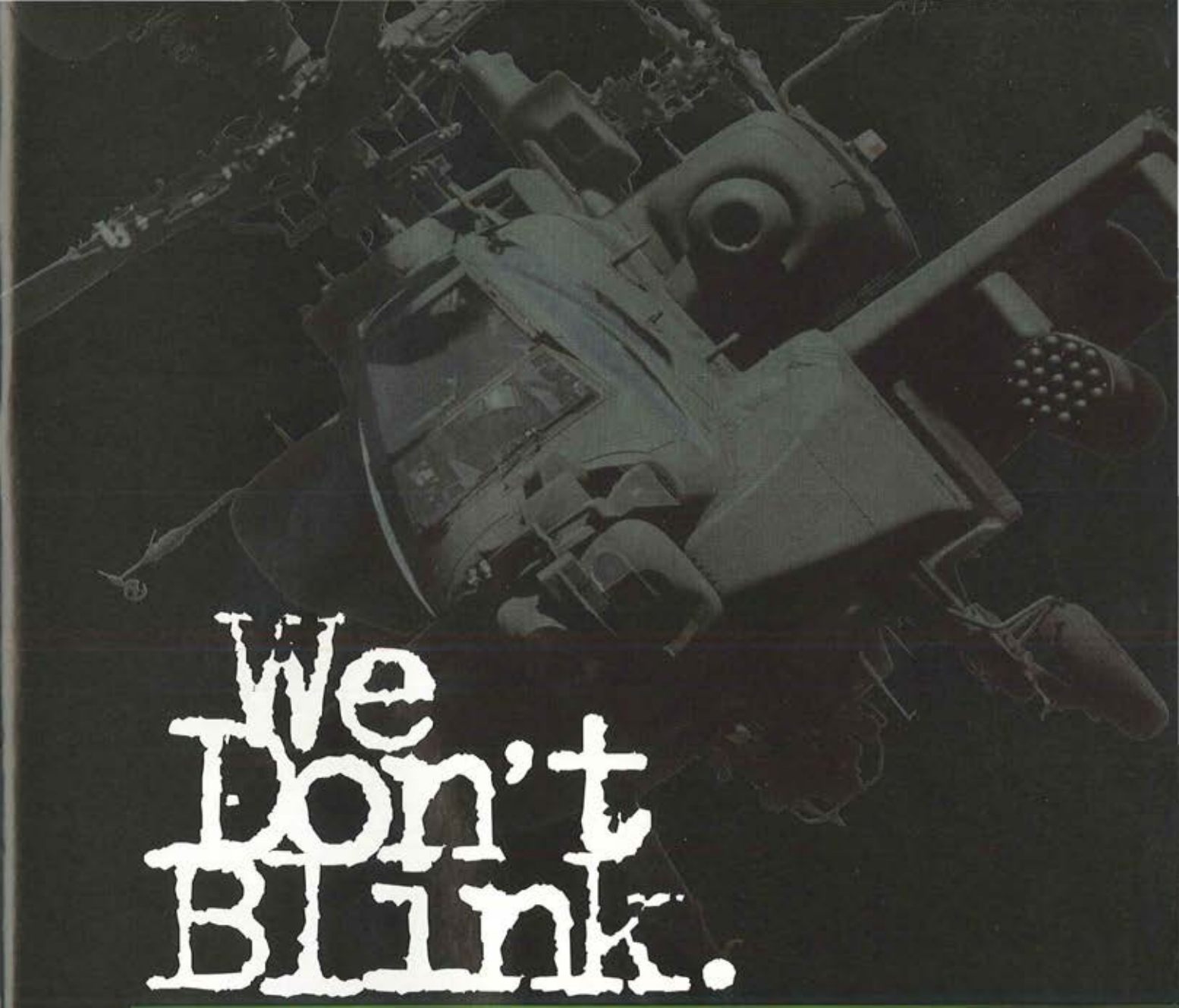
- Provide a limited mission rehearsal using a SASO Training Support Package (TSP).

ATX VI

The III Corps commander authorized the deploying TF Falcon battalions to participate in the ATX as part of the MRE. The exercise ran concurrently with the 10th Avn. Bde. headquarters attending the MRE and controlling the units there and at the ATX. This meant that the brigade headquarters would have to direct actions on both Fort Polk terrain and the Bosnian database. This presented a robust command and control environment for the brigade headquarters.

TECHNICAL ARCHITECTURE

To make this exercise a success, the Aviation Center's DOTDS and contractor support teams created a digital linkage to Fort Polk to make



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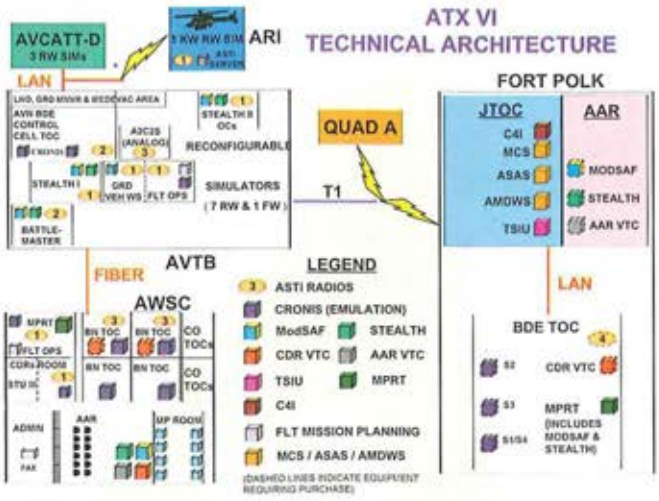

the real-time transfer of information possible [see diagram above].

Normally, a fiber-optic Local Area Network (LAN) is used to connect the seven fully reconfigureable cockpits of the Aviation Test Bed (AVTB), the three cockpits from the AVCATT-A Demonstrator, and the Army Research Institute's Kiowa Warrior simulator with the unit TOCs at the Aviation Warfighting Simulation Center (AWSC). For this exercise, reliable connectivity had to be achieved not just on Fort Rucker, but as far away as Fort Polk.

To do this, a T-1 phone line carried all tactical radio communications, reconfigureable simulators, Modular Semi-Automated Forces (ModSAF) workstations, CRONIS C4I emulation workstations (a replication of the information system used in Bosnia), ground vehicle workstation, full-time commanders' video teleconference (VTC), and simulation data logging, recording and playback capabilities. Needless to say, this connectivity was a first and allowed the 10th Avn. Bde. HQs at Fort Polk to not only plan missions carried out at Fort Rucker, but to observe and command and control them as well.

RESULT

In the seven days from 10 through 17 May, aviators from the Army Reserve and National Guard worked alongside their active-duty counterparts under the control of TF Falcon. During this time, they flew more than 600 hours in an OPTEMPO that required up to 30 aircraft sorties, 24 hours per day. Daily feedback was provided by the observer controllers of JRTC, NTC and the Training Support Battalion (TSB) at Fort Knox, using formal after-action reviews, that were observed by the aviation brigade leadership at JRTC via VTC.

At the end of the exercise, virtual simulation met the training challenge by providing a robust, intense environment for the unit to exercise the combat skills required in a SASO mission, from brigade staff to flight - crew level. Although not a substitute for live training, robust simulation training exercises such as the ATX series can help prepare units for operations in new tactical and political environments by exposing them to the virtual terrain and tactical situations they may expect to encounter. The ability to repetitiously practice the unique tactics, techniques, and procedures in a SASO environment can hone those leader and procedural skills that are most critical. As the soldiers of TF Falcon prepare to depart for Bosnia, they can be confident that they have rehearsed all the missions that will be demanded of them in Bosnia, setting the conditions for their success.

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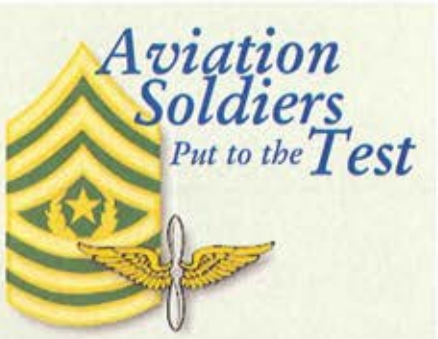
Maj. Gen. Anthony Jones is Aviation Branch Chief and CG, U.S. Army Aviation Center (USAAVNC) and Fort Rucker, Ala., and Commandant, U.S. Army Aviation Logistics School (USAALS), Fort Eustis, Va.



by CSM Major Edward Iannone

From the war-torn streets of Bosnia to crumbled towns in Oklahoma, average people become heroes and freedom fighters without a moment's hesitation.

The Army provides training and opportunities for hardworking individuals to enhance their skills and lead others to do the same.

On military installations around the world soldiers help each other and make each individual post a better place to work and live. While doing so, many people have found their chance to shine. Among them is Sgt. Bryant W. Clark of Company B, 2nd Battalion, 1st Aviation Regiment, in Katterbach, Germany.

During the last five years, Clark has continually worked to enhance the progression of aviation training around the world.

During assignments in Bosnia, Croatia and Macedonia he worked in support of the Beirut Airbridge, Operation Joint Endeavor, Operation Joint Guard and the United Nations Preventative Deployment Force, and received awards recognizing his outstanding technical expertise.

Training with Britain's Royal Navy, attending exercises with the German Bundeswehr and participating in operations around the world have become another part of everyday life for Clark.

He has trained more than 100 soldiers in his battalion as UH-60 crew members and gunners, and also implemented the first non-rated crew member auxiliary power plant qualification program within the 4th Brigade. He was also selected above his peers to be evaluated as a UH-60 enlisted standardization instructor by the V Corps Aviation Standardization and Safety Detachment, receiving a recommendation to perform those duties.

Taking control of an operation moving three UH-60Ls to Macedonia as a noncommissioned officer in charge, serving as platoon sergeant of a forward-deployed element and acting as first sergeant and platoon sergeant during his rear detachment duties still wasn't enough to keep him busy. Clark managed to complete nearly 200 hours of correspondence courses and be selected for the E-6 board after only five months in grade. When we reflect on war situations or a military career, death and hardship are often the only visible remnants. Yet Clark has many positive memories and experiences to pass on.

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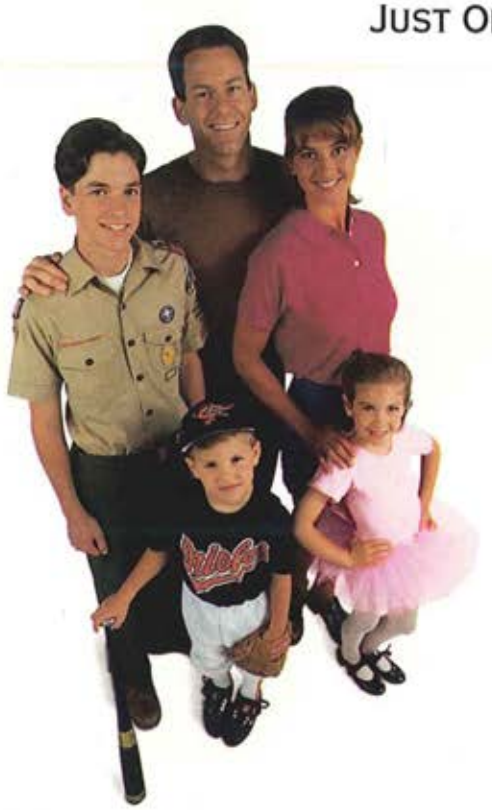

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STRICOM Aviation Programs

by Brig. Gen. William L. Bond

The U.S. Army Simulation, Training and Instrumentation Command (STRICOM) has a long history of providing training and simulation support to Army aviation. I have chosen to highlight a couple of those programs in this article — our work on Synthetic Theater of War Architecture (STOW-A) and the AC-130U programs with the Special Operations Command, and our work in support of combined-arms training with U.S. Army Training and Doctrine Command, the National Guard and the Reserves. It is my vision that we in the aviation community leverage from the work we are doing in other collective and combined-arms training to ensure that we maximize our limited resources. For many years aviation has led the combined-arms force — we need to continue to do so.

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Synthetic Theater of War Architecture

In March 1997 Maj. Gen. William F. Tangney, commander of the U.S. Army Special Warfare Center and School at Fort Bragg, N.C., approved the first in a series of simulation-based exercises designed to address some of the most significant training challenges now facing special operations forces (SOF). The STOW-A program provided the opportunity to integrate SOF into existing Army STOW-A exercises and architecture for realistic simulation-based training. The integration of the Combat Mission Simulators and Mission Planning and Rehearsal Systems into STOW-A expands the Army's current synthetic battlespace capabilities and improves the training of the 160th Special Operations Aviation Regiment (SOAR) and other U.S. Special Operations Command (USSOCOM) elements. By leveraging existing technologies and proven training techniques this team of soldiers, program managers and technicians provided the commander with a powerful set of training tools. Using this integration, SOF trainees will develop and maintain proficiency in their individual and collective skills; hone mission planning techniques; and conduct mission rehearsals across live, virtual and constructive environments simultaneously.

The primary training objectives of the exercise focused on two key areas. The first was to establish a simulation capability that supported air mission commander (AMC), ground force commander (GFC), battle staff synchronization training and mission rehearsal. The second objective was to establish training systems architecture to provide a simulation capability that refined and validated tactics for multi-aircraft, all-weather operations. Initial planning for a SOF STOW-A began in March 1997 and culminated in the first exercise in October 1998. The October SOF STOW-A was the first in a series of four phases, increasing the interoperability and expansion of the DIS/HLA network to conduct complex operations across the spectrum of conflict with each phase ending in an exercise. USSOCOM elements provided the user input and were the primary drivers in identifying numerous collective tasks from the units' Mission Essential Task List (MET-L). They also developed a scenario to train those tasks, including both a primary and secondary training audience.

The terminal training objective (TTO) for the first iteration was a company raid. This scenario incorporated a wide spectrum of intermediate training objectives (ITO) and required extensive coordination between USSOCOM elements. The scenario was based on a direct-action mission within the environment of the Shugart-Gordon MOUT site at Fort Polk, La. The STOW-A exercise time line reflected the N-Hour sequence used by units in real-world mission execution. USSOCOM elements were moved to Fort Campbell,

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This open architecture system was also selected for the U.S. Navy, Marine Corps, and the Coast Guard H-60 family and the CH-53E model under the Integrated Mechanical Diagnostics-Commercial Operations and Support Savings Initiative (IMD-COSSI) program, as well as on the Agusta A109K2 and the Eurocopter AS350 and A355 Series.

*Sensor systems provided in partnership with Vibro Meter, Inc.

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Ky., replicating an intermediate staging base (ISB), and establishing a joint environment for mission execution. While initial mission planning was occurring, an MH-47 inserted a reconnaissance detachment (executed in the MH-47 Combat Mission Simulator) to provide intelligence on the target area. The units conducted mission analysis and rehearsals at facilities at Fort Campbell, using command-and-control (C2) aircraft and operational JSOF Operations Center (live), high-fidelity Combat Mission Simulators (virtual) and JANUS (constructive) systems that were linked in a Distributed Interactive Simulation (DIS) network.

The training medium for this exercise centered on live and simulated environments. The live medium included real-world combat mission training for commanders and battalion staffs. Additionally, actual C2 aircraft provided the live tactical link for operations across a virtual-to-live bridge created for this exercise. The maneuver of the ground force and all assault and fire-support aviation assets were simulated. The simulation hardware used JANUS with Sound Storm for the ground force; Combat Mission Simulator for flight lead aircrew;AC-140 Battle Management Station (BMS) for the AC-130 aircrew; TOPSCENE for the air mission commander, ground force commander and flight lead aircrew; and Simulyzer as an after-action review (AAR) tool for all participants.

Using "Black Boxes," DIU and PASS, each simulation package was connected to a DIS-compliant network. This allowed each system to communicate and correlate activities across eight unique geo-specific databases. Correlation is critical, as it ensures that each independent system sees that same entity in the same location at the same time. A "Long Haul" fiber optic cable linked the AC-130 BMS at Hurlbert Field, Fla., into the Fort Campbell DIS network. Specific enhancements to JANUS provided the ability for the ground force to conduct detailed MOUT operations, including capabilities application and realistic battlefield sounds.

The exercise communication package included a virtual-to-live bridge that allowed the Combat Mission Simulator, the JANUS terminals, the AC-130 BMS and C2 aircraft to communicate in a secure or non-secure mode. Multiple FM radio nets, SATCOM nets, UHF, VHF and MX could be monitored using an ASTi Board, a STOW Light Initiative. This hand-held communications integrator provided the users all of the required tactical nets without numerous radios at each station and the inherent work-around for long-distance communications.

Integration of high fidelity special operations combat mission simulators and mission planning and rehearsal systems into existing Army STOW-A exercises and architecture expands the Army's synthetic battlespace capabilities and improves the training of the 160th SOAR and other USSOCOM elements. The integration of live, virtual and constructive simulation increases the training readiness of the units involved and provides a complete mission-rehearsal tool. Using existing technology, a DIS-compliant federation was developed to

reach across the live environment and the "Long Haul" HLA network.

STRICOM is developing training products to support Air Force Special Operations Command (AFSOC). To support AC-130U (Spooky) training requirements, the command needed a vehicle to provide initial qualification, currency and specific-mission training for aircrews, and malfunction trouble-shooting training for aircrews and avionics maintenance technicians. Both the aircrews and the maintenance technicians needed a system that would provide a realistic simulation of the sensors, communications, navigation, fire-control and weapons systems at a level matching actual aircraft performance and still meet training requirements.

The latest of the AC-130 gunships, the AC-130U is one of the most complex aircraft weapons systems in the world today, containing nearly one million lines of software code in its mission computers and avionics system. The system incorporates the latest sensor technology, along with an entirely new fire-control system, to substantially increase the gunship's combat effectiveness. In concert with an array of sensors, the AC-130U is armed with a 25mm Gatling-gun, a rapid-fire 40mm Bofors cannon, and a 105mm howitzer. The AC-130U represents a major advancement over previous gunships and incorporates features to enhance maintainability and supportability making certain its crews are available any time, any place.

STRICOM formed a highly effective Integrated Product Team (IPT) to meet customer requirements. The team included extensive user participation, under the Advanced Distributed Simulation and Training II (ADST II) contract to develop a testbed (TB) supporting the AC-130U. Designed as a testbed, the AC-130U ATD/TB allows flexibility to define fidelity, system performance and analysis of candidate systems and supports training capabilities assessment, validation and experimentation. This testbed allows aircrews to practice critical aircraft and systems emergency procedures. The system also allows for conducting mission employment scenarios with a realistic threat environment.

Future enhancements include an FAA Level C flight deck and will soon be integrated with the existing Navigator/Fire Control Officer (Nav/FCO) and Sensor Operator Testbed. This integrated configuration will provide an ATD/TB that provides not only stand alone aircrew and maintenance training capabilities, but also the capability to conduct networked exercises with

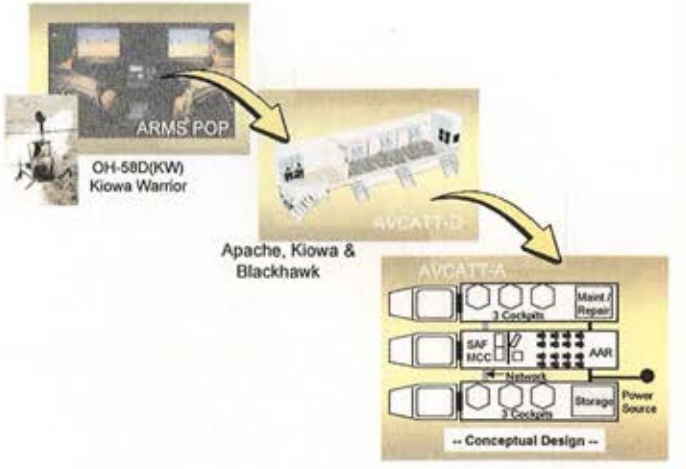
The latest of the AC-130 gunships, the AC-130U is one of the most complex aircraft weapons systems in the world today.

other AFSOC and USSOCOM assets located at distant sites. In addition, an electronic warfare officer (EWO) station is being added to the ATD/TB concurrently with the flight deck. The addition of the EWO station to the ATD/TB will enhance training capabilities and provide for full crew mission training.

Aviation Combined Arms Training - Making the Dream a Reality

The new Aviation Combined Arms Tactical Trainer-Aviation Reconfigurable Manned Simulator (AVCATT-A) is expected to be a total Army aviation training system that creates the dynamic battlefield environment to repetitively fight the mission equipment packages of modern aircraft and weapon systems. AVCATT-A bridges the gap between individual flight simulators and the digitized battlefield of tomorrow. To facilitate worldwide training in support of aviator readiness and deployment, AVCATT-A will be a fully mobile system. The baseline system will consist of reconfigurable simulators that support the AH-64A/D, UH-60A/L, CH-47D, OH-58D, UH-1H and AH-1F platforms. Plans are currently underway to simulate the RAH-66 for tactics, techniques and procedures (TTP) development as well. In addition to the simulation of these platforms, AVCATT-A will have full AAR capability as well as OPFOR and BLUFOR computer generated forces (CGF).

AVCATT-A is the formal acquisition program for aviation collective training. It has benefited greatly from early proof-of-concept efforts and early prototype training systems. Early program-related activities included the Aviation Reconfigurable Manned Simulator (ARMS) and Aviation Combined Arms Tactical Trainer Demonstrator (AVCATT-D). ARMS has been a valuable tool in defining AVCATT-A performance requirements. AVCATT-D has been successfully used to prepare aviation units for National Training Center (NTC) rotations, as well as to train and validate mission readiness of aviation units prior to deployment to our current overseas missions in Bosnia.



AVCATT-A, as a reconfigurable simulator, has almost limitless potential to simulate other aircraft, including those of our NATO allies. Planned to be HLA/JTA-A compliant, AVCATT-A will have the potential to link with not only other Army training systems, but also to digital tactical operation centers and the USAF's newly emerging Distributed Mission Training (DMT) system -allowing joint task force training. AVCATT-A will be able to train aviators in a realistic combined-arms environment, but will have the capability to interoperate with the Close Combat Tactical Trainer (CCTT) for a combined air-ground training experience. Early experimentation has shown great value in this type of synchronized training. Currently in source selection, AVCATT-A is a system to watch during the next few years!

Conclusion

These are just a few of the aviation simulation programs that STRICOM has developed with our customers. But there is a potential to do much more in this area. By using STRICOM, aviation has been able to leverage the work done for other weapon systems and increase capabilities, while also making the best use of limited resources. It is my desire that future virtual simulation systems share terrain databases and core distributed interactive simulation systems to ensure that all our systems can play together and maximize our training and our training resources.

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Brig. Gen. William L. Bond is commander of the U.S. Army Simulation, Training and Instrumentation Command in Orlando, Fla.

Army XXI-Air Cavalry Operations: Examining Manned and Unmanned Team Operations

by Capt. Gil Watson

The Air Maneuver Battle Lab (AMBL), at Fort Rucker, Ala., a part of U.S. Army Training and Doctrine Command's battle lab structure, uses live, virtual and constructive simulations to execute its mission. AMBL's mission is "to fully integrate air maneuver into Force XXI/Army After Next combined-arms operations through the planning, execution and analysis of warfighting experiments and technology demonstrations." This is done to examine advanced concepts and technology, which enhance the commander's ability to fight and win on the 21st-century battlefield.

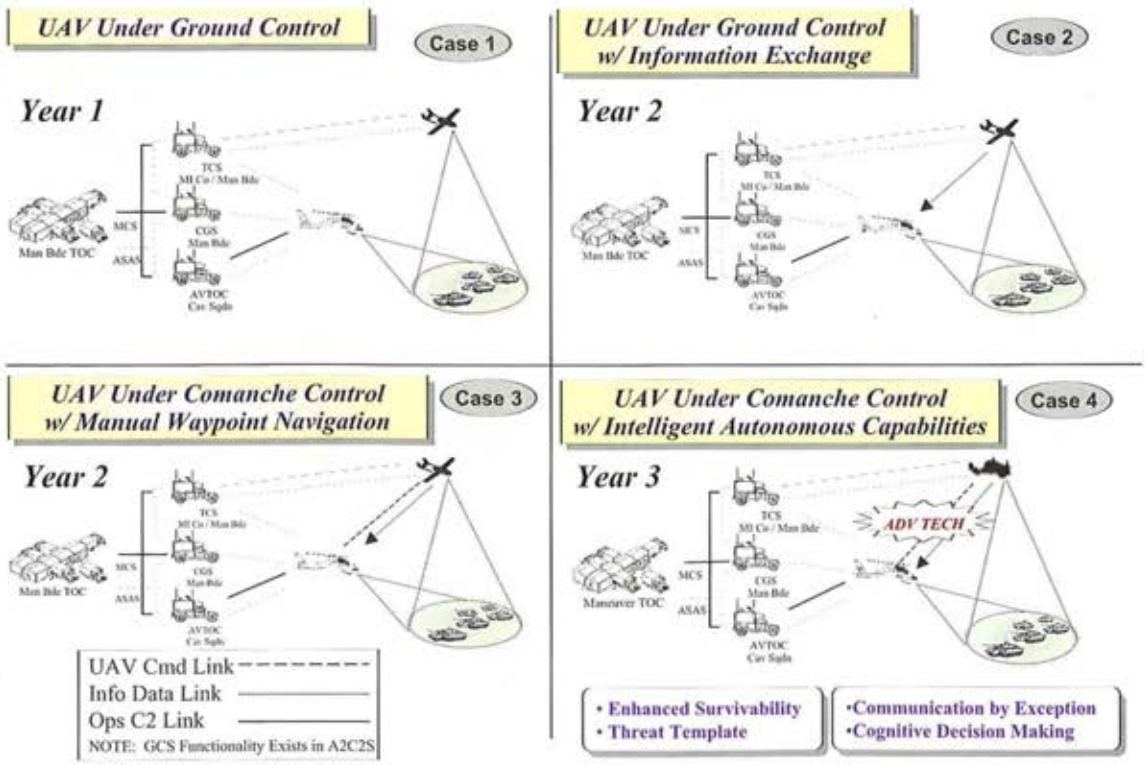
Over the past few years we have explored capabilities, equipment, employment methods and concepts that provide battlefield information to assist in answering the maneuver Commander's Critical Information Requirements (CCIR). In particular, the information provided by a lethal, survivable, flexible team — an air maneuver team — of helicopters and tactical unmanned aerial vehicles (TUAVs) conducting tactical-reconnaissance missions.

To date, helicopter and UAV operations have occurred as separate actions without regard to their ability to complement each other. The capability of employing manned and unmanned platforms to capitalize on the unique benefits of each system is currently being explored. Manned and Unmanned (MUM) Aerial Platform Operations on the Digitized Battlefield, a three year experiment, is beginning the final year of exploring the operational efficiency gained from teaming manned and unmanned aerial platforms on the future battlefield. The strategy is to explore four alternatives that progressively build on the level and means of interaction between the aerial platforms [see Figure 1]. Each year we begin with a base case to establish a point from which to measure performance deltas.

MUM I

AMBL conducted the first year of MUM teaming experimentation, MUM I, in 1997. The mission was to conduct a zone reconnaissance and identify high payoff targets (HPTs) amid an entrenched Red infantry division in Southwest Asia. Helicopter and TUAV systems operated independently in the base case. Each system crew received their operations orders (OPORD) from their respective headquarters. The crews conducted opera-

Figure 1



tions in the same area with the same threat but were not aware of the information collected by the other system.

In Case 1 the mission remained the same, however, the helicopter system and TUAV worked as a team. The team received the same OPORD and planned their mission together, with the strengths of each platform in mind. The TUAVs were under operational control (OPCON) of the aviation unit commander. The helicopter pilots and the TUAV crew in the Tactical Control Station (TCS) exchanged information through voice communication and limited digital spot reports. The helicopter crew could redirect the TUAV, via communications with the TCS at any point during the mission.

From MUM 1, we concluded that teamed systems provide greater capability to conduct tactical reconnaissance missions. The advantages offered by teaming MUM systems, within the scope of this assessment, indicate that the MUM teams can complete missions more efficiently and effectively, and with increased survivability, than when those systems are employed individually.

MUM II

Last year, in MUM II, the teaming concept was expanded by exploring two additional cases in a more confining tactical environment — Central Europe. The mission was to conduct a zone reconnaissance with requirements to identify HPTs within a stability and support operation. Complicating the mission were refugee, host nation, paramilitary and regular army entities. The base case was Case 1 from the first year, regamed in the Central Europe scenario. We first measured performance deltas with the TUAV under ground control while exchanging voice, digital and video information (Case 2). As we transitioned to Case 3, we added control of the TUAV platform and sensor package to the helicopter crew. In addition to fighting the manned platform the crew had to direct the activity of the TUAV. This examined crew workload issues and the suitability of controlling the TUAV platform and sensors by the manned system.

In Case 2, the sharing of video and message information increased the effectiveness and survivability of both the manned system and the MUM team. However, Case 3 demonstrated an excessive workload for the manned system. The results from MUM II clearly indicated that continued investigation is needed to assess possible advantages that could be gained by providing a technology solution, which would enable and assist the manned system crew to control the unmanned platform and sensor payload.

At the conclusion of MUM II, it was determined that additional capability in both the unmanned platform and sensor payload was necessary in order to fully explore Case 4. As a result of MUM I and II, the Directorate of Combat Developments identified requirements for an unmanned system to be integrated into air maneuver operations. During MUM III, the unmanned platform will be defined from the vertical take off and landing (VTOL) Navy Operational Requirements Document (ORD) and the sensor payload will be defined by U.S. Army Communications-Electronics Command (CECOM) Night Vision and Electronic Sensors Directorate (NVESD). These capabilities will be referred to as a short-range (SR) TUAV and be fully integrated for modeling and simulation in MUM III.

MUM III

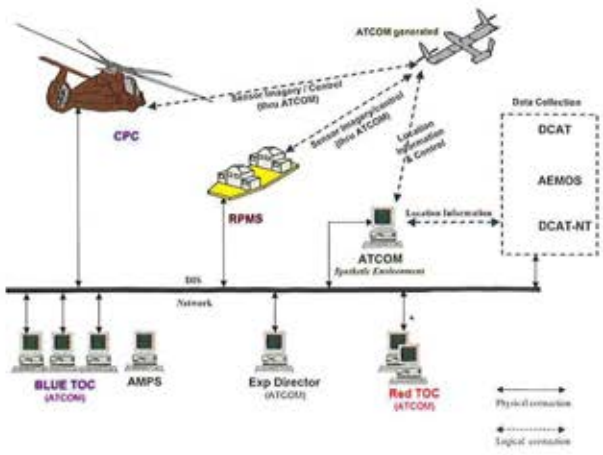
MUM III will examine the performance deltas of information exchange and control of an SR-TUAV platform and sensors with the addition of automated/aided decision-making capabilities to assist the helicopter crew in performing the MUM team mission. This experiment will examine the synergistic effect of teaming the capabilities of each system to increase the maneuver force commander's ability to visualize, shape and dominate the battlespace. A base case will be conducted with only the manned system performing a zone reconnaissance to confirm HPTs in an updated version of the same robust scenario as used in MUM II. Finally, Case 4 will apply autonomous aided intelligent capabilities to assist in reducing the excessive workload issues experienced in Case 3.

The simulation modeling will incorporate virtual simulation while maintaining a constructive-simulation backbone. The manned platforms will be represented with virtual simulators to provide immersion into the simulation. The SR TUAV will be represented in constructive simulation, with control over its actions exercised by the virtual simulators. The various simulation systems will be linked via an Ethernet network and use Distributive Interactive Simulation (DIS) protocols [see Figure 2]. These systems are described below:

- Advanced Tactical Combat Model (ATCOM) is a stochastic, force-on-force, aviation-focused, combat simulation model that is DIS compliant, and simulates in real-time or faster than real-time. Interactions between opposing forces are simulated over a digital terrain database considering weapons and sensor performance, combat vehicle characteristics, weather, tactics and communications links between air and ground systems. ATCOM is a hardware-in-the-loop (HITL) simulation, requiring gamers and tacticians to make inputs during simulation to affect the tactical interplay. ATCOM can be run in a batch-

Figure 2

Simulation Architecture



simulation mode to produce multiple replications of the experiment for statistical analysis. The model provides a plan view of the battlefield, overlaid with graphics depicting positions of combat entities and interactions. All data is recordable and runs on a Silicon Graphics Incorporated (SGI) Octane, with the accompanying "out-the-window" view on another SGI OCTANE.

Within the MUM III simulation architecture, ATCOM :

- Provides the simulation environment and raw data batching.
- Generates the UAV entity.
- Calculates, models, and records interactions between the UAVs and the other entities in the simulation. This includes sensor payload and platform control of the UAV from the manned platform.
- Performs combined arms interactions of between Blue and Red forces.
- Provides digital maps and overlays for situational awareness at Blue, Red and Experiment Director stations.
- The Comanche Portable Cockpit (CPC) is a dual seat replication of the RAH-66 cockpit. The CPC is a trailer-mounted (hence, transportable) simulator that provides the mission equipment capabilities of the RAH-66 into the MUM III simulation confederation. The CPC virtual simulation enables the manned platform to exchange communications with the unmanned air vehicle to include control commands as well as data link of the UAV sensor imagery.
- The Rapid Prototyping Manned Simulator (RPMS) was developed during the Rotorcraft Pilot's Associate (RPA) Advanced Technology Demonstration (ATD). This ATD developed cognitive decision making aids for aircrews that have application to the command and control of UAVs as well. The RPMS will introduce, in a virtual cockpit, additional capabilities of controlling the unmanned platform. These are technology capabilities that are part of the RPA Program, but not part of the current Comanche baseline design represented in the CPC.
- Aviation Mission Planning System (AMPS) is an automated mission planning, rehearsal and synchronization tool designed specifically for the aviation commander and aviator. Over the course of the experiment AMBL will incorporate the data files from AMPS into the TOC display graphics. Subsequently, the military graphics produced in the team's planning sessions may be imported into the simulation through ATCOM. During the MUM III experiment ABML will use the beta version of AMPS 5.0 provided by the AMPS Project Manager's office.
- Data Collection Analysis Tool (DCAT) is a real-time data capture and analysis application that collects data in a DIS exercise and provides feedback to the user concerning performance of the systems under scrutiny. DCAT provides the user the ability to monitor DIS Protocol Data Units (PDU), as they are captured by the application, to perform exercise debugging. An object-oriented database is created in real-time, which is used to generate collated information to the user. In addition, DCAT is capable of providing the user with real-time and post-processed data from the exercise. The data is relayed to the user in a variety of easily understood and tailored graphs and charts. DCAT is applicable for use as an After Action Review (AAR) support tool, an experiment debugging and monitoring tool, a real-time experiment analysis tool, and a post-process analytic tool. A Windows NT version of DCAT will be used as a Beta test for that version of the software.
- Advanced Experiment Monitoring System (AEMOS) is also used as a data collection and analysis tool. This provides another approach to the real-time acquisition and processing of PDU based data, and the real-time generation of graphical presentations of experiment results.

The MUM III experiment contains a series of events, beginning 1 June with the network setup and initial integration of the simulation and data collection models. The CPC and RPMS technical/tactical integration is scheduled for July 26 to Aug. 27. Training and rehearsal will be conducted from Sept. 20 to Oct. 4. Finally, MUM III record runs will take place Oct. 11 through Nov. 5.

The Air Maneuver Battle Lab continues to play an important role in defining the future of maneuver operations in the third dimension. MUM III is another example of our commitment to examining advanced concepts and technology which enhance the commander's ability to dominate the battlespace of the future.

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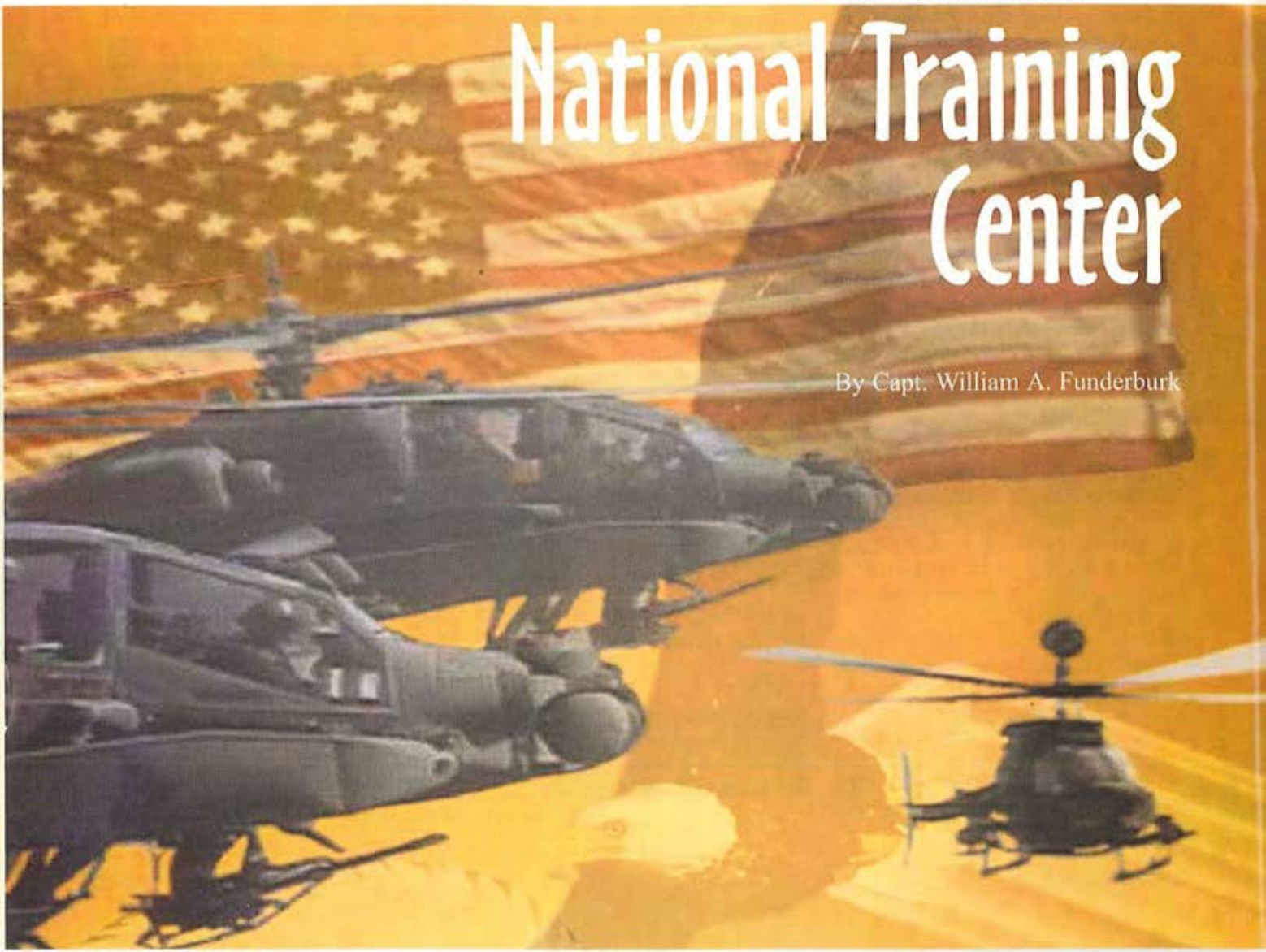
Capt. Gil Watson is experiment director for MUM III at Fort Rucker, Ala.

Training Aviation at the National Training Center

By Capt. William A. Funderburk



The National Training Center (NTC) at Fort Irwin, Calif., continues to evolve training scenarios, simulation systems and trainer expertise to ensure Army aviation's preparation for the complexities of aviation operations today and into the 21st century. The NTC's Combat Aviation Training Division (Eagle Team) is at the forefront of this evolution; our trainers are the catalyst for recent aviation training initiatives that provide aviation units with the most realistic, sophisticated and demanding training environment in the world.

About the Team

Eagle Team consists of 80 personnel task organized into aviation brigade, attack/cavalry and assault operations training teams, as well as a tactical analysis team and an OH-58C flight detachment. Although we are subject to standard personnel turnover rates the team maintains an extensive base of aviation knowledge and trainer experience. This base of knowledge and experience comes from the officers and NCOs who rotate to the team from tactical units and their daily duties as trainers once assigned to the team. During a standard fiscal year the Eagles train approximately four aviation brigade task forces, three battalion-level task forces, one regimental aviation squadron and two reduced GSAB task forces. The Eagles also participate as division cavalry aviation trainers twice a year, on average. In addition, the Eagles support a number of training exercises outside of the standard NTC rotation schedule, including Bosnian deployment preparation training external evaluations and active and reserve component home station training packages.

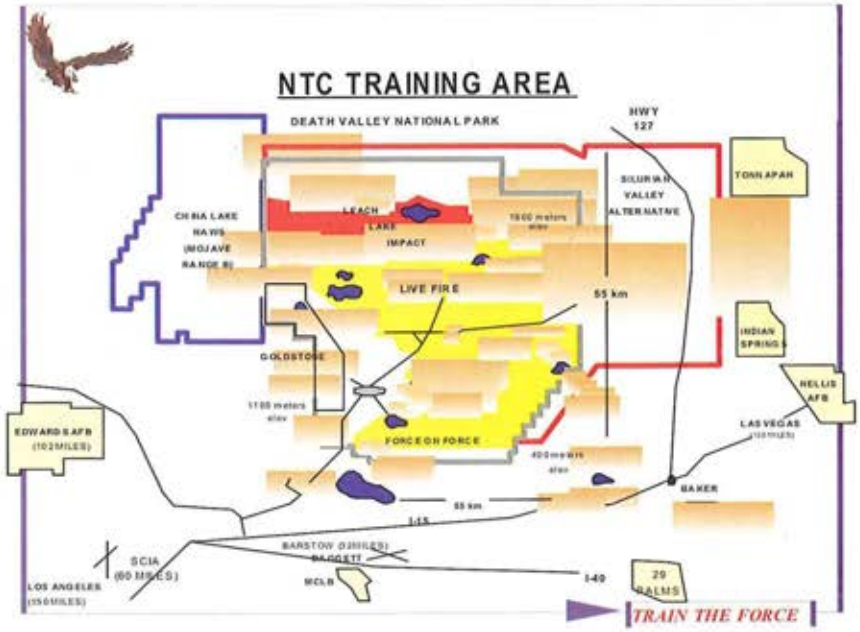
Majors assigned to Eagle Team serve as either the aviation brigade staff trainer, attack or assault operations trainer, or senior aviation analyst. Captains can expect to serve their first six to 12 months as company-level trainers or tactical analysts within their areas of expertise (such as attack, cavalry and assault). Upon completion of their first year, captains may transition to battle staff trainer duties or may retain their company-trainer positions. The average branch-qualified captain will participate in 20 rotations and various home station training initiatives during a standard two-year tour with the Eagle Team.

Captains assigned as company trainers are exposed to a variety of aviation operations and other combat arms branches outside of their branch specialties. For example, given a reduced package, it is routine for captains to work outside their areas of expertise with other maneuver teams. Recently, Eagle Team instituted an exchange program which allows its captains to work with the NTC OPFOR observer/controller teams.

Aviation NCOs assigned to Eagle Team function as attack or assault NCO trainers. They work closely with NCOs of varying MOSs, who function as FARP, medical and NBC trainers, to name only a few. Eagle Team flight detachment warrant officers serve primarily as pilots for the company trainers who observe company-level operations from an OH-58C. The typical tour for warrant officers is three years. The demanding flight experience, combined with continual exposure to various tactical operations, results in a rewarding assignment. Warrants are also assigned as gunnery, AVUM, armament and safety trainers. They are assigned specifically as trainers and do not normally function as part of the flight detachment. All officers are assigned against operational flight positions and earn gate time as FAC 2 (company trainers) or FAC 2 Waived (staff trainers).

Eagle Team trainers spend approximately 23 days on and four days off for every rotation cycle. The first five days are spent receiving the rotational unit and helping it prepare for deployment into the "box" as the unit performs reception, staging, onward movement and integration operations. The next 14 days are spent in the desert training the rotational unit through constant observation and after-action reviews (AARs) as the unit completes force-on-force and live-fire operations. During the four days following the desert training, known as Between Rotation Days (BRD), aviation trainers recover their gear and participate in various training sessions, OPD and NCOPD to further their professional knowledge and prepare for the next rotation. Finally, there are four days of compensatory time which most trainers spend with their families at one of the numerous attractions within two to three hours from the NTC.

Aviation Trainers



Training and Scenario Initiatives

Training scenarios at the NTC are based upon the rotational unit's Mission Essential Task List and guidance from the unit's division or corps commander. Eagle Team works closely with the NTC scenario writers to ensure aviation training objectives are incorporated into both force-on-force and live-fire missions. This input, coupled with a host of new training initiatives, is focused on enhancing aviation training at the NTC and home station. Some of the recent initiatives include:

- Improvement of the China Lake electronic range scenario.
- Combat Search and Rescue (CSAR) and Downed Aircraft Recovery Team (DART) missions for both force-on-force and live-fire.
- FARP live-fire.
- Civilians on the Battlefield.
- Home station training of active, Reserve and National Guard aviation units.
- The Eagle Team Home Page.

The China Lake deep-attack mission is currently the only mission that offers increased depth, off the NTC, for attack helicopter battalions. A variety of force-on-force opponents are available at China Lake, with possibilities ranging from a complex air defense facility and tactical ballistic missiles to maneuver targets and actual OPFOR. New instrumentation systems provide objective casualty removal at China Lake and linkage with the NTC instrumentation, thus facilitating seamless AARs. Recent scenarios incorporated use of actual Air Force TACAIR, Navy EA-6Bs and special operations forces, all of which were integrated and controlled by the aviation commander. These additions, coupled with realistic battlefield effects, make for a very demanding training event.

Incorporation of CSAR and DART scenarios into both force-on-force and live-fire provides units the opportunity to train for these difficult combat operations. These missions typically require integration of utility, attack and observation helicopters, cannon and rocket artillery, and joint assets. During force-on-force the unit conducts CSAR/DART in response to their OPFOR-induced MILES losses. In live-fire operations, CSAR/DART is conducted using live-fire targetry for both utility and attack aircraft en route and at the crash site. Aircraft crash sites are replicated during live-fire with salvaged aircraft and mannequins with moulage injuries. Extensive teamwork and rehearsals are required among the ground maneuver brigade, the aviation headquarters and subordinate elements of the aviation headquarters (such as AVUM elements, attack teams, utility support, etc.) to successfully complete the CSAR/DART missions.

FARP Live-fire training is an initiative developed to reverse the downward trends in FARP survivability and perimeter defense. Normally the FARP is ordered to displace to support an external requirement. During occupation, the FARP is threatened by remnant OPFOR and forced to defend a perimeter using organic weapons. The event focuses on small-unit, light-infantry tactics, weapons-employment procedures, PCC/PCI and ground casualty evacuation.

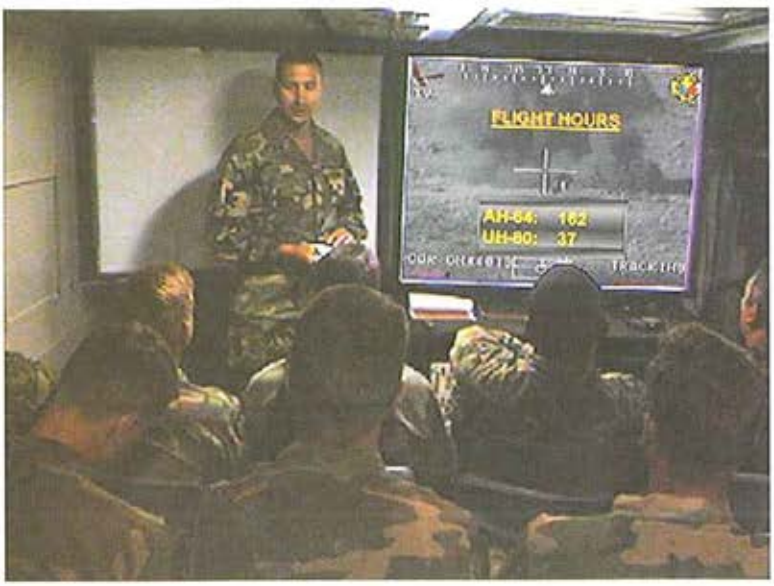
An additional force protection training initiative deals with civilians on the battlefield and media teams. Rotational units experience a full array of civilian activities that vary from humanitarian assistance to terrorism. Trainers observe unit actions and focus AARs on the proper level of force or assistance as prescribed by the 52ID (M) rules of engagement and the laws of land warfare. Media teams conduct interviews with rotational units, providing the unit the ability to deliver its command message, practice OPSEC and validate media-relations procedures.

A productive initiative designed to benefit both active and reserve components is the Eagle Team Home Station Training Package. Between rotations and during light aviation rotations, Eagle Team is capable of deploying home station training packages to support units that are preparing to deploy to the NTC or have a requirement for trainers to support home station training events. In the past year the Eagles traveled to Fort Stewart, Ga., Fort Hood, Texas, and Bosnia training exercises at Fort Rucker, Ala. The teams have also traveled in support of National Guard and Reserve aviation units in Montana, Idaho and Mississippi. The focus of the home station visits is tailored by the requesting commander and includes trend reversal (based on trends seen at the NTC) and doctrinal based instruction. The training packages are funded by the requesting unit.

Finally, there is the Eagle Team Home Page, which provides the Army with a variety of classes, documentation of trends seen at the NTC, answers to common questions and POCs for various training teams. The homepage recently underwent complete revision and can be accessed at www.irwin.army.mil/eagle/index.htm. Tactical classes, environmental training tapes, recent trends, and a host of other topics are easily downloaded from the home page.

After-Action Reviews

The most important aspect of a trainer's duties and the rotational unit's training at the NTC is the conduct of AARs. The Eagles take great efforts to provide rotational units with quality AARs from company to aviation



brigade level. AARs at company level are facilitated by the company trainer and will normally include computer graphics displaying OPFOR and BLUEFOR positioning during key events in the battle. Company AARs are normally conducted within one hour of mission completion. Battalion task force and brigade-level AARs are facilitated by the senior aviation trainer and are conducted primarily in a fully instrumented AAR van or theater.

AAR products include digital videos which display player positioning of all combat vehicles and aircraft throughout the battle, gun-camera footage (from AH-64s and OH-58Ds), low-light and FLIR camera footage of assault and GS missions, ASET IV weapon-to-target footage, battlefield communications cuts (FM, VHF, and UHF) and battle action summary videos. Additional techniques for battalion- and brigade-level AARs include the "HUMMER-top" AAR, the "staff" AAR and the "commander's HUMMER-top" AAR, all of which are conducted near the unit's TOC to facilitate the unit's battle rhythm. The Eagle Team also provides NCO and CSS AARs throughout the rotation and conducts two gunnery AARs during live fires using a mobile gun camera tape-review system. In addition to these AARs, each level of command receives a "Take-Home Package" describing each mission that the unit conducted and the observed tasks associated with those missions.

The NTC is the premier training center for the world's greatest army. Likewise, the Eagle Team and the NTC Operations Group remain vigilant in their efforts to ensure that aviation training at the NTC is relative to aviation's evolving roles, doctrine and TTPs. The Eagles remain committed to providing timely and accurate training feedback and the most demanding mission scenarios possible. We look forward to training your unit, either here at the NTC or at your home station. If you are interested in refining your professional skills and sharing your experience with the force, we invite you to join us as a trainer for the most rewarding tour of your career.

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Capt. Funderburk was Attack Battalion S-3 Trainer, Fort Irwin, Calif, when he authored this article. He is currently assigned to 3rd Squadron, 6th Cavalry Brigade, Camp Humphreys in Korea.

Briefings continued from page 3

Canada's **Derlan Aerospace** and the Boeing Co. have signed an agreement to develop components for a new transmission for the AH-64D Apache Longbow. The companies will collaborate in the development of "split-torque" face gear technology for use in the new transmission. Derlan will manufacture the face gears using a Boeing-patented continuous grinding process, will develop special grinding machines based on Boeing designs, and will design and produce a test stand to validate the transmission's performance. Current schedules call for initial testing to begin within three years and, once a production decision is made, Derlan will be the principle contractor for the new transmission.

The Army and the **Boeing Sikorsky RAH-66 Comanche Joint Program Office** have signed a memorandum of understanding (MOU) that defines the Comanche program's engineering and manufacturing development (EMD) phase and establishes an innovative working relationship between the Army and the contracting team. The agreement reflects maximum focus on acquisition streamlining, maintaining the integrated product team process used throughout the Comanche program, facilitating communication, and promoting increased teamwork among Boeing Sikorsky and its government customers.

A team from the 160th SOAR recently demonstrated an enhanced air-transportability kit that will be an integral part of the CH-47F Chinook helicopter now under development by **the Boeing Co**. The kit allows maintenance personnel to easily remove and reinstall the CH-47's aft pylon and transmission, a necessary requirement to fit the Chinook into the cargo holds of large transport aircraft. The first CH-47F is scheduled to enter service in 2003, with Boeing set to modernize at least 300 earlier-model Chinooks.

AVCATT-ARMS: Futures Development at Its Best

By Col. James A. Herberg and CWO 3 James H. Ridley (Ret.)

The Aviation Combined Arms Tactical Trainer-Aviation Reconfigurable Manned Simulator (AVCATT-ARMS) is not just a trainer, it's the latest tool for simulation-based doctrine and tactics, techniques and procedures (TTP) development. AVCATT-ARMS was initially conceived by the Army National Guard as a way to conduct collective training efficiently and inexpensively.

Last November the U.S. Army Training and Doctrine Command System Manager for Comanche (TSM-C) was introduced to a proposed system and immediately realized that this was the vehicle to capture the RAH-66 Comanche's future capabilities and develop TTPs from team- through squadron- and battalion-level. The TSM-C office determined that this simulation, if purchased early enough in the development cycle, could effectively solve one of the major problems encountered in the fielding of new equipment-that of having appropriate TTPs available during the fielding of the new equipment and units.

AVCATT is being designed as the U.S. Army Aviation Center's new simulation tool. The cockpit can be configured to replicate the active Army's AH-64A/D, RAH-66, OH-58D, UH-60A/L/K/Q, CH-47D and the reserve components' AH-1F/P and UH-1H/V. Using a networked simulation battlefield environment, unit collective training can be realistically conducted at substantial savings in both time and dollars. AVCATT-ARMS will be a critical component of the Army's Combined Arms Training Strategy (CATS) and the development of future operational TTPs.

This system provides an unprecedented capability to develop procedures from team- through battalion- and squadron-level with similar and dissimilar aircraft, thus opening up an entirely new vista of doctrinal development. Additionally, AVCATT-ARMS is mobile and transportable to any theater in which Army aviation may operate. It will provide commanders with a capability to conduct mission rehearsal far superior to anything available today.

Today's acquisition programs are expensive and growing more so as we attempt to incorporate increasingly sophisticated capabilities in our future platforms. The AVCATT-ARMS concept provides a way to decrease the training and TTP-development costs in concert with the Simulation Based Acquisition (SBA) process, while providing a system with far-reaching capabilities for future employment. It will provide a realistic, high-intensity, task-loaded combat environment for attack, reconnaissance and lift aircraft. Incorporated into AVCATT-ARMS is a Semi-Automated Forces (SAF) workstation that allows the "battle master" to create and insert friendly and enemy forces on the battlefield.

The simulation acquisition strategy for the RAH-66 Comanche calls for an AVCATT-ARMS to be delivered in September 2002. That's a full year before Force Development Test and Evaluation II (exploration of troop- and company-level TTPs) are conducted and three years before the first collective training by the pilots who will fly the aircraft during its Initial Operational Test and Evaluation (IOT&E). This high-fidelity collective training capability will allow experimentation with new concepts for employment, as well as exploration of the new capabilities the Comanche brings to the total force. At the same time, it will save many expensive flying hours that would otherwise have to be devoted to this experimentation — all this before the first aviators ever touch the controls of the actual aircraft for collective training.

Additional capabilities are inherent in AVCATT-ARMS. The battle master workstation provides the capability to

simulate a higher headquarters and the "fog of battle" present on any battlefield. Pre-mission planning using the Aviation Mission Planning System (AMPS) can be incorporated into the system to provide a realistic mission fly-through capability before mission execution. An after-action review (AAR) capability allows commanders and their staffs to conduct immediate AARs, reinforcing lessons learned from the training experience. Also located in the AVCATT-ARMS trailer is the battalion- and squadron-level staff workstation allowing the staff to practice and train during any exercise. All these capabilities greatly increase the value of using AVCATT-ARMS during the development phase of any new Army rotary-wing aircraft.

Early in the Comanche program, in a manner that presaged the current SBA concept, simulation was used in the source-selection process at a cost of approximately $20 million in the mid 1980s, far less than the $500 million UH-60 prototype fly-off in the 1970s. From a TRADOC perspective, the simulation training and development capabilities provided by AVCATT-ARMS are just as important as the simulation procedures used to determine the appropriate airframe for the LHX concept. Exotic and imaginative "out of the box" concepts that would have been difficult or impossible to accurately simulate in the past can now be flown under realistic cockpit and battlefield conditions at the lowest tactical level in a virtual-simulation environment. This approach is less expensive and far more representative of actual battlefield conditions and requirements than any constructive or virtual training device that exists for collective aviation training.

An accurate portrayal of Comanche in simulation will reduce the time, resources and risks of the acquisition process while increasing the usability of the platform. Similar to the source-selection process that determined the Comanche's airframe design, TSM-Comanche believes that the use of AVCATT-ARMS will eliminate the problem of fielding a futuristic aircraft wedded to outdated employment techniques tied to current airframe capabilities. We have learned this lesson twice. First, we fielded the AH-1S (with its TSU that allowed it to detect and track targets at extended ranges) with the OH-58A that had no optics other than the pilot's eyes. Second, we fielded the AH-64 into units that still had OH-58A/C aircraft. The Apache's endurance, range, speed and optics — read that as mission equipment package (MEP) for the Comanche — were so vastly superior to the OH-58's that there was almost no real operational compatibility between the aircraft.

Our doctrine was initially unable to keep up with the capabilities the Apache brought to the field because those capabilities far exceeded our expectations. Unit commanders continued to attempt to use the two aircraft in an effort to comply with doctrinal requirements. Not until the Aviation Restructure Initiative (ARI) did the Army formally recognize the inadequacies of the OH-58A/C and eliminate it from attack battalions and squadrons. The goal of TSM-Comanche is to field the Comanche with new and realistic TTPs, leveraging the new capabilities it brings to the battlefield and the force commander.

The Comanche program has a unique advantage over other programs in that it has an Early Operational Capability (EOC) unit consisting of aviation warrant officers and enlisted soldiers who are subject matter experts (SME) in aviation and the Comanche. These soldiers provide their expertise and field experience to contractors and developers to maximize the aircraft's design, employment, functionality and maintainability. It is these soldiers who will develop the TTPs for the Comanche — from individual cockpit, button-pushing procedures and airframe maintainability to battalion and squadron level employment and collective maintenance requirements.

The use of simulation increases the ability to conduct force-on-force exercises and the flexibility to conduct multiple scenarios while eliminating the potential for catastrophic equipment failure during new and stressful situations that push the envelope in which the aircraft and aircrews operate. AVCATT-ARMS will not eliminate the need for operational testing, but it will be a powerful risk-mitigation tool.

Simulation is an area recognized by both the Comanche Program Manager Office (PMO) and TSM-Comanche that provides huge dividends for a relatively inexpensive investment. Without an AVCATT-ARMS during the development phase of the Comanche program the RAH-66 unit might be fielded under the same constraints under which the AH-1S and AH-64A were fielded. Both the Comanche PMO and TSM-Comanche are committed to ensuring that Comanche fielding will be accomplished without such constraints.

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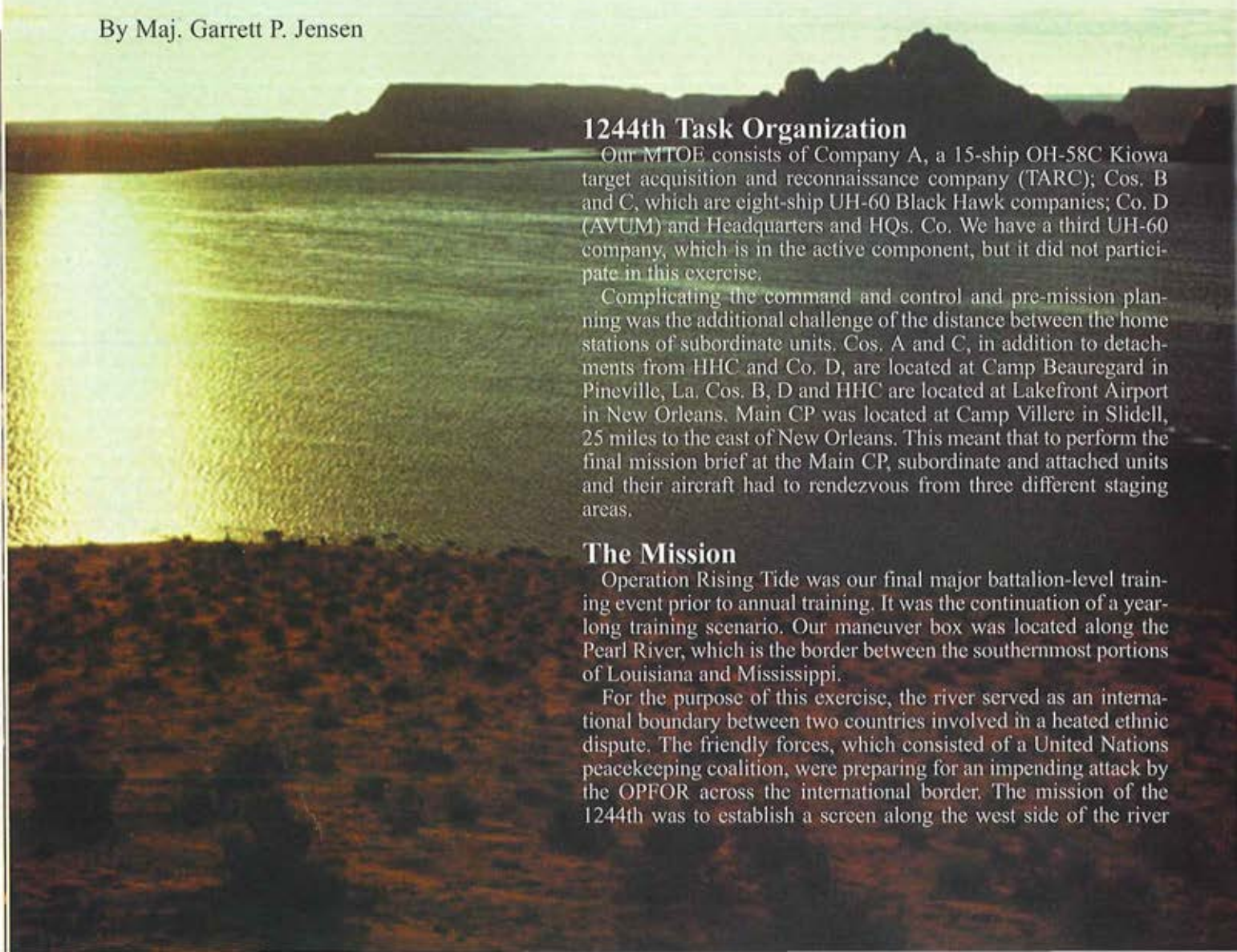
Col. James A. Herberg is the TRADOC System Manager, Comanche, at Fort Rucker, Ala. CWO 3 James H. Ridley (Ret.) is a senior systems analyst for Veridian Inc., a contractor supporting TSM-Comanche at Fort Rucker.

Operation Rising Tide

By Maj. Garrett P. Jensen

The 1244th Aviation Battalion of the Louisiana Army National Guard, commanded by Lt. Col. Tom Zabasky and headquartered in New Orleans, is facing the same challenge that every unit in the military is experiencing: how to continue to provide realistic training in an environment that is becoming progressively more austere. The following is an example of how Capt. Sherry Brannan, our S3, was able to think "outside the nine dots" to maximize available resources and execute a very successful field training exercise on a drill weekend. This mission's successes can be attributed to detailed advanced planning, simultaneous multi-echelon training and sister service participation.



1244th Task Organization

Our MTOE consists of Company A, a 15-ship OH-58C Kiowa target acquisition and reconnaissance company (TARC); Cos. B and C, which are eight-ship UH-60 Black Hawk companies; Co. D (AVUM) and Headquarters and HQs. Co. We have a third UH-60 company, which is in the active component, but it did not participate in this exercise.

Complicating the command and control and pre-mission planning was the additional challenge of the distance between the home stations of subordinate units. Cos. A and C, in addition to detachments from HHC and Co. D, are located at Camp Beauregard in Pineville, La. Cos. B, D and HHC are located at Lakefront Airport in New Orleans. Main CP was located at Camp Villere in Slidell, 25 miles to the east of New Orleans. This meant that to perform the final mission brief at the Main CP, subordinate and attached units and their aircraft had to rendezvous from three different staging areas.

The Mission

Operation Rising Tide was our final major battalion-level training event prior to annual training. It was the continuation of a year-long training scenario. Our maneuver box was located along the Pearl River, which is the border between the southernmost portions of Louisiana and Mississippi.

For the purpose of this exercise, the river served as an international boundary between two countries involved in a heated ethnic dispute. The friendly forces, which consisted of a United Nations peacekeeping coalition, were preparing for an impending attack by the OPFOR across the international border. The mission of the 1244th was to establish a screen along the west side of the river

within its zone, to move a notional artillery battalion to within indirect fire range of the border, and to provide an airborne retransmission platform and an additional command-and-control platform.

Subordinate Unit Missions

The TARC company was to perform a screen on the west side of the international border to gather intelligence on OPFOR enemy concentrations and associated equipment. Its zone extended to 5 kilometers beyond the east side of the river. The UH-60 companies had two separate and distinct missions. Co. B was tasked with slingloading a notional artillery battalion to a fire base within range of the international border. The second Black Hawk company, Co. C, provided command and control, retrans and VIP observation platforms. Co. D provided a maintenance contact team and HHC established the Main CP, ground retrans and FARPS.

OPFOR Task Organization and Mission

The OPFOR air threat consisted of two AH-1W Cobras from Marine Air Group 42, located at Belle Chase NAS in New Orleans. Their mission was to destroy the aeroscout screen and command-and-control aircraft, and also to provide security for the OPFOR resupply mission along the river. The waterborne OPFOR was provided by the Navy's Special Boat Unit 22 located at the New Orleans Naval Support Activity. The three 27-foot PBLs (patrol boat, light) that participated in the exercise were to navigate 10 miles up the Pearl River and simulate resupplying OPFOR units positioned along the eastern side of the river.

Fire Support

Since we have no organic fire-support section within the battalion, our request for an attached cell from the Louisiana National Guard's 1141st Field Artillery Bn. was granted. This section processed calls for fire from the TARC company. The notional artillery battalion emplaced by Co. B provided direct support. The purpose of fires was to destroy OPFOR air defense artillery and to provide immediate suppression when necessary.

Significant Training Events

Aeroscout Screen

The scouts were able to practice relief on station and maintain continuous contact with the OPFOR patrol boats. They also trained on providing the S2 with spot reports and calling fire missions into the fire-support cell. The OPFOR Cobras, however, proved to be much more elusive. They were seldom seen.

Slingload Operations

While the scouts were performing their screen mission and calling for fires on the OPFOR resupply boats, further to the south there were UH-60s moving a notional artillery battalion from the corps rear to within range of the international border. In reality, they were slingloading 55 gal drums of concrete for RL progression purposes.

FARP Operations

This was the first time in a drill weekend that the POL Platoon had deployed two operational FARP's simultaneously. The two FARPS, which were located 50 miles apart, hot-refueled 17 aircraft and pumped 3,200 gals of JP8 in three hours. The first FARP was located 50 miles to the north of the second at Bogalusa. This FARP's mission was to support the scouts in the northern portion of the screen. The second, in the south, was located five miles to the west of the battalion main CP. It was tasked with supporting the southernmost scouts, the C2 and VIP UH-60s, the slingload aircraft and the Marine Cobras. The POL Platoon's performance exceeded our expectations.

Another significant event that took place in one of the FARP's was our S2, Cadet Barth, passing INTSUM's to the aircrew members while their aircraft were at idle being refueled. This was an excellent idea.

OPFOR Air Attack

Late in the exercise the OPFOR Cobras "destroyed" the TOC, "killing" the entire command group. This forced the assistant S3 to re-establish TOC operations in the ALOC and assume control of the mission. Fortunately, the S1 and S4 had been following the mission and keeping their SITMAP current with friendly and OPFOR graphics. It was a smooth transition.

Medic Casualty Treatment

Our flight surgeon, Capt. Barrios, capitalized on the aftermath of the air attack. He prepared the victims with moulage and then issued each one a symptoms card for the medics to read. The medics performed triage, provided treatment and simulated air ambulance medical evacuation. The S1 then generated casualty feeder reports.

Convoy/Drivers Training

One main-body convoy was necessary to satisfy mission requirements. Other vehicle sorties included those for the FARPs and retrans site. This provided an opportunity for the units' noncrewmember enlisted personnel to practice their PCI checks and perform driver's qualification training.

There is no substitute for detailed planning, especially with scant resources. This FTX had been on the calendar for nine months. Detailed planning by the S3 had begun six months prior to execution. Routinely, he will issue a WARNORD 90 days from execution for battalion-level missions. The OPORD typically follows the WARNORD by 30 days. However, due to the complexity of this mission, 30 days was added to the timeline. This allowed subordinate units even more time to execute their troop leading procedures.

This mission had been briefed, rebriefed and backbriefed several different times to several different audiences. Although only four hours had elapsed from the final brief to ENDEX, it was near the intensity of the OPTEMPO of the NTC. From planning to execution, the S3 section was able to train on seven of its 10 collective tasks. Capt. Brannan summarized his thoughts on the outcome of the FTX, "We are a long way from being able to do this mission at night, but for a unit with only 39 training days a year, I feel pretty good about what we accomplished."

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Maj. Garrett P. Jensen is the executive officer of the 1244th Aviation Battalion in New Orleans, La.

More *Conspiracy* than Program — The Beginnings of the ARMED HELICOPTER

CWO 4 Thomas J. McDonald III (Ret.)

At precisely 2:38 in the morning of January 16, 1991, eight McDonnell Douglas AH-64A Apache helicopters fired the first shots of Operation Desert Storm. Four and one-half minutes later, two vital Iraqi air defense radar sites lay completely destroyed.

The attack helicopters that are now an integral part of Army aviation had a much more humble beginning. Work on arming helicopters began in earnest in early 1956, with a small group at Fort Rucker, Ala. Never authorized at the Pentagon level, with no money budgeted for the work, "The project was more nearly a conspiracy than a program," according to the officer in charge.

First Steps

The idea of arming helicopters was tested as early as 1942, with a 20mm cannon installed in the nose of a Sikorsky R-5. The Navy evaluated helicopters for antisubmarine use during World War II as well. Bell Helicopter mounted a bazooka on the skid of a Model 47 in 1950, and the 24th Infantry Division developed a hand grenade "bomber" in 1953. Official interest in arming helicopters stopped with the end of the Korean War.

The Air Force appeared to feel threatened by armed aircraft owned by other branches of the service. As Lt. Gen. I. H. Edwards noted in a memo declassified in 1973: "The Air Force is concerned over the large numbers of aircraft and personnel included in the Army's 1952 budgets." He then had the chutzpah to suggest "transferring appropriate funds from the Army to the Air Force, to be applied against the manning, equipping and supporting of Air Force transport units." The secretary of defense probably never saw this idea.

A November 1952 agreement prohibited the Army from duplicating the "close-combat support, assault transport and other troop-carrier airlift" missions of the USAF. This document, and successors much like it, were worked around or ignored by Army brass almost from the time the ink was dry. The very term "airmobile" was later used by the Army because this was not prohibited, while "assault transport" was.

Brig. Gen. Carl I. [illegible] (seated in a Cessna L-19 trainer) championed the armed helicopter program from the start. Without his tenacity in the face of indifference and opposition, Army helicopters of the period would not have fired the first shot.

The arming of Army aircraft began with project Able Buster, a test that ran from April through July 1955. Able Buster's purpose was to test light off-the-shelf aircraft used en masse as anti-tank weapons. Existing rockets were designed to be launched from aircraft traveling at several hundred miles per hour, not at the much slower speed of light planes. Also, it was difficult to evaluate what a swarm of airplanes could do when only a handful were actually available. The initial results were not promising, but Army Aviation School commandant Brig. Gen. Carl I. Hutton recommended that the project be continued as Baker Buster, with weapons and aircraft designed for the job.

When the Department of the Army disapproved this request in December 1955 and directed that the whole project be dropped, Hutton found it a bitter pill. There was a bright side, though. A leftover collection of weapons and sights was available at the Fort Rucker home of the aviation school. Hutton felt that armed helicopter transport would help solve mobility problems on what was then expected to be a nuclear battlefield. No funds were available, and the whole concept had

just been disapproved by his superiors. Nonetheless, he decided to proceed privately. Early in 1956, he selected Col. Jay D. Vanderpool as project officer, and directed him to see what could be done.

Testing the Concept

Vanderpool's appointment marked the start of one of the cheapest and most successful research-and-development programs in modern military history. Vanderpool was not a pilot, and had fought behind enemy lines in both WW II and Korea. He believed strongly that aircraft had not been exploited for ground warfare because of the Cold War emphasis on the intercept and strategic-bombing roles. Apart from the colonel, the initial team consisted of just two pilots, one crew chief and one administrator.

The team used a Bell H-13E Sioux (which became the OH-13E following the 1962 adoption of the Tri-Service aircraft designation system) for the initial tests. Using leftover parts from Able Buster, one aircraft was armed with two .30-caliber machine guns and two Oerlikon 8cm anti-tank rockets. By the spring of 1956 this first system was ready to be test-fired, though no one was really sure how the helicopter would react. The recoil of the guns might cause structural damage or pitch-control problems. Imperfect understanding of helicopter aerodynamics at the time caused some suspicion that the rockets could blow the air cushion from under the hovering machine. A more realistic concern was that the rockets would not fly true due to interference from the rotorwash, and the lack of forward airspeed at launch.

For the first tests the aircraft was secured to a wooden platform and the weapons were fired by remote control. The earliest machine gun firings cracked the bubbles enclosing the cockpits. Shock-mounting the bubbles by enlarging the screw holes and putting a rubber grommet in each one improved this situation, but the problem was never completely eliminated.

Once this problem was under control, crews fired the weapons with the helicopter's engine running, then from a hover, and finally while in forward flight. Rockets flew straight and produced a reasonably small dispersion pattern. The basic concept worked.

Col. Jay D. Vanderpool found his visionary concepts difficult to introduce into the military bureaucracy. In later writing, he remembered being "painfully aware of the inertia and obstructions encountered by proponents of the musket, the airplane, the tank, the parachute and nuclear-powered submarine, to name a few."

Experiments continued in the spring of 1956, but no written records of this period survive. At the same time, Hutton and Vanderpool ran exercises to develop the tactics to exploit the concept.

As Hutton said in his memoirs: "These experiments and exercises were beginning to be quite extensive, and it became advisable to secure some authority to continue them." Training Memorandum Number 13 from the Continental Army Command (CONARC) arrived in June 1956 and "furnished the cover under which approval was requested." This memorandum directed infantry division commanders to begin testing highly mobile task forces designed to operate on a nuclear battlefield. CONARC commander Gen. W. G. Wyman directed that task-force development would not disrupt training already required, that firing exercises be included and that equipment would not be simulated.

In a June 27, 1956, letter to Wyman, Hutton pointed out that the mobility of task forces "appears to me to be no greater than the mobility of task forces of World War II." He then requested permission to "experiment with existing types of helicopters, and ... run some problems similar to those of Training Memo #13." Wyman replied on July 13, approving the idea and directing that a plan be prepared and coordinated with the Infantry School. Neither general specifically addressed the arming of helicopters, which would have violated Defense Department policy.

Most official and unofficial histories on the subject overlook the work of the winter and spring of 1956 and mark June 27, 1956, as the start of the armed-helicopter program. The program actually started months before then, however, as several sources confirm.

One source is the memory of a project pilot, Capt. John D. Roberts. Another is the written plan, produced per Wyman's orders. The plan's writer got his tenses confused. First came several pages of discussion as to what would be done when work started in the future. Then, the statement "Experimentation continues (author's emphasis) in the firing of rockets and machine guns using H-13/H-23 helicopters as a firing platform." No one at CONARC questioned the discrepancy. Several contemporary articles have inconsistent dates, for example describing

"several weeks" of work between June 27 and Jul. 5, 1956. But the clincher is Hutton's previously quoted memoir.

Evidently deciding that his 27 June request would eventually be approved, Hutton felt ready to conduct the first "official" firing on Jul. 5, 1956. Armament had by now been upgraded to two WW II-vintage .50-caliber AN-M2 machine guns, and four of the Oerlikon rockets. The pilot this time was Capt. James Montgomery, and the firing was an unqualified success.

Capt. James Montgomery with the first "official" armament kit. He was the test pilot in July 1957 firing. Earlier versions used lighter .30-cal. machine guns, and only one pair of the Oerlikon rockets.

Spreading the Vision

With official permission now granted Vanderpool went on a tour of ordinance plants, looking for ideas. There were still no suitable systems available. He visited the General Electric Company's Burlington, Vt., facility, where engineer Thurlow T. "Turtle" Mayhood and his associate Jack Harding agreed to build a rocket kit and deliver it within three months. This was unusual, in that the colonel had no money or government contract to offer. The only plan consisted of a drawing on a paper napkin. This level of industry cooperation continued as the norm for several years. While a contractor would not be paid, he would obtain free use of an aircraft and pilot to test a new idea and could hope to make a sale if the prototype worked.

Larger aircraft and systems were used by the group that came to be known as "Vanderpool's Fools." By mid-1957 10 aircraft were being employed, including six H-13 Sioux, two Piasecki H-21 Shawnees, one Piasecki H-25 Army Mule and one Sikorsky H-19 Chickasaw. The unit had by then been designated the Sky Cavalry Platoon (Provisional), and had 27 men assigned. Hutton's successor, Brig. Gen. Bogardis R. Cairns, continued the work with enthusiasm. Growth continued, along with name changes. First came the 7292d Aerial Combat Reconnaissance Company (Experimental), and then in March 1959 the 8305th Aerial Cmbt. Recon. Co. The final version of the unit had about 70 members. Both company-sized units were commonly known as the "ACR Company."

The entire program had no official recognition above the CONARC approval for "experimental" units, and no specific developmental funds were available. Yet morale was high, and the men called themselves "The Royal Order of the Fighting Hover Bugs." Each pilot had a nickname. CWO Lawrence C. Hammond became the "Chief Piddler," CWO James D. Lombard was "Chief Inventor" and Capt. W. F. Gurley was "Chief Operator."

Pilots and crew chiefs were selected for their enthusiasm, proficiency and machine-shop skills. Many of the warrant officers in the project were former Marine Corps captains and majors signed on by the Army after the Korean War. They had fired weapons from fighter aircraft, and had buddies still in the Corps who allowed them to "borrow" equipment for testing on helicopters. Anyone in the unit who had an armament system idea could have a prototype built and tested. Basic weapon types were the .30-caliber aerial machine gun and, ultimately, the 2.75-inch folding-fin rocket. Within these limits, each pilot designed, and often built, his own weapon system. Vanderpool was seeking innovation, not standardization.

Developing the Systems

Called "kits," these armament prototypes were usually made in the post machine shop. Kits were eventually given alphabetical designations from A through V, but these were for reference only and did not always reflect the order in which they were developed. Some kits carried no designation at all; the General Electric kit was called just that and other kits existed in several versions.

Kit O was one significant development. This H-21 Shawnee had a B-29 Superfortress gun turret mounted under the nose. The idea was that the aircraft could deliver fire on an area even while in a nose-high landing attitude; something not possible with fixed guns. This particular installation did not work very well. The H-21 electrical system was not built to reliably produce enough power for the guns, and the extra weight carried so far forward made flying difficult. Still, the idea was sound, and this system was the forerunner of the chin turrets now in use on virtually every attack helicopter in the world.

The Piaseki H-21 was officially named the Shawnee, but often called the "Flying Banana." This example had a chin turret from a Boeing B-29 Superfortress mounted under the nose.

Armed helicopters reached another milestone with Kit K in August 1958, when the ACR Company tested French built SS-10 missiles mounted on an H-13H. This provided the first true anti-tank capability, something that had been the original aim of Able Buster. So important was this goal that the Army actually provided a contract to Bell Helicopter for the system. Unlike today's missiles, the SS-10 had to be hand-flown all the way to the target, rather like a radio-controlled air-

plane. Though this proved very difficult to do in a vibrating helicopter the test firing was a success. Still, the Army deferred action on adopting the system in December 1958, citing Department of Defense policy limiting Army aircraft weapons to defensive systems only. The program was dropped in favor of the improved SS-11 in February 1959. A few were eventually installed on Hueys.

One of Vanderpool's implicit missions was selling the airmobile concept to the rest of the military. The fact that he did not have an optimum air vehicle or weapon was one problem, the lack of formal funding was another. The team had to overcome Army resistance before they could expect policy support from headquarters in a turf war with the Air Force. The larger political issue was the emotionally charged Army vs. Air Force roles-and-missions controversy, and lingering hard feelings in some quarters over the 1947 transformation of the Army Air Forces into the separate U.S. Air Force. These factors caused even the hard-charging Hutton to recommend against the formation of a separate Army aviation branch.

"The team labored under a constant threat that the Army would order the project terminated in some 'horse trade' with the Air Force, or that the Air Force would force a premature decision at Department of Defense level," Vanderpool said. This almost happened when the Army deputy chief of staff for logistics, Gen. Carter B. Magruder, became worried about possible Air Force objections. He tried to block the arming of helicopters for use against enemy soldiers and positions, since this was a USAF role, and also objected that these aircraft would be too low to locate targets anyway. In a compromise between Magruder and the chief of research and development, Lt. Gen. Arthur Trudeau, the Army issued a formal finding that the helicopter was too vulnerable to attack ground forces and would carry only defensive armament.

In order to carry out this sales mission, from June 1957 on ACR crews barnstormed military installations around the country giving firepower demonstrations. The aircraft appeared vulnerable, but the demonstrations showed that this vulnerability could be minimized by speed and agility combined with firepower and evasive action.

The SS-10 missile provided this Bell H-13H with true anti-tank capability.

Retired major general (and former AAAA president) Benjamin Harrison was involved in the project, remembers that the standard demonstration at Fort Rucker's Matteson Range "had CWO 2 Charley Bramier flying his H-21 very close to the stands, rolling the nose wheel on the ground for about 30 yards and then firing the .50-cal under the noses of the greatly shocked audience. Charley was a super troop, and one of those guys who really loved to fly that 21. Today he would be grounded as a cowboy or worse. Nonetheless, he expertly demonstrated the maneuverability of the rather large H-21."

Proving the Concept

A single demonstration at Fort Bliss, Texas, in the spring of 1958 had the greatest impact on the decision making process. Then as now, Fort Bliss was the home of air defense and Vanderpool said that troops there were "convinced that they could shoot down the helicopter with air rifles." The desert would provide little cover to the aircraft, and Army Chief of Staff Gen. Maxwell D. Taylor would be attending.

Close examination of the desert disclosed that what appeared at first glance to be flat terrain was actually laced with dry streambeds. These were deep enough to conceal a helicopter flying at three to 10 feet off the ground. The stream beds also made navigation simple, and a number of them conveniently converged at a point about 100 yards in front of the bleachers at the demonstration range.

The midday heat was a problem, since the overloaded and underpowered aircraft could not take off or hover at the 6,000-foot density altitude. After conferring with engine and airframe manufacturers, Vanderpool asked his pilots to "borrow" an extra 250 rpm for takeoff and 100 rpm for cruise.

The guests at the demonstration were invited to observe the aircraft while they were about three miles away. They were to determine how frequently they could detect the aircraft, and whether they could be engaged by ground weapons. The helicopters then descended into the swales and were barely glimpsed again until they popped up in front of the stands. They seemingly emerged firing from the desert floor. Larger birds firing rockets and carrying troops for an airmobile infantry assault quickly followed. When the "battle" was over, Wyman turned to Taylor and said, "Max, that is what I have been trying to tell you."

While the concept was ultimately successful, the improvised nature of these systems provided exciting moments for ACR pilots. Roberts, who flew H-13 number 2511 through a variety of tests, was once slightly wounded when the cockpit door flew open during firing, deflecting bullets into the cockpit. "After that," he says today, "we generally flew with the doors removed." The same pilot and aircraft acquired a rocket assist when one of the experimental Weevil rockets hung up in a launch tube. It ignited the other five on the right side and pitched the nose up and left, even with full forward cyclic applied. Luckily for Roberts, the motors burned out when the aircraft reached

a 45degree pitch attitude, and he was able to recover.

Crashes were seen by Hutton as the cost of doing business, and accidents did not go on a pilot's record. Acknowledgment of accidents or incidents would have provided the program's foes with an excuse to close it down, so they were usually kept under wraps. Most damage resulted from gun vibration, or from landing on uneven ground with kits slung low under the skids of H-13 Sioux.

There were at least two noteworthy incidents. One again involved Roberts, flying 2511. The aircraft was armed on the main post, then flown a few miles to Matteson Range for a demonstration. It was hot, and the presence of a passenger put the aircraft 165 pounds over the maximum weight. While landing in the close confines of the range the helicopter encountered settling with power, descending into its own rotorwash. It hit hard, bounced and landed on its left side. Roberts and his passenger were uninjured, and the demonstration went on as planned.

The other accident also occurred en route to a live-fire exercise, this time at Fort Benning, Ga. Lt. Bobby Latham was flying an H-13 with an armament kit installed. A lieutenant colonel who was not a pilot was his passenger. Latham hit a tree, completely shattering the bubble. He landed at Fort Benning, where Vanderpool and the other pilots pondered what to do. The aircraft with the kit was one of a kind, and needed for the demonstration.

While there were no deaths or serious injuries during the program, there were several accidents and incidents. This overloaded H-13 crashed at Fort Rucker on Jan. 21, 1958, just before a firing demonstration.

A group of ACR pilots at Fort Benning. Lt. Bobby Latham (looking somewhat windblown)? is second from the left.

Latham volunteered to fly what was now an open-cockpit H-13 the 90 miles from Fort Benning to Fort Rucker. He arrived at Ozark (now Cairns) Army Airfield unannounced, and landed among the student trainer aircraft. The airfield commander was apoplectic, demanding to know just how and why his helicopter was in this condition and threatening dire consequences for the lieutenant. Word of this misdeed quickly reached Hutton. Learning that the miscreant belonged to Vanderpool, he ordered that the aircraft get a new bubble immediately, and the rest be forgotten. Latham returned to Fort Benning later the same day, after one of the fastest bubble changes ever.

Another treetop flier, the same Charley Bramier mentioned earlier, welded an open set of hedge clippers to the nose landing gear of his H-21. The idea was that he could cut through smaller limbs or wires and avoid Latham's fate. This is an early example of a wire-strike protection system for helicopters, something else that is now standard on military and many civil rotorcraft.

One close call occurred on Nov. 26, 1958, when two rockets were accidentally fired. CWO Lawrence Hammond fired eight 4.5-inch rockets from his Sikorsky H-34 Choctaw to determine if the cargo compartment windows would be blown in by the blast (they were). The aircraft was then rearmed for a later demonstration, the shattered windows not being seen as a significant problem. A half-hour later, Hammond turned the battery switch on to start the aircraft. Two rockets left the tubes, one from each side of the fuselage. One hit a tree 50 yards away and exploded. The other detonated near a rifle range that was in use at the time.

The investigation into this near tragedy found that, as originally designed, four switches had to be on in order to shoot rockets. By the time the electricity got to the launchers, the drop in voltage was so great that the rockets would not fire. In order to provide ample current, a jumper

wire had been placed between the battery switches and the station distributor for the rockets, effectively bypassing the safety switches. This, combined with some other wiring fault or stray voltage, caused the rounds to fire. Changes to procedures to prevent a repeat included requiring that aircraft be pointed downrange while being loaded, and that a ground wire remain in place until after engine start.

An Idea Validated

A formal requirement to arm Army aircraft was finally approved in May 1960, after four years of testing and staff studies. Despite growing acceptance of the airmobile concept, officers at the Pentagon were often slow to support the idea, and progress was slow. This changed with the Kennedy administration when Secretary of Defense Robert McNamara ordered the Army to explore "... the opportunities offered by aeronautical technology for making a revolutionary break with traditional surface mobility means." He went on to say, "I shall be disappointed if the Army's reexamination merely produces ... recommendations to procure more of the same, rather than a plan for implementing fresh and perhaps unorthodox concepts!"

The ACR team, probably late 1957 or early 1958. Vanderpool is on the far left, in the dress uniform. Pilots along the back row, starting from right to left, are Lt. Bobby Latham, Capt. James Montgomery, Capt. Ernest L. Boswell, Capt. John Roberts, Lieutenant Robert Chedester, Captain Stanley Ballantyne, CWO 2 Charley Brameier, and WO 1 Ray Darbe. Vanderpool, Ballantyne, and Montgomery were the original nucleus of the group.

Testing during the summer of 1962 resulted in recommendations that air-cavalry and air-transport brigades and air-assault divisions be introduced into the force. To prove the concept the 11th Air Assault Division (Test) was organized in February 1963. Eventually redesignated the 1st Air Cavalry Division, the unit deployed to Vietnam in August 1965.

Overlooked, scoffed at and underfunded, the pioneering work of Vanderpool's Fools, " ... more nearly a conspiracy than a program," led directly to the ubiquitous Huey and sleek Cobra gunships of the Vietnam era, and the far more advanced aircraft of today.

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Developing Tactics to Match the Systems

The parallel development of airmobile tactics for air cavalry units was just as important as the progress of armament systems. The fact that a rocket could be fired from a helicopter did not mean that the idea was tactically sound. Firing exercises at Fort Rucker were always non-tactical, with aircraft hovering or making passes in front of the bleachers on Matteson Range. This very lack of a tactical foundation worried many of the visitors who witnessed the demonstrations.

Vanderpool conducted separate tactical exercises on weekends using school aircraft, which were not in use on Saturday and Sunday. They were flown by instructor pilots, working on their days off on what Hutton termed "a somewhat voluntary basis." He added, "Had there been a dropping off in the number of 'volunteers' that Col. Vanderpool could round up - the implication would have been unmistakable that there was something wrong with the fundamental premise. The cheerful people who participated on their weekends gave us the first indication that we were on the track of something."

The first mission was an attack on a road block. The helicopter force was to act as an advance guard, allowing troops on the ground to march unimpeded. Attacking from an inverted "V" or "Y" formation along the road, the flank aircraft made passes to cover the deployment of troops from the base platoon. "There were several mistakes here," Hutton said. "The first was that our thinking remained too road-bound, out of long habit, of course. With the ability of the flying machine to move independently of the roads, we could cover a road while moving along routes away from it. Jumping from terrain feature to terrain feature was easy. Next, the action was developed too rapidly. There was no reconnaissance of the objective before the attack." The dismounted attack also took place too near the objective, and from the direction that the "enemy" was expecting.

A repeat of the drill corrected these faults. The troops attacked from the rear, under the covering fire of the reconnaissance helicopters.

Maneuvers were run and rerun until combat-development officers and unit commanders decided that they had arrived at valid and feasible tactical solutions. These findings were incorporated directly into draft training texts and organizational charts. Seeing a need for a text to teach a large number of people a new concept of war, Vanderpool literally wrote the book on air-cavalry operations. Using the last of the horse cavalry publications as a guide, he rewrote the 1936 manual chapter by chapter, largely by substituting the word "helicopter" for "horse" as needed. Vanderpool concluded that "A ground commander could be divorced from the incidents and accidents of terrain that had restricted him for centuries. Tests had proven that former barriers such as streams and swamps could become avenues of approach by elevating the force only a few inches." - CWO 4 Thomas J. McDonald III, Ret.

ADVANCED COMMON ENGINE DEMONSTRATOR

by Col. Waldo F. Carmona

3000 HP CLASS

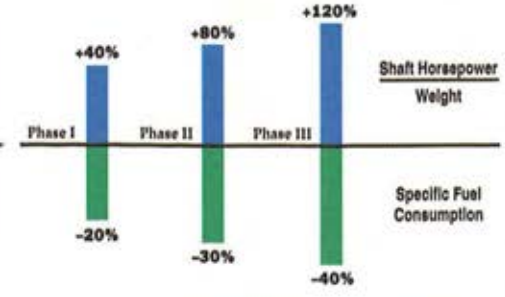
For the past 10 years the Aviation Applied Technology Directorate at Fort Eustis, Va., has been working the Joint Turbine Advanced Gas Generator (JTAGG) advanced-development program. JTAGG, a joint Army/Navy/Air Force effort, is a core engine program directed toward achieving the turboshaft/turboprop engine goals of the Integrated High Performance Turbine Engine Technology (IHPTET) Program shown in Figure 1.

JTAGG I goals included a 20 percent reduction in specific fuel consumption (sfc) and a 40 percent increase in shaft horsepower-to-weight ratio (shp/wt). These goals were exceeded in fiscal year 1995, with a demonstrated 22 percent reduction in sfc and a 64 percent increase in shp/wt. The Phase II goals are a 30 percent reduction in sfc, an 80 percent increase in shp/wt and a 20 percent reduction in production and maintenance costs to be demonstrated in calendar year 2000.

JTAGG III performance goals include a 40 percent reduction in sfc, a 120 percent increase in shp/wt, and a 35 percent reduction in production and maintenance costs to be demonstrated in FY 2003. All of these goals are to be demonstrated without compromising component durability or life. The IHPTET program is providing a technology base for future propulsion systems that will provide revolutionary improvements in aircraft capability.

Integrated High Performance Turbine Engine Technology Initiative

TURBOPROP/TURBOSHAFT PERFORMANCE GOALS



TECHNOLOGY BASELINE:
Modern Production
TS/TP Engines

DURABILITY REQUIREMENTS:
6000 HRS HCF
15000 Cycles LCF
7500 Cycles LCF (hot parts)
Sand Tolerant

Figure1

Performance degradation has occurred in both the Black Hawk and Apache as a result of normal aircraft weight growth associated with new mission equipment packages. In addition, increased lift and range requirements are being sought to support future battle scenarios. A significant increase in aircraft mission radius capability, up to 300 km, is desired for both the Apache and Black Hawk.

In addition to performance issues, a common engine for both the Black Hawk and Apache would greatly reduce the increasing operating and support costs associated with aviation systems. There exists an unfunded requirement for an advanced common engine in the 3,000 hp class to support modernization requirements necessary to ensure the Apache and Black Hawk helicopters remain operationally effective well into the 21st century. This engine development effort will lever-

age the gas generator technology developed under the IHPTET/JTAGG program. Considering the schedule necessary to support the current modernization plan, the 3,000 hp class common engine program will infuse technology of between IHPTET Phase I and Phase II levels.

Army users want improvements in both aircraft range and payload capability. Typically, existing engines are "grown" by increasing airflow and/or turbine inlet temperature to meet the larger horsepower demand resulting from aircraft weight growth. Assuming there is no significant improvement in specific fuel consumption, the aircraft fuel-burn rate is increased, thus decreasing the mission range capability. The negative range impact results because significant mission time will be accumulated at lower, less efficient, engine power settings relative to the current engine installation.

In order to get both an improvement in range and payload capability, a new centerline engine needs to be developed. With the significant strides that have been made in propulsive capability over the last 10 years, it is time to take advantage of this new capability. Accordingly, there is an unfunded requirement for an advanced common engine in the 3,000 hp class applicable to both the modernized Black Hawk and Apache helicopters.

Preliminary analyses have been conducted to size the new engine and quantify the benefits associated with a new centerline approach for the Black Hawk and Apache. These analyses are based on emerging assumptions; specific performance estimates are provided only to show a relative impact of various engine technology levels as compared to a derivative engine approach. These estimates are subject to change based on vehicle gross weight, mission design requirements and other vehicle modifications. The analysis to size the engine was based on a hover out-of-ground effect (HOGE) with 200 feet per minute rate of climb capability for the Black Hawk operating at 4,000, 95 degrees F using maximum rated power (MRP). A 26,600 pound takeoff gross weight (TOGWt) was also assumed for the 9,000 lb external-lift mission. Based on these assumptions the required uninstalled horsepower for the new engines is approximately 2,900 hp at sea level standard (SLS) and 2,200 hp at 4,000, 95 F at MRP.

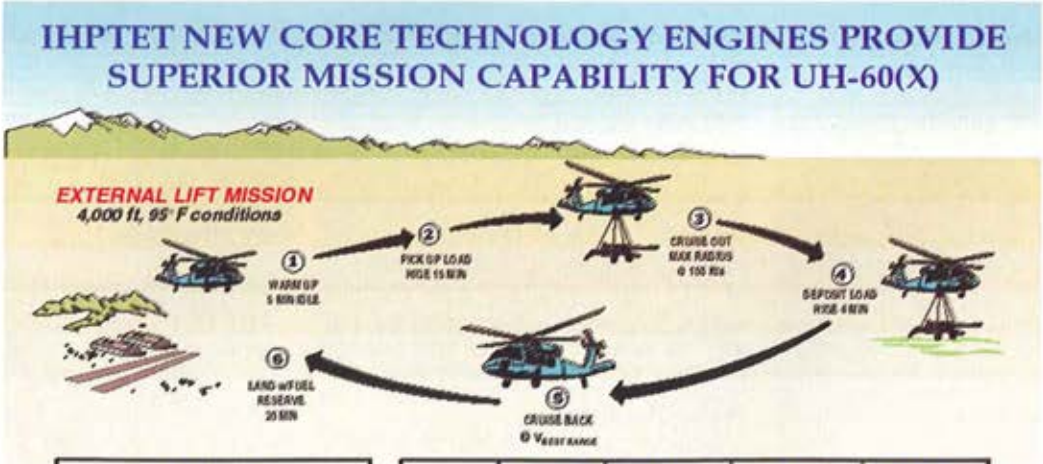
Black Hawk

The Black Hawk will need both increased range and payload capability to meet the expected requirements of the modernization plan. Currently the Black Hawk operates with two T700-GE-701C engines, each providing 1,856 hp installed at SLS, MRP. This power available provides a HOGE capability of about 20,050 lbs at 4,000, 95 degrees F operating conditions. Assuming an internal fuel load of 2,164 lbs and a TOGWt of 20,050 lbs, the current Black Hawk can carry about 5,100 lbs of external payload over a radius of action of 125 km. If the Black Hawk TOGWt grows to 26,600 lbs to provide for a 9,000 lb external-lift capability, the resulting aircraft power required exceeds the capability of the current engines. Thus, if the TOGWt grows as predicted, an increase in engine capability will be required.

There are two primary options available to provide the increased horsepower: either develop a derivative engine or a new centerline engine. The following analyses compare the aircraft performance impact of these propulsion approaches.

Lift Mission

Assuming a derivative engine is developed providing the necessary horsepower growth at a current sfc technology level, the external 9,000 lbs lift could be accomplished. However, the radius of action would only be 55 km, considerably less than the radius capability today. However, a new centerline with a 20 percent reduction in sfc and a 40 percent increase in shp/wt (JTAGG I goals) allows a radius of action of 100 km. A



ENGINES	Growth HP −0% SFC +25% HP/wt	New Core −20% SFC +40% HP/wt	New Core −25% SFC +60% HP/wt	New Core −30% SFC +80% HP/wt
Mission Radius (km)	55	100	125	150
TOGWT (lbs)	26,600	26,600	26,600	26,600
Payload Capability (lbs)	9,000	9,000	9,000	9,000

Figure 2

30% reduction in sfc and 80% increase in shp/wt (JTAGG II goals) results in a 150 km radius of action (see Figure 2 on previous page).

Considering that the JTAGG I program demonstrated a 22 percent reduction in sfc and 64 percent increase in shp/wt, it is considered low risk to achieve both increased range and payload capability with the new centerline approach.

Assault Mission

Looking at a combat assault mission scenario, the current TOGWt of the Black Hawk is about 18,600 lbs, whereas the modernized Black Hawk is assumed to have a TOGWt of 21,100 lbs. The current Black Hawk with 701C engines has a radius of action of 230 km. The growth derivative engine approach only provides a radius of action of 155 km, significantly less than the current Black Hawk capability. A new centerline with a 20 percent reduction in sfc and 40 percent increase in shp/wt (JTAGG I goals) provides a radius of action of 215 km, and a 30 percent reduction in sfc and 80 percent increase in shp/wt (JTAGG II goals) results in a 255 km radius of action. To maintain the current radius of action capability for the modernized Black Hawk, a derivative engine is therefore not sufficient; a new centerline is required.

There are also options being discussed to increase the internal fuel tank capacity of the Black Hawk from 360 gals to 412 or 440 gals. Increasing the internal fuel capacity to 412 gals increases the radius of action for a derivative engine to 185 km for the combat assault mission (still below the 230 km capability which exists today). A new centerline incorporating JTAGG I-level technology provides a radius of action capability of 250 km; incorporating JTAGG II-level technology results in a radius of action capability of 300 km. Increasing the internal fuel capacity to 440 gals only increases the radius of action for a derivative engine to 200 km (still below the current UH-60L capability).

However, a new centerline incorporating JTAGG I-level technology provides a radius of action capability of 275 km, and incorporating JTAGG II-level technology results in a radius of action capability of 325 km. The new centerline, as discussed above, significantly improves upon today's capability.

A deep insertion mission scenario was also analyzed to compare the merits of derivative versus new centerline approaches. The mission requires the Black Hawk, using 460 gals of external fuel, to deposit 11 troops and cruise back with a 20 minute fuel reserve. The current Black Hawk has a radius of action capability of 550 km. A modernized Black Hawk with derivative engines provides only a radius of action of 400 km, significantly less than the current capability. Installing new centerline engines with a 20 percent reduction in sfc and 40 percent increase in shp/wt (JTAGG I goals) provides a radius of action capability of 515 km. Installing new engines with a 30 percent reduction in sfc and 80 percent increase in shp/wt (JTAGG II goals) results in a 600 km radius of action.

"IHPTET new-core technology engines also provide superior mission capability for the modernized Longbow Apache".

Looking at self-deployment capability, the current Black Hawk ferry range is 1,150 nm. If a derivative engine with no improvement in sfc is selected for the modernized Black Hawk, then the maximum ferry leg is estimated to be 810 nm. A new core approach with 20 percent reduction in sfc provides a maximum ferry leg of 1,035 nm and a new core with 30 percent reduction in sfc results in a maximum ferry leg of 1,205 nm.

Considering the European deployment routes, the primary route has a 1,150 nm leg, the first alternate a 755 nm leg and the second alternate a 1394 nm leg. For the African deployment routes the primary has an 1,150 nm leg and the alternate a 1,394 nm leg. For the Latin American/South American deployment routes the primary has a 1,394 nm leg and the alternate a 1,067 nm leg. The derivative engine approach only allows self deployment of the modernized Black Hawk using the first alternate of the European deployment routes. However, a new centerline incorporating IHPTET technologies allows self deployment capability on several routes.

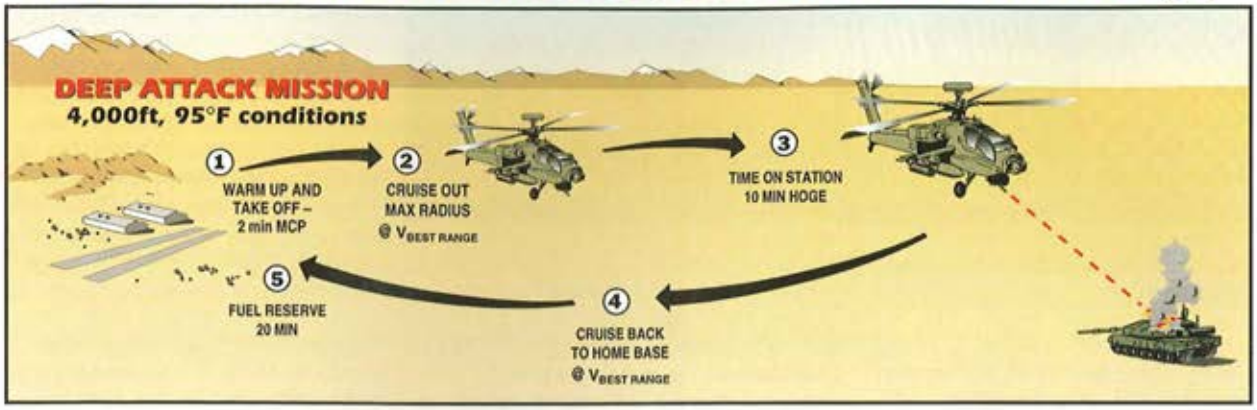
Also, this new engine technology could provide significant benefit to the Sea Hawk. Looking at the attack-mission profile and assuming a TOGWt of 21,740 lbs incorporating two acoustic homing torpedoes and a fuel load of 5,100 lbs, the current-technology engines allow cruising out to 93 kilometers with 187 minutes on station. Application of Phase I technology would allow 250 minutes on station, a 34 percent increase, and Phase II 295 minutes on station, a 58 percent increase.

Application of the JTAGG technology also provides fuel savings of approximately $20 million per year and operation and support (O&S) cost savings of approximately $240 million per year. Thus, the significant improvement in capability is very affordable.

Longbow Apache

IHPTET new-core technology engines also provide superior mission capability for the modernized Longbow Apache. Looking at a combat mission with a TOGWt of 18,700 lbs and a fuel load of 375 gals, the current capability with 701C engines is 220 km. Assuming a common growth derivative engine is installed, only about 200 km radius of action results compared to 230 km with incorporating JTAGG I technology and 280 km with incorporating JTAGG II technology.

Figure 3 IHPTET NEW CORE TECHNOLOGY ENGINES PROVIDE SUPERIOR MISSION CAPABILITY FOR AH64(X)



ASSUMPTIONS

- Fuel Load: 835 gal (includes 2 external tanks)
- Engines Sized for Commonality w/UH60(X) (~2700hp SLS @ IRP)

ENGINES	Growth HP – 0% SFC + 25% HP/wt	New Core – 20% SFC + 40% HP/wt	New Core – 25% SFC + 60% HP/wt	New Core – 30% SFC + 80% HP/wt
Mission Radius (km)	435	565	605	655
TOGWT (lbs)	22,500	22,500	22,500	22,500
Payload Capability (lbs)	1540	1645	1740	1850

Considering a deep attack mission scenario with a TOGWt of 22,500 lbs and a fuel load of 835 gals (includes two external fuel tanks), a derivative engine provides a mission radius of 435 km and a payload capability of 1,540 lbs. However, utilizing JTAGG I technology allows a mission radius of 565 km and a payload capability of 1,645 lbs. Similarly, application of Phase II technology provides a mission radius of 655 km and a payload capability of 1,850 lbs (see Figure 3).

A new core will also provide self-deployment capability for the modernized Apache.

The results of an Apache Enhancement Study conducted by McDonnell Douglas Helicopter Systems in March 1994 underscores the benefits of incorporating JTAGG technology into the modernized Apache. The study said "The decreased fuel flow and weight of the JTAGG engines, yielding greater mission radius and increased payload capability, made these engines the single most effective performance improvement".

Application of the JTAGG technology also provides approximately an $18 million per year fuel savings and operation and support (O&S) cost savings of approximately $425 million per year. The significant improvement in performance capability is thus very affordable.

In summary, over the past 10 years propulsion system technology has made significant strides. The propulsion system capability resulting from the technologies developed under the IHPTET program will provide significantly improved capability and life for upgrades and derivatives of current engines, and revolutionary potential for new engines through the integration of advanced materials, innovative structures, and improved aerothermodynamics.

Application of these technologies provides significant improvement for both the UH-60 and AH-64 with regards to both increased range and payload capability. The reduced O&S cost of these engines make this a very affordable opportunity. To simply do a derivative engine would be a missed opportunity and although the systems may have increased payload capability they would suffer a loss of range. Is this the diminished capability we are willing to have the user live with or is it worth the investment to provide a significant capability, affordably to the user?

The incorporation of new core technology offers a superior solution that provides the necessary horsepower to meet future Army lift requirements while significantly improving existing aircraft range capability at the projected higher vehicle gross weights. The improved fuel consumption, reliability and maintainability characteristics, and the drive for lower engine acquisition and maintenance costs with the new core approach addresses the need for reduced O & S costs.

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Col. Waldo F. Carmona is commander of the AATD and associate director for technology at AVRDEC.

Freeing up a Pilot's Ears: Three-Dimensional Audio Input in Rotorcraft

By Maj. Michael K. Haider

It is a very dark night as the attack helicopter team moves forward towards the intended target. The air battle captain's (ABC) cockpit is a very busy one. There are close air support jets, artillery and other aircraft to communicate with. The inside of his flight helmet sounds similar to a busy Manhattan deli at lunchtime. If everything is normal, the ABC will be operating at nearly full capacity. Throw in a system failure audio warning or some cockpit confusion and overload is just around the corner.

Most pilots have experienced the frustration involved with audio overload occurring at a critical time in the cockpit. In fact, many flight instructors I have spoken with have noted that the first faculty to diminish in accuracy during times of high pilot workload is hearing. Work is currently being undertaken to help alleviate this common problem at England's former Royal Aircraft Establishment, at Farnborough, which is now part of the Defence Evaluation and Research Agency. The solution is to present pilots with a three-dimensional audio input to help them decipher all of the sounds that occur in an average cockpit, including several conversations, both in and outside of the aircraft. This article will briefly explain how three-dimensional audio input is developed and discuss some of the possible uses of this emerging technology in rotorcraft.

Sound localization, the ability to locate a sound, is based upon a combination of binaural (both ears) and monaural (single ear) cues. These cues are what allows a person to hear a sound and immediately look in the direction of that sound. Knowing the location of a sound often assists in its interpretation. Binaural cues are derived from between-ear differences arising from the spatial separation of the ears and the head shadowing the sounds. Monaural cues are modifications to the sound due to diffraction, resonance and reflections from the head, shoulders, upper body or the actual ear shape.

Each person has a unique set of cues and they are collectively called a Head Related Transfer Function (HRTF). One method for creating an HRTF is to surround the subject with a sphere of small noise sources (speakers) and fit the subject's ear canals with tiny microphones. This method empirically measures the differences between the two ears' perceptions in frequency and amplitude. Using this method and varying the location of the noise source will build an HRTF for each individual. When a three-dimensional audio is intended for use by many pilots an "averaged" HRTF can be applied, because it has been found that, in general, people can obtain reasonable directional information without the use of individual HRTFs. Once implemented in a stereo helmet this HRTF is used to produce three-dimensional audio.

Once the modeling of the HRTF is complete and the three-dimensional audio is available in the flight helmet, there are three choices available as to how the sound is referenced. The sound can be head oriented, aircraft oriented or earth oriented.

Making the sound head oriented is the least expensive and simplest method of the three. One of the advantages of head-oriented sound is that there is no head tracker required inside the cockpit. The three-dimensional audio would be most commonly used in this case to "sort out" sounds that would otherwise be confusing to the pilot. Each specific sound is assigned to an area of the head. In this case, a pilot listening to three or four radios simultaneously would hear them as distinct sounds coming from different areas. As a result, the pilot would be much less likely to miss a radio call during a conversation inside the aircraft.

Taking the three-dimensional audio to the next level would incorporate a headtracking device in the cockpit. It makes the sound aircraft oriented, and because of the need for head tracking it is more complex and expensive than head-oriented options. This is an obvious addition to an attack helicopter that may already have a head-tracking system. Some of the uses of aircraft orientation could be intercom system inputs coming from each crew member's actual position or a dual system-failure warning coming from the system's actual location (port or starboard engine for instance) to assist in executing the emergency procedure.

In large aircraft such as the CH-47, where several crew members may be on the intercom simultaneously, there are several advantages of having aircraft-oriented sound. For example, during sling-load operations it is handy to know if a second crew member is assisting in the conning. Also, three-dimensional audio would easily discern the confusion of several crew members simultaneously cautioning a pilot about an obstacle during night-vision goggle operations. In the unfortunate scenario of a single engine fire, the warning would come from the correct side of the aircraft and perhaps assist the pilot in identifying the correct "T" handle to pull. This could possibly prevent an unnecessary aircraft loss due to hurried or inaccurate decision making. Any other emergency that involves a duplex system could also use the audio orientation.

When incorporating headtracking and aircraft orientation (location), three-dimensional audio becomes earth oriented. This installation is not as simple as the others because the aircraft must have some onboard system capable of determining the azimuth to the outside object (VOR, waypoint, other aircraft, etc.). There are several uses for earth orientation, including incoming threat warning, navigational assistance or the location of other aircraft. By integrating the three-dimensional audio system with conventional threat-warning systems that already portray azimuth information, the pilot is presented with a more complete picture of the approaching threat missile.

Using the sound as a homing device in poor weather could help a pilot return to a homebase or ship. Sound could also be used to orient a pilot to the location of the next waypoint, route or a rally point on a battlefield. An excellent use of the earth-oriented sound would be to locate other aircraft. Returning to the scenario at the beginning of this article, the ABC would have much better situational awareness by knowing the locations of his attack helicopters if their voices (assuming no radio silence) came to him over three-

dimensional audio. In a night blackout scenario, the ABC spends an inordinate amount of time calculating locations of other aircraft. Three-dimensional audio would at least let him know who is closest to the target.

There are many uses for three-dimensional audio in the cockpits of Army helicopters. From the simple decluttering of the myriad of sounds to actual improvements of situational awareness outside the aircraft, the advantages of this technology would be welcomed by many busy ears. As systems become more and more complex the need to involve as many senses as possible becomes greater. Three-dimensional audio may soon be a system we cannot afford to live without.

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Maj. Michael K. Haider, assigned to the U.S. Army Personnel Exchange Program in the United Kingdom, is research and development flight commander for the Rotary Wing Test Squadron at the Defence Evaluation Research Agency, Boscombe Down.

mailbox

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Dear Editor:

The April-May article on Aviation Branch heritage by Maj. Gen. Anthony Jones contained an erroneous comment about the use of helicopters in the Korean War. Each infantry division had four H-13s; how they were used depended on the division commander.

When I arrived in Korea for service with the 7th Infantry Division in April 1952 I was the only rated helicopter pilot in the division. The four H-13s hadn't flown in months, and when I finally got them airworthy I had a private fleet of helicopters until other pilots finally arrived.

When Maj. Gen. Wayne C. Smith took command of the division the H-13s became an important command tool. We flew those H-13s from early to late, seven days a week. I was assigned as Smith's pilot and eventually was also appointed his aide de camp, though I still flew my share of L-19 combat missions at the general's convenience.

Having served a World War II tour in B-17s, riddled with holes on every mission, I thoroughly enjoyed Korea and feel to this day that we made a tremendous contribution to Army aviation.

Dr. James Scudder

Dear Editor:

I have just reread Maj. Bob Douthit's article "Maintaining the Edge,"(Feb. 1999) in which he did the "community" a service by writing such an interesting description of an outstanding training experience. In my many years of emphasizing practical training activities, I have not seen a more worthy example of "how it should be done."

Congratulations to Major Douthit and all those involved in this experience!

Maj. Gen. Jim Smith (Ret.)

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MESA, AZ
Mr. Chuck H. Kempton

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WO1 Richard D. Alvord
WO1 Gladys L. Baldwin
2LT Del P. Boyer
2LT David L. Brannan
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Mr. Mark D. Slominski
Mr. Tony Spica
Mr. Walter A. Storrs III
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Mr. John B. Timmons
CPT Anthony F. Whitaker

Silver Eagles

The Silver Eagles program recognizes those who are marking their 30th and 40th years of membership in AAAA this

30 Year Members

Alden, John B., LTC, Ret.
Andrew, William J., CW4, Ret.
Arnold, R. "Pete", MSG, Ret.
Barreca, Nicholas E., COL, Ret.
Barton, Vance L., CW5, Ret.
Bennett, Robert J., MAJ
Bonn, John H., LTC, Ret.
Breder, Craig W., Mr., Ret.
Bristow, Wm. D., Jr, COL, Ret.
Buchheit, Joseph D., LTC
Clawson, William R., MAJ, Ret.
Conrad, Anthony J., CW4, Ret.
Copeland, Guy L., LTC, Ret.
Dennis, Earl W., Jr, LTC, Ret.
Dodson, John P., Mr.
Dodson, Michael L., LTG
Downs, Curtis H., COL, Ret.
Enright, John L., COL
Ernst, Steven J., MAJ, Ret.
Falcon, Benjamin F., Mr.
Fallis, Robert P., LTC, Ret.
Finder, Adolph J., CW3, Ret.
Fuller, William L., Mr.
Gibbons, Bruce H., COL, Ret.
Goodbary, Robert A., MG, Ret.
Hatch, Larry G., MAJ, Ret.
Hazzard, Billy E., LTC, Ret.
Heath, Herman S., COL, Ret.
Hofmann, Mark A., Dr.
Howard, Alfred N., LTC, Ret.
Jacobs, Kendall E., Mr.
Jenks, James E.,Jr, LTC, Ret.
Jordanides, Spero, Mr.
Kahlert, Thomas A., LTC
Kellaway, William C., CW4, Ret.
Kilborn, David C., CW4, Ret.
King, Clifford C., CW4, Ret.
Kolb, Thomas M., MAJ, Ret.
Kulmayer, Joseph L., COL, Ret.
Langston, Gary E., LTC, Ret.
Lippencott, Barry L., LTC, Ret.
Lovett, Michael L., LTC, Ret.
Lum, David A., LTC
McClellan, Robt. E, Jr, CW5, Ret.
McLendon, Walter H., COL, Ret.
Mellor, John L., Jr, LTC
Merkel, Chas. E.,jr, MAJ
Miller, Billy J., COL, Ret.
Moss, Arthur W., Mr.
Mullen, Orlin L., BG, Ret.
Rhodes, Jerry L., Mr.
Saboe, Michael S., Mr.
Sherbino, Vercyl L., CW4, Ret.
Shirley, John H., LTC, Ret.
Shrode, Jack W.,Jr., MAJ, Ret.
Shtogren, Thomas A., Mr.
Smith, Alan M, LTC, Ret.
Smith, Jack M., CW4, Ret.
Stallings, Roger J., COL, Ret.
Stuelpnagel, Thomas R., Mr.
Tarker, Alexander D, MAJ, Ret.
Thomas, John D.,Jr., MG
Ulakovic, James J., Mr.
Vlasics, Robert F., LTC, Ret.
Wade, Michael R., MAJ, Ret.
Walker, Milburn F., Mr., Ret.
Wallace, William J., LTC, Ret.
Walls, Russell K., LTC, Ret.
Ward, Harry R., CW5
Wenzel, Paul J., COL, Ret.
White, James M., CW3, Ret.
Williams, Robert B., LTC, Ret.
Wright, Dean E., COL, Ret.
Yates, Clyde P., LTC

40 Year Members

Adamson, George W., COL, Ret.
Antross, Richard C., COL, Ret.
Barry, John W., MAJ, Ret.
Beatty, George S.Jr, MG, Ret.
Bedsole, William K., COL, Ret.
Best, David M., COL, Ret.
Biggs, Richard D., CW3, Ret.
Bisch, Frederick R, COL, Ret.
Black, Charles S., COL, Ret.
Bond, James A., LTC, Ret.
Brandenburg, John N., LTG, Ret.
Braun, Julius H., BG, Ret.
Brown, Chas. L, Jr, COL, Ret.
Brown, Richard W., LTC, Ret.
Burdett, Antoinette, Mrs.
Calhoun, George B., COL, Ret.
Canedy, Charles E., BG, Ret.
Carlisle, John C., LTC, Ret.
Carr, Glenn P., LTC, Ret.
Carson, Ray M., COL, Ret.
Ciley, Colin D.,Jr, COL, Ret.
Clark, Davis, COL, Ret.
Comer, John F., LTC, Ret.
Conley, Samuel G.jr, COL, Ret.
Connell, Thomas E., COL, Ret.
Cottrell, David D., COL, Ret.
Crook, George R., COL, Ret.
Crooks, Eugene F., COL, Ret.
Crouch, Wm. E., Jr., COL, Ret.
Crozier, Ted A., COL, Ret.
Daly, Jerome R., Rev., Ret.
Deel, Arlin, COL, Ret.
Drenz, Charles F., MG, Ret.
Eaton, Kenneth C., LTC, Ret.
Ellis, Samuel F., CW4, Ret.
Feutz, Lester, Mr., Ret.
Filby, Robert A., COL, Ret.
Filer, Robert E., COL, Ret.
Fleming, Thomas E., COL, Ret.
Forsyth, Harry L., CW4, Ret.
Fournier, Albert L., COL, Ret.
Fuller, Christopher, Mr., Ret.
Funk, David L., BG, Ret.
Gale, Paul B., COL, Ret.
Garten, Lynn W., LTC, Ret.
Grimm, Adolph H., LTC, Ret.
Halff, Henry R., CW4, Ret.
Hardwick, Willis C., LTC, Ret.
Hark, William H., COL, Ret.
Hemingway, Jack W., BG, Ret.
Heuer, Martin, LTC, Ret.
Hill, James R., COL, Ret.
Hoffman, Glenn F., LTC, Ret.
Hogan, Wayne C., COL, Ret.
Horan, Michael J., COL, Ret.
Howlett, Byron P. Jr, COL, Ret.
Hurst, Dale W., LTC, Ret.
Johnson, Clifford E., LTC, Ret.
Jones, Clynne T., LTC, Ret.
Keefer, Gary L., LTC
Kellar, Robert S., COL, Ret.
Kemp, Freddie L., LTC, Ret.
Klein, Frank J.,Jr, COL, Ret.
Kline, Gerald L., COL, Ret.
Lauterbach, John W., COL, Ret.
Lawson, Robert A., COL, Ret.
Leonard, Jack E., Mr.
Leslie, James M., BG, Ret.
Lockwood, Bill G., COL, Ret.
Logerquist, Benjamin A., COL, Ret.
Lorenz, Dwight L., LTC, Ret.
Lupton, Wm. R., Jr., LTC, Ret.
Lutz, George A., COL, Ret.
Mangum, Robert A., COL, Ret.
Mapp, James H., BG, Ret.
Mason, Robert L., COL
Mathison, Theodore E., COL, Ret.
McChesney, Frank L., LTC, Ret.
McCoole, Delos A., LTC, Ret.
McGillicuddy, C.F., Jr., COL, Ret.
McGlockton, William H., COL, Ret.
McNair, Jeptha I.Jr, LTC, Ret.
Meader, Jerome C.Jr, LTC, Ret.
Mikuta, Joel J., COL, Ret.
Morgan, George A., COL, Ret.
Morton, James O., COL, Ret.
Mulvaney, Merle L., LTC, Ret.
Nicholson, Frederick C, CW4, Ret.
Niles, Gary W., LTC, Ret.
Parrish, Glenwood N., COL, Ret.
Peavy, Jack D., LTC, Ret.
Putnam, George W.Jr, MG, Ret.
Quedens, Bernard B., COL, Ret.
Ramsey, Bobby A., COL, Ret.
Rast, Gary F., Mr.
Ratcliff, Walter A., COL, Ret.
Rawlings, Morris G., LTC, Ret.
Rockey, James D., COL, Ret.
Ruffin, William H., CW4, Ret.
Schramm, Walter J., CW4, Ret.
Scott Jr., Charles M., BG, Ret.
Scott, Harold R., CW4, Ret.
Seefeldt, Richard S., CW4, Ret.
Sibert, George W., COL, Ret.
Silver, Harold, LTC, Ret.
Sims, Wesley N., LTC, Ret.
Smith, William A., LTC, Ret.
Stewart, John P., COL, Ret.
Stowell, James L., MAJ, Ret.
Strickland, Sidney L., LTC, Ret.
Sulpizi, James R., COL, Ret.
Teeter, Charles E., MG, Ret.
Thayer, George E.Jr, COL, Ret.
Thompson, Jack H., LTC, Ret.
Tolfa, Edward, Jr, COL, Ret.
Townsend, Harry W., COL, Ret.
Turner, Edwin H., LTC
Urrutia, Carlos E., COL, Ret.
Vohs, Ralph H., COL, Ret.
Waddell, Roger W., LTC, Ret.
Walker, Milton H., LTC, Ret.
Warner, Charles O., CW4, Ret.
Welsch, H. Fritz, Mr.
Wheeler, Douglas E., LTC, Ret.
Wilson, Donald E., COL, Ret.
Wilson, Max H., MAJ, Ret.
Wolfe, Rodney D., BG, Ret.
Wood, Douglas J., LTC, Ret.
Young, Raymond H., COL, Ret.
Ziegler, H. Edward, MAJ, Ret.

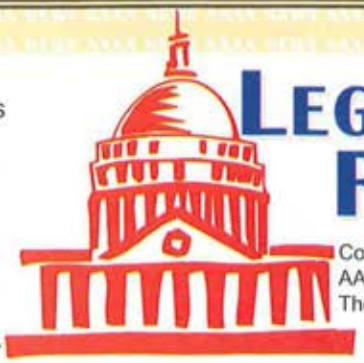
United States Military Academy Cadet of the Year

Maj. Gen. Carl McNair (Ret.) presented the USMA Cadet of the Year Award to Cadet Scott Stechshulte at a ceremony held at Eisenhower Hall, West Point, N.Y., on May 25, 1999.

CFC•CFC•CFC•CFC•

The AAAA Scholarship Foundation, Inc. (AAAASFI) is part of the Combined Federal Campaign (CFC), a workplace charitable fund drive conducted by the U.S. government for all federal employees. It is the single largest workplace fund drive in the country, raising approximately $195 million in pledges annually.

Please consider making a CFC-sponsored contribution to the AAAA Scholarship Foundation this year.



LEGISLATIVE REPORT

Col. Sylvester C. Berdux, Jr. (Ret.)
AAAA Representative to
The Military Coalition (TMC)

Special Alert for Disabled Beneficiaries Under 65

Effective July 1, 1999, disabled uniformed services beneficiaries under 65 who are eligible for Medicare will lose their TRICARE second-payer coverage unless they are enrolled in Medicare Part B (Part B covers doctor bills, whereas Part A covers hospitalization). To protect against high late-enrollment penalties, a special Part B open enrollment period is available for disabled beneficiaries under 65, but only until July 31.

Disabled Medicare-eligible beneficiaries under age 65 have been entitled to TRICARE/CHAMPUS coverage as second payer to Medicare since July 1992. Before then, such individuals lost their TRICARE/CHAMPUS benefit when they became eligible for Medicare.

But the law that restored TRICARE as a second-payer for younger disabled beneficiaries also required enrollment in Medicare Part B to avoid cost-shifting from Medicare to TRICARE. For years, the Department of Defense never notified these younger disabled beneficiaries of the requirement to enroll in Part B, but went ahead and provided the TRICARE coverage anyway. When reviews identified this discrepancy a couple of years ago, the Pentagon agreed to start notifying the beneficiaries that they must enroll in Part B.

Unfortunately, there is a 10 percent per year late-enrollment penalty for Part B, so someone who was notified five years late was faced with paying a Part B premium 50 percent larger than it would have been if notified promptly.

Recognizing their responsibility for the delay in such situations, DOD officials negotiated a special Part B enrollment period, in which no late-enrollment penalty will be charged for the seven-year period from July 1992 to July 1999.

Beneficiaries who became eligible for Medicare Part A on or after July 1, 1992, will have no late-enrollment penalty as long as they sign up before July 31. Those who became eligible for Medicare before July 1, 1992, will have a reduced penalty because that seven-year period won't be counted in their penalty calculation.

Medicare Part B monthly premiums for 1999 are $45.50 (plus any late charge). Those enrolled before July 31 will be covered for services as of July 1, 1999. All beneficiaries in this situation are supposed to be getting individual notifications, but we want to make sure no one falls through the cracks. TROA chapters are urged to publicize this information in meetings and newsletters.

Remember also that records held by the DEERS Support Office (DSO) in Monterey, Calif., need to be updated when a uniformed services retiree or spouse becomes eligible for Medicare and enrolls in Medicare Part B. This can be done at the nearest military ID card-issuing office or by calling DEERS at (800) 334-4162 for California residents, (800) 527-5602 for Alaska and Hawaii residents, and (800) 538-9552 for residents of all other states.

Questions on Medicare should be directed to the SSA toll free number (800) 772-1213 or by contacting a local Social Security Office.

House Veterans Benefits Subcommittee Approves Bill

The Subcommittee wrapped a variety of initiatives into its annual veterans bill and approved the bill by voice vote, clearing it for consideration by the full Veterans Committee. Here's a synopsis of some of the initiatives in the bill.

Fiscal Year 2000 COLAs:

The bill would authorize full-inflation cost-of-living adjustments for recipients of Department of Veterans Affairs disability compensation, survivors' Dependency and Indemnity Compensation (DIC) and certain other VA benefits. The COLA will be of the same percentage as the Social Security COLA and will take effect at the same time (December 1).

Unlike those for Social Security and military and federal civilian retired pay, COLAs for VA beneficiaries are not automatic, but must be approved in annual legislation.

Survivor Benefits Reinstatement:

Approved reinstatement of certain medical, education and home loan benefits for disabled veterans' surviving spouses whose second or subsequent marriage ends in divorce. Remarried survivors lose all VA benefits, but prior to 1990 the benefits were reinstated if the remarriage ended in death or divorce. Last year, Congress reinstated DIC payments to such 'survivors, but overlooked the other benefits. This change fully restores the pre-1990 benefit situation.

VA Claims Processing:

The bill would set up a new division within the Veterans Benefits Administration to consider disputed claims. This initiative is aimed at providing veterans faster and more accurate claims processing.

World War II Memorial:

The American Battle Monuments Commission would be allowed to borrow up to $65 million from the U.S. Treasury for construction and maintenance of the World War II memorial. The subcommittee is trying to speed up construction progress.

Cemeteries:

Two provisions of the bill would require a comprehensive assessment of veterans' cemeteries and direct the secretary of veterans affairs to start work on four additional national cemeteries for veterans. The concern is that current cemetery capacity will not be sufficient to meet the nation's obligation to the aging population of World War II and Korean War veterans.

House Passes Defense Authorization Bill

A pause to reflect over Memorial Day weekend apparently helped calm ruffled feathers in both parties as House members worked out their differences enough to approve the FY 2000 Defense Authorization Bill late Thursday night by a vote of 365 to 58. Before the break, House members couldn't even agree on the rules to consider the bill. But a Kosovo peace agreement in the interim helped take some steam out of the contentious debate over sending American ground forces into that troubled area.

With the Senate having passed its version of the Authorization Act on May 27, the stage is now set for a House/Senate conference committee to work out the differences between the two bills. We expect this process will continue into the month of July. Then both House and Senate will again have to approve the conference committee's compromise bill before it can be sent to the president. Hopefully, the final bill will be signed into law in September, and possibly earlier.

Some improvements are pretty much done deals, as they

appear in both House and Senate bills. These include a 4.8 percent active/Reserve Jan. 1 pay raise, plus another raise in July, with amounts varying by grade and years of service; a substantive restoration of retirement benefit cuts imposed on members who entered service after July 31, 1986; some modest additional compensation for certain 20-year retirees with severe service-connected disabilities; and some strong direction to Defense Department leaders on improving health benefits and fixing TRICARE claims processing problems. But significant differences remain to be worked out on possible upgrades in housing allowances, survivor benefits, health care, retired pay rules for retirees working as federal civilians and more.

Amendments Would Upgrade Savings Options, Health Care

Two amendments strongly endorsed by The Military Coalition were added to the Authorization Bill before final House approval.

The first, offered by Military Personnel Subcommittee Chairman Steve Buyer (R-IN) and Ranking Minority Member Neil Abercrombie (D-HI), would authorize all active duty and Reserve personnel to put up to five percent of their basic pay into the tax-deferred Thrift Savings Plan (TSP) currently available to federal civilian employees. Members also would be eligible to deposit part or all of any special incentive pays or bonuses in the TSP, up to the IRS limit of $10,000 per year in total TSP deposits. This mirrored a similar provision already approved by the Senate.

Reps. John Thune (R-SD) and Charles Stenholm (D-TX) successfully offered an amendment to authorize several health care changes. In part, it would authorize incentives to promote faster claims processing, eliminate non-availability statement requirements for TRICARE Standard, eliminate certain pre-authorization requirements for in-network care, authorize travel reimbursement when patients are referred to providers more than 100 miles away, and require a study of TRICARE reimbursement levels, with defined conditions for proposing improvements.

Scarborough Bill Would Raise SBP Annuity

On May 27 Rep. Joe Scarborough (R-FL) introduced H.R. 2000. Like Sen. Thurmond's bill, it would increase the minimum age-62 SBP annuity from 35 percent to 40 percent of SBP-covered retired pay as of Oct. 1, 1999. It would further increase the minimum annuity to 45% of covered retired pay as of Oct. 1, 2004. The new minimums would apply to all current survivors as well as all future ones.

The Senate version of the FY 2000 Defense Authorization Bill includes Thurmond's initiative, but House Budget Committee funding concerns have traditionally made SBP improvements a tougher sell in the House. One of the ways we can improve the prospects of House approval is to generate a large cosponsor list for H.R. 2000 during the next month or so. But our work is cut out for us, since Scarborough's H.R. 2000 has only four cosponsors so far (Reps. Norwood (R-GA), Pickering (R-MS), Smith (D-WA) and Weldon (R-FL).

We need your help now to contact your representative and urge him or her to sign on as a cosponsor of Scarborough's H.R. 2000. Contact your legislators' offices by phone, letter or e-mail.

Military Homeowner Tax Relief Update

The Taxpayer Relief Act of 1997 provided a great boon to most American homeowners by allowing them a tax-free capital gain of up to $500,000 on a home occupied as a principal residence for at least two of the five years preceding sale. However, the 1997 Law inadvertently disadvantaged many military homeowners.

Many military members who receive extended assignments overseas, or to assignments that require occupancy of government quarters, etc., keep their homes at the old duty station in hopes of eventually returning to it. In many cases, subsequent circumstances preclude that, and they have to sell the home to buy another one. Under the 1997 law, members who have been reassigned more than three years can be required to pay tax on part or all of the capital gain - solely because they had to comply with government orders.

Legislation proposed by Sen. John McCain (R-AZ) (S. 309) and Rep. Amo Houghton (R-NY) (H.R. 865) would fix that problem by exempting from the "two-of-five-year clock" all time spent away from the home on military orders. Last year, Houghton's proposal was passed by the House as part of an omnibus tax cut bill. But both the Senate and the administration raised concerns about using the budget surplus to fund any tax relief before addressing Social Security requirements, and the whole tax bill died.

Although that troublesome problem is still on the table, House and Senate leaders have expressed optimism about passing some sort of tax bill this year. TMC is still hopeful that, if tax legislation does go forward, the McCain/Houghton provisions will be included. House leaders will try to generate a tax bill next month.

You can help support inclusion of the military homeowner provision by urging your representatives to cosponsor H.R. 865 and your senators to cosponsor S. 309. Contact your legislators' offices by phone, letter or e-mail.

Cleland Offers Long-Term Care Bill

Sen. Max Cleland (D-GA) has introduced a bill (S. 894) to establish a government-sponsored group long-term health-care plan for federal civilians and military personnel. Both active and retired members, family members and survivors would be eligible to participate.

Cleland's bill is the Senate counterpart to H.R. 1111, introduced in the House by Rep. Connie Morella (R-MD).

Both bills specify that the government would not subsidize the coverage, and that premiums would be set to fully cover the expected future cost of the care. The benefit for participants would be substantially lower group coverage rates because of the size of the government enrollee pool. The government also would pay the administrative cost of overseeing the plan. Defense and civilian personnel officials and organizations unanimously support the plan, and we're optimistic of its enactment.

Meanwhile, TMC has been working with Cleland and Morella to address some technical issues in their bill language. The intent is to ensure coverage is extended to include Reserve and Guard personnel and retirees, Public Health Service and NOAA Corps officers, as well as dependents and survivors of all eligible members.

Please contact your legislators to ask them to support this important measure. Senators should be urged to cosponsor S. 894 and representatives to cosponsor H.R. 1111. These are the only bills that include uniformed service personnel as well as federal civilians.

Retiree Dental Plan

Sen. Wayne Allard's (R-CO) amendment would authorize the secretary of defense to provide additional covered services under the retiree dental program, comparable to those offered active-duty dependents. Since retiree premiums would be raised to cover the expected additional cost, we expect the House to be receptive.

Military Voting Rights

Sen. Phil Gramm's (R-TX) amendment would guarantee active duty servicemembers' and dependents' absentee voting rights in state and local elections (current law protects rights only for federal elections). Previously, this initiative has been opposed by House Administration Committee Chairman Bill Thomas (R-CA), who supports trying to change state laws instead. TMC agrees with Gramm that a single federal law change is the only practical solution.

AAAA NEWS

New Chapter Officers

Air Assault:
Col. Samuel J. Hubbard, Jr., President; Col. Richard B. Bowman, Sr. Vice President; CWO 4 Luis G. Diaz, Treasurer; CSM Gregory Howard, VP Membership Enrollment; Col. Paul R. Soderlund, Ret., V.P. Programs; Lt. Col. Robin L. Mealer, V.P. Chapter Awards.

Black Knights:
Capt. Daniel H. Dent, Secretary.

Connecticut:
Ms. Norma D. Nardozzi, Treasurer.

Ragin' Cajun:
Lt. Col. Kurt S. Story, President; Capt. Thomas R. Davies, Sr. Vice President; 1st Lt. Allyson T. Houston, Secretary; Maj. Todd Z. Conyers, Treasurer; CWO 3 Marc V. Elig, V.P. Membership Enrollment; CWO 4 Albert J. Taitano, V. P. Programs; Mr. John D. Wilde, V.P. Industry Affairs.

Savannah:
1st Lt. Paul J. Maggiano, Secretary.

AAAA Soldiers of the Month

A Chapter Program to Recognize Outstanding Aviation Soldiers on a Monthly Basis

Pfc. Richard K. Charles III
May1999
(Tennessee Valley Chapter)

Pfc. James M. Clement
June1999
(Tennessee Valley Chapter)

AAAA Soldiers of the Quarter

A Chapter Program to Recognize Outstanding Aviation Soldiers on a Quarterly Basis

Spc. Nicole R. Curtis
2nd Qtr. FY99
(Aviation Center Chapter)

AAAA Non-Commissioned Officer of the Quarter

A Chapter Program to Recognize Outstanding NCO's on a Quarterly Basis

SSG Michael L. Pippin
2nd Qtr. FY99
(Aviation Center Chapter)

SSG Ramon Blanco
2nd Qtr. FY99
(Tennessee Valley Chapter)

AAAA Distinguished Instructor of the Quarter

A Chapter Program to Recognize Distinguished Aviation Instructors on a Quarterly Basis

Sfc. Joseph W. Kirby
3rd Quarter FY99
(Colonial Virginia Chapter)

New AAAA Life Members

Col. Michael H. Abbott, Ret.
CWO 4 Victor E. Berger, Ret.
Ms. Judith L. Bhansali
Mr. Kirit J. Bhansali
Mr. W. E. Butterworth III
Lt. Col. Morris G. Cook, Ret.
Capt. Robb D. Craddock
Maj. Michael A. DiGennaro, Ret.
Lt. Col. John S. Emmerson
Capt. Brian P. Fitzgerald
Mr. Jon J. Funkhouser
CWO 4 Danny L. Ferguson, Ret.
Col. James H. Hairston
CWO 3 Todd A. Larson
Capt. Victor C. Lindenmeyer
Col. Randall G. Oliver, Ret.
Lt. Col. Pultz
WO 1 Paul G. Reges
Col. Theodore M. Stults, Ret.
Maj. John A. Styer
Col. William G. Yarborough, Jr.

New AAAA Industry Members

Concorde Battery Corporation
HyVee, LLC - CV International
Jetsetters Travel, Inc.
Regents College
RGB Spectrum

In Memoriam

CWO 4 John P. Valaer

New AAAA Order of St. Michael Recipients

Maj. Gen. Emmitt E. Gibson (Gold)
Gen. Johnnie E. Wilson (Gold)
CSM Hiram L. Claytor (Silver)
CWO 5 Michael J. Hutson (Silver)
John H. Bae (Silver)
Maj. Gen. David W. Gay (Silver)
Col. Christopher L. Sargent (Silver)
Col. James A. Kelley (Silver)
Col. James R. Myles (Silver)
Lt. Col.Michael E. Moody (Bronze)
Lt. Col. Daniel L. Garvey (Bronze)
Maj. Gen James C. Riley (Bronze)
Lt. Col. Anthony S. Shannon (Bronze)
Maj. David R. Arterburn (Bronze)
Lt. Col. Jan P. Ithier (Bronze)
CWO 4 Daniel J. Runyon (Bronze)
CWO 5 Michael S. Kather (Bronze)
Lt. Col. M. Vance Sales, Jr. (Bronze)
MSG James L. Laughlin (Bronze)
Maj. Jerome M. Tarutani (Bronze)
CWO 5 Daniel L. Montelongo (Bronze)
Maj. Roger K. Mayer (Bronze)
SGM Jimmie L. Taylor (Bronze)
Lt. Col. Joseph A. Moore, Jr. (Bronze)
CWO 4 John C. Watson (Bronze)
CWO 4 Donald T. Braun (Bronze)
CWO 4 Stephen W. Peckham (Bronze)
CWO 5 Lawrence D. Davidian (Bronze)
CWO 3 Thomas A. Grier (Bronze)
COL Michael D. Barbero (Bronze)
MSG Jay W. Maitland (Bronze)
Capt. Gregory R. Mogavero (Bronze)
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Maj. Erich Erker (Bronze)
Lt. Col. Richard G. Cercone (Bronze)
Maj. David B. Parker (Bronze)
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Lt. Col. Bruce E. Brydges (Bronze)
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Lt. Col. Charles R. Reed (Bronze)
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Lt. Col. Daniel S. Stewart (Bronze)
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CWO 3 Eric E. Rings (Bronze)

Aces

The following members have been recognized as Aces for their signing up five new members each.
Ms. Mary M. Akers
Mr. Peter A. Lawrence
Maj. John C. Sauer
Sfc. Pamela L. Shugart
CWO 5 Richard L. Williams

Sept. 15-19. The annual reunion of the former members of the U.S. Army's 4th/506th Helicopter Company and its associated 152 Maintenance Detachment will be held at the Battlefield Inn, Vicksburg, Miss. For reservations call 1-800-359-9363. For more information contact D. R. Woodmansee, 5801 N. Oakwood Rd., #A110, Enid, OK 73703 1-580-242-2942 or E-Mail ray@enid.com.

Oct. 11. AAAA National Executive Board Meeting, Washington, D.C.

Oct. 11. AAAA Scholarship Foundation, Inc. Executive Committee Meeting, Washington, D.C.

Oct. 11-13. 1999 AUSA Annual Meeting, Washington Marriott Wardman Park Hotel, Washington, D.C.

Oct. 26-28. AHS Structures Meeting, Williamsburg, Va.

Oct. 23. Army Aviation Center Chapter 8th Annual Chili 5K and Cook-Off Competition. Contact Capt. Joe Edwards (334) 255-5054 or CWO 2 Steve Black (334) 255-5820.

Mar. 29-Apr. 1, 2000. The 2000 AAAA Annual Convention, Fort Worth Convention Center, Fort Worth, Texas.

ARMY AVIATION Book Store

U.S. Army Aircraft Since 1947

An Illustrated Reference

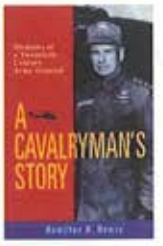
by Stephen Harding

U.S. Army Aircraft Since 1947 — An Illustrated Reference by Stephen Harding U.S. Army Aircraft Since 1947 is the only comprehensive, up-to-date guide to the 124 types of helicopters, fixed-wing aircraft and experimental flying machines used by the U.S. Army since 1947. The author discusses each aircraft type used by the Army air arm. Within each chapter the author includes information on aircraft serials, markings, weapon systems, operational history and other technical data. Illustrated with more than 220 color and black and white photographs. [Schiffer Publishing Ltd. Size: 8 ½" x 11", 264 pages, hard cover; ISBN: 9-7643-0190-X].

Black Hawk Down

by Mark Bowden

Black Hawk Down is the gripping story of the most intense firefight American soldiers have fought since the Vietnam War — the October 1993 battle in Mogadishu, Somalia. Bowden's dramatic narrative captures the harrowing ordeal through the eyes and words of the young men who fought the battle, a battle that ultimately led to the posthumous awarding of two Medals of Honor. [Atlantic Monthly Press, hardcover]



A Cavalryman's Story

Memoirs of a Twentieth Century Army General Hamilton H. Howze

A Cavalryman's Story is the memoir of a professional soldier recognized today as the father of U.S. Army Airmobile tactics and doctrine. Howze emerged as one of a handful of perceptive Army officers who recognized the potential of a sky cavalry. As the first director of Army aviation, Howze promoted the concept to industry, the government, and the public. His vision came to fruition in the 1960s when he presided over the U.S. Army Tactical Mobility Requirements Board, known as the Howze Board, which proved the viability of sky cavalry in combat. [Smithsonian Institution Press, Size: 6"x9", 316 pages, hard cover, ISBN: 1-56098-664-6].

Breaking the Phalanx

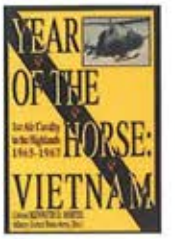
by Douglas A. Macgregor

This work proposes the reorganization of America's ground forces on the strategic, operational and tactical levels. Central to the proposal is the simple thesis that the U.S. Army must take control of its future by exploiting the emerging revolution in military affairs. The analysis argues that a new Army warfighting organization will not only be more deployable and effective in joint operations; reorganized information-age ground forces will be significantly less expensive to operate, maintain and modernize than the Army's current Cold War division-based organizations. [Praeger Publishers, Size: 6"x9 1/8", paperback, 283 pages, ISBN: 0-275-957942].

Year of the Horse: Vietnam

1st Cavalry in the Highland 1965-1967

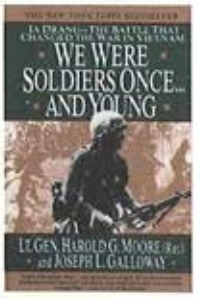
by Col. Kenneth D. Mertel (USA, Ret.)



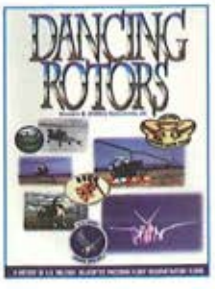
Year of the Horse: Vietnam is the day-to-day story of the 1st Battalion, Airborne, 8th Cavalry Division. Mertel give a vivid picture of the building of his own battalion, the rigorous training of officers and men, and, finally, the long voyage across the Pacific to Vietnam. Mertel pays tribute to the many acts of heroism of his men, who lived, worked and fought together in some of the world's most inhospitable conditions. [Schiffer Publishing Ltd., Size: 6"x9", 384 pages, hard cover; 59 color photographs, 9 maps; ISBN: 0-7643-0190-X].

We Were Soldiers Once ... And Young

by Harold G. Moore & Joseph L. Galloway



We Were Soldiers Once ... and Young is a devastating account that rises above the specific ordeal it chronicles to present a picture of men facing the ultimate challenge, dealing with it in ways they would have found unimaginable only a few hours earlier. It reveals to us, as rarely before, man's most heroic and horrendous endeavor. [Harper Collins Publishers, Size: 5 ½" x 8, 483 pages, paperback. ISBN: 0-06097576-8].



Dancing Rotors

by Harry E. (Ned) Gilliand, Jr.

Dancing Rotors documents the evolution of U.S. military helicopter precision flight demonstration teams from 1948 through 1976. It covers Army and Navy efforts to provide unique shows to stimulate recruiting into both branches of service, and especially into their rotary-wing aviation programs. A wealth of very unique helicopter history, heretofore untold, is now within the reach of every helo enthusiast. [Aerofax, Inc., size: 8 ½" x 11", 483 pages, paperback. ISBN: 0942548-57-4].

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