Special Focus: Digitizing the Battlefield

SPECIAL FOCUS: DIGITIZING THE BATTLEFIELD

ARMY AVIATION

OFFICIAL PUBLICATION OF THE ARMY AVIATION ASSOCIATION OF AMERICA • FEBRUARY 28, 1995

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ARMY AVIATION is the official journal of the Army Aviation Association of America (AAAA). The views expressed in this publication are those of the individual authors, not the Department of Defense or its elements. The content does not necessarily reflect the official U.S. Army position nor the position of the Army Aviation Association of America (AAAA) or the staff of Army Aviation Publications, Inc., (AAPI). Title reg ® in U.S. Patent Office. Registration Number 1,533,053.

SUBSCRIPTION DATA
ARMY AVIATION (ISSN 0004-248X) is published monthly, except April and September by AAPI, 49 Richmondville Avenue, Westport, CT 06880-2000. Tel: (203) 226-6184. Subscription rates for non-AAAA members: $25, one year; $48, two years; add $10 per year for foreign addresses other than military APOs. Single copy price: $3.00.

POSTAL
Second class postage paid at Westport, CT and other offices.

POSTMASTER
Send address changes to AAPI, 49 Richmondville Avenue, Westport, CT 06880-2000.

FORTHCOMING ISSUES
March-April 1995— AAAA Annual Convention.

May 1995— Post Convention Wrap-Up, Army Aviation Modernization Plan, Simulation, and UAVs.

Briefings

The **U.S. Army Aviation Applied Technology Directorate (AATD)**, Ft. Eustis, VA, issued four Director's Awards for outstanding contributions during Fiscal Year 1994. The awardees were: **Raymond H. Wall**, Director's Award for Merit; **Brian K. McGhee**, Director's Awards for General Excellence, Category I; **Geoffrey R. Downer**, Director's Award for Technological Achievement; and **Steven M. Puckett**, the Director's Award for General Excellence, Category II. Each awardee received a Department of the Army citation, an engraved plaque, and a cash award of $1,000.

Bell Helicopter Textron, Inc. has contracted **Honeywell Defense Avionics Systems** to develop software that will incorporate Honeywell's Embedded Global Positioning System-Aided Inertial Navigation System (EGI) into the cockpit of the OH-58D Kiowa Warrior. The contract is a $1.2M engineering change.

The U.S. Army has selected the **2nd Armored Division**, Ft. Hood, TX, as its "Experimental Force" (EXFOR) for Force XXI operations. The EXFOR will be used to conduct experiments in digitization and to gain insight into equipment, new organizational designs, and new operational and doctrinal concepts for Force XXI. The EXFOR's initial component will be a redesigned digitized brigade-size task force, referred to as Task Force XXI. Additionally, a combat support and combat service support "slice" from divisional units. Slice units will provide intelligence, artillery, aviation, air defense, engineer, maintenance, medical, and logistics support to the Task Force during combat operations. The Task Force XXI experiment will pave the way for a full division-level experiment. For more information, contact LTC Richard David, Army Public Affairs, at (703) 697-4314.

The **4th Battalion, 101st Aviation Regiment** ("The Wings of the Eagle") is hosting a reunion of all former members, to include the "Comancheros" and "Kingsmen" who fought valiantly during the 101st Airborne Division's deployment to Vietnam. The activities will commence on Wednesday, 17 May 1995 and finish Friday evening, 19 May 1995. Among the events planned will be an Open House, static display, a No-Host Dinner, and a Memorial Service. For more information on hotels, maps, a tentative schedule of events and other activities, please contact CW2 Laura Smith or CW2 John Pruden at A Co., 4/101st Aviation Regiment, Ft. Campbell, KY 42223, Commercial: (502) 798-3128/3189 or DSN: 635-3128/3189.

Correction: The 31 December 1994 issue of *ARMY AVIATION* Magazine contained a typographical error in the title of the article by BG Jerome V. Foust and COL Richard Beauchemin. The correct title is "DUSTOFF: Dedicated Unhesitating Service to Our Fighting Forces". *ARMY AVIATION* regrets the error.

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FEATURE ARTICLES

FOCUS: DIGITIZING THE BATTLEFIELD

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Paid Advertisement: Boeing Sikorsky. *Comanche aircraft No. 1 continues to take shape in preparation for its November first flight. Caption provided by the advertiser.*

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THE ARMY DIGITIZATION PLAN

"Information Age technology is changing and will revolutionize the way we conduct military operations. Conflict will be characterized by danger, fear, and uncertainty. Victory will depend on the skill, courage, and imagination of people trained to use the available technology."
— GEN GORDON R. SULLIVAN,
Chief of Staff, U.S. Army

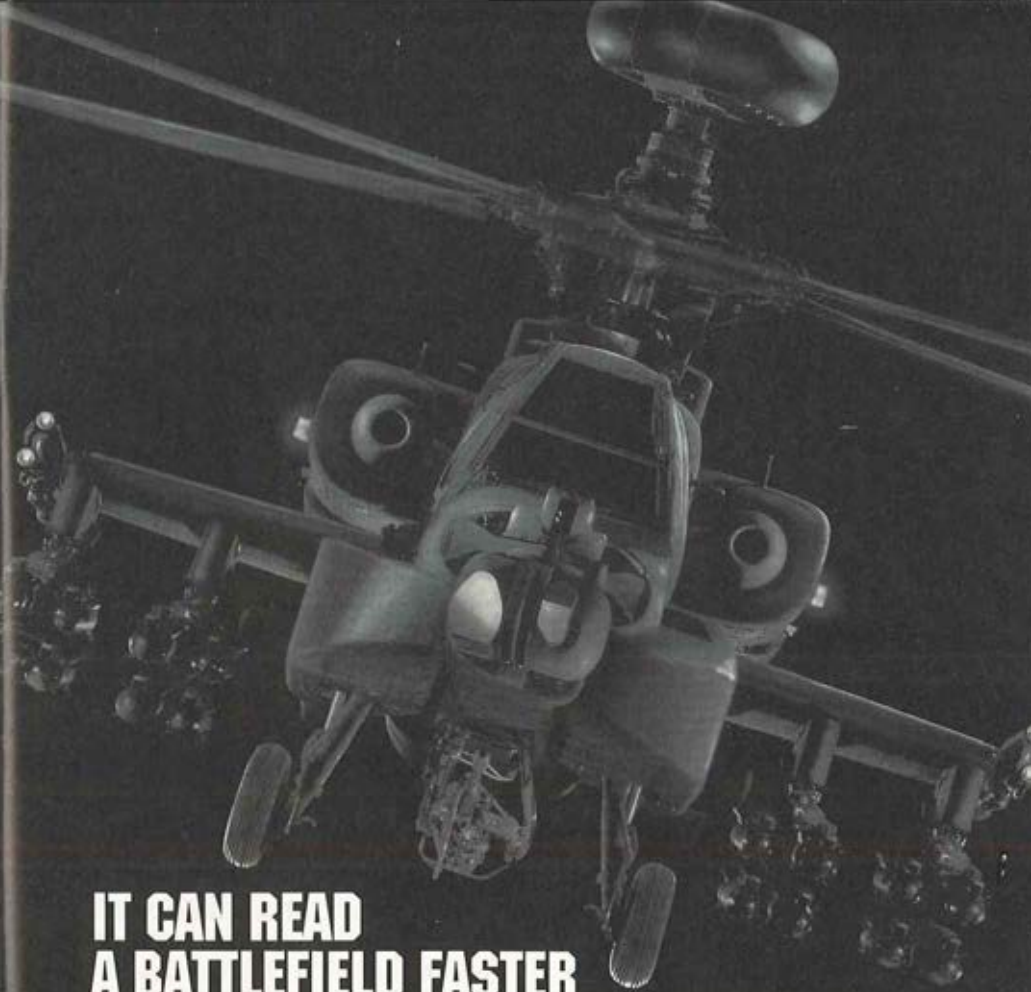
The Director, Army Digitization Office, outlines the newest developments in digitizing the battlefield.

The Chief of Staff of the Army has recently approved the Army Digitization Office (ADO) Campaign Plan. A part of the Force XXI effort, the ADO Campaign Plan outlines a strategy to digitize the Army using an iterative approach relying on intensive experimentation and constant upgrading.

The plan provides for four major thrusts: acquisition, communications, integration, and a future Battlefield Information Transmission System to achieve seamless integration from tactical through strategic levels. These thrusts will be focused by the technical, operational, and system architectures and validated by a continuous evaluation process. The campaign plan will ensure connectivity between all tactical communications systems, interoperability between Army digital information systems, as well as compatibility in the joint and combined environments, giving the Army the means to field Force XXI.

In conjunction with the recent efforts of the Army Science Board and in accordance with the Department of Defense's Tactical Architecture of Information Management (TAFIM), the ADO has adopted three architectures that it will coordinate and oversee to ensure force interoperability. These architectures will be provided to materiel developers to establish a seamless information system.

Similar to a building code, the Technical Architecture consists of the rules and standards governing the arrangement, interaction, and interdependence of the elements that form the information system. The Army Acquisition Executive, as the Army's Technical Architect, has assigned the Director for Information Systems, Command and Control, Communications, and Computers (DISC-4) to develop



IT CAN READ A BATTLEFIELD FASTER THAN YOU CAN READ THIS HEADLINE.

Lurking near a darkened battlefield, the modernized AH-64D Longbow Apache can rapidly detect and classify 256 enemy targets... *faster* than you can read this headline.

Then almost instantaneously, the Apache can transmit target data to air and ground units for battle planning and engagement.

Longbow Apache, with its fire control radar and digital avionics, will be the premiere system within the Army's Force XXI, controlling *the Battlespace* through real-time information and efficient battle management.

The multi-role Longbow Apache will maintain overwhelming dominance and provide a significant deterrent to aggression.

Longbow Apache – enhancing combat operational tempo, lethality and battlefield survivability. It's more than just progress. *It's information-age warfare.*

MCDONNELL DOUGLAS

and maintain the Technical Architecture.

The Operational Architecture, developed by TRADOC, is the plan for use of the new information capabilities offered by digitizing the radio nets. The Systems Architecture, developed by the Communications-Electronics Command Research and Development Center and TRADOC, is a description of the physical connectivity of an information system, including identification of the nodes (radios, switches, terminals) and their physical deployment.

A series of Advanced Warfighting Experiments (AWEs) and Advanced Technology Demonstrations (ATDs) will serve as the proving ground to experiment and evaluate the digitization concept. In the near-term, a brigade-sized AWE, TF XXI, scheduled for 1996-1997, will focus Army efforts at brigade and below. Recently, the Chief of Staff named the 2d Armored Division at Ft. Hood, TX as the Army's Experimental Force (EXFOR). The EXFOR will be the Army's TF XXI. Culminating in a two-week rotation at the National Training Center, AWE Task Force XXI will determine the requirements for, and the improvements in, survivability, lethality, and tempo resulting from digitization.

The Operational Test and Evaluation Command (OPTEC) will lead the operational analysis effort. OPTEC has devised a "rolling baseline" concept for the assessment of digitization. This assessment will link all the simulations, ATDs, and AWEs into an iterative, cumulative baseline for each succeeding exercise. By being involved throughout the entire process, OPTEC can compare the new capabilities to those in the baseline, thereby measuring the value added by digitization.

Of the four major ADO thrusts, the first consists of acquiring the hardware and software to provide a digital information capability at brigade and below. While a few systems already have an embedded digital information system, most notably the M1A2 tank with its Intervehicular Information System (IVIS), most platforms and individual soldiers do not. To fill this void, the ADO has funded the acquisition of an appliqué through the Program Executive Office for Command and Control Systems which will be installed on selected platforms and issued to selected soldiers. The appliqué will consist of a computer unit akin to a laptop integrated into a POS/NAV device and a communications interface. The appliqué contract, which was awarded in January to a team headed by TRW, will also include the software for Brigade and Below.

This software, called Force XXI Battle Command Brigade and Below (FBCB2) will be the standard Army command and control software at that level. PEO CCS will manage the execution of development and fielding of the appliqué and software. Other PEOs are responsible for the integration of the core command and control

software into their platforms. For instance, PEO Aviation will ensure the Longbow Apache software will be interoperable with FBCB2.

A second thrust is the Tactical Internet. This links present digital radios, such as SINCGARS, Enhanced Position Locating and Reporting System (EPLRS), and Multiple Subscriber Equipment (MSE) in a network arrangement using gateways to provide connectivity. This internet-like structure will enable digital messages to be passed from tactical to strategic levels.

To make this a reality, the Army is improving SINCGARS and EPLRS radios to substantially increase their data-hauling capacity. The Army is also acquiring routers such as the Internet Controller Card and the Tactical Multinet Gateway to facilitate seamless data transmission from SINCGARS into MSE and EPLRS using commercial internet protocols.

Another aspect of a seamless architecture requires interoperability between information systems such as the Army Battle Command System (ABCS) and the Army Global Command and Control System (AGCCS). The ADO is coordinating the production of Variable Message Format (VMF) messages to act as the standard digital message between applications. Platforms in aviation, armor, and field artillery will also be integrated with VMF messages through the modifications and improvements to their existing future digital architectures. Joint and combined interoperability is likewise essential, and the ADO is currently working with those communities to provide the necessary compatibility through compliance with the Department of Defense Common Operating Equipment which will provide a common software core.

The final scope of effort involves identifying and procuring the Army's future digital radio. This effort is now known as the Battlefield Information Transmission System. Increased requirements for digital information will necessitate a marked increase in data-hauling capability at the tactical level. In coordination with the ADO, ODISC-4 is leading the Army effort to identify such leading-edge technologies as multi-band, multi-mode, cellular, and commercial satellite communications to provide this capability. The DISC-4 will move from an experimental approach to developing the requirement and acquisition strategy about the year 2000.

The digitization effort cannot fail. To date, the ADO has had a great relationship with all the MACOMs, staff agencies, and the other services in defining and coordinating their parts in Force XXI. Given this continued team effort, the information technology required for Force XXI will be there to ensure the Army's role as the nation's guarantor of Land Force Dominance.

★★

MG Rigby is the Director, Army Digitization Office, Washington, D.C.

INFORMATION IS THE HIGH GROUND!

An unstable world in transition from the Industrial Age to the Information Age has resulted in a new national military strategy and a vision for the 21st Century Army — Force XXI. America's Army — Force XXI — will use information as a weapon to capitalize on the five tenets of Army operations: initiative, agility, depth, synchronization, and what aviation inherently brings to the fight — versatility.

What digitizing the force means to Army Aviation.

History has proven time and again the real value of winning the information war. During the Civil War, GEN Robert E. Lee might have come away from the battle of Gettysburg with a different outcome had he an accurate picture of the Union positions. During World War II, the allied forces possessed an unprecedented advantage over the Germans due to the capture and exploitation of the Enigma machine (a secure message device). The allied intelligence community was able to read numerous German messages, thus providing allied commanders valuable information. This information proved to be the decisive edge during numerous battles to include the invasion of Normandy. These are but two historical examples of many that clearly show the importance of winning the information war.

The Information Age represents an entirely new period for America's Army, and we in Army Aviation are aggressively responding by formulating the Aviation Force XXI Campaign Plan. This plan evolves both sequentially and simultaneously around the Army's three axes of advance: Joint Venture (redesign the warfighting force), TDA/Institutional Army (re-engineer from factory to foxhole), and the applica-

tion of Information Age technology (through digitization). Our plan is in draft, but the goal is to determine the increased warfighting capability of a digitized aviation force, and assess its impact on Doctrine, Training, Leaders, Organization, Materiel, and Soldiers (DTLOMS).

Digitizing the aviation force means harnessing the power of information technologies throughout the battlespace, tailored to the needs of each decider, shooter, and supporter. Army Aviation is pursuing seven digitization programs that will enhance our warfighting capability, ensuring Aviation remains relevant to Force XXI's goals and objectives. Furthermore, our Directorate of Combat Development has identified what we call the "Force XXI Nine Critical Linkages", which are key to ensuring horizontal integration of our programs with the combined arms team digital players. These efforts will greatly affect the elements of battle command.

Army Aviation will be heavily involved in numerous combined arms Advanced Warfighting Experiments (AWEs) focusing on the third axis of advance — Information Age technology (digitization). The following article, "Operating in the Information Age", by COL Stephen S. MacWillie, Ret. and LTC Jerry Brecher, Ret., discuss the 2003 Board's effort that established much of the groundwork for the Aviation Force XXI Campaign Plan — our strategy for participation in AWEs and for enhancing battle command.

Information Age technology will dramatically enhance the ability of commanders to allocate and prioritize resources, make adjustments, and select the critical time and place to act. Accurate real-time information will give commanders the situational awareness to better control forces, synchronize efforts, and achieve decisive victory with minimal casualties. The evolution of battle command and how information has influenced that process is depicted in Figure 1. What has changed in an unprecedented manner is the way information is collected and delivered throughout the entire battlespace; not only the physical breadth, depth, and height but the operational dimensions of time, tempo, depth, and synchronization.

This is an exciting time for Army Aviation. We are on the leading edge of change. Our senior Army leadership has a clear vision and a sound plan. We at USAAVNC, working closely with PEO Aviation and the TRADOC Battle Labs, are translating that vision into reality. When? How? We can't yet nail down all the details, but that's to come. A British historian, Michael Howard, once wrote, "What matters is to prevent ... being too badly wrong ... to get it right quickly when the moment arrives."

GEN Sullivan and our Army's senior leaders have focused us on the

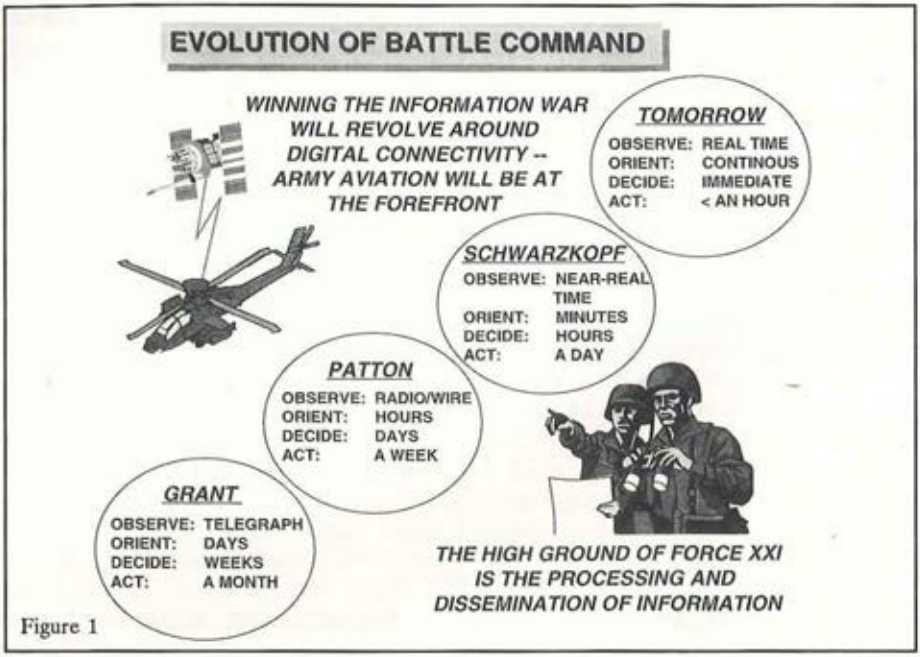


Figure 1

challenges the 21st Century will bring while maintaining a trained and ready force able to meet our nation's call at any time. This continuity during a period of change has resulted in setting forth the arguments and imperatives for the future in a number of important documents each of you should be familiar with: Training and Doctrine Command Pam 525-5, *Force XXI Operations*, and TRADOC Pam 525-200-2, *Battle Command*.

At our recent 1995 Brigade Commander's Conference, we distributed 525-5 and our U.S. Army Aviation Center Training and Doctrine Command Pam 525-XXX, *U.S. Army Operational Concept for Aviation* (still in draft) to the Brigade commanders. We solicited comments on our draft. We want to get it to you in the field with the hope that we can "... get it right quickly." The final product we hope will encompass aviation's versatility throughout the range of military operations. It, along with our Force XXI AWE Campaign Plan, will help keep the future square in our sights as we seek new opportunities to remain at the leading edge, at the vanguard of change.

★★

MG Adams is Aviation Branch Chief and Commanding General, USAAVNC and Ft. Rucker, AL, and Commandant, U.S. Army Aviation Logistics School (USAALS), Ft. Eustis, VA.

DIGITIZATION AND THE EARLY ENTRY SCENARIO

As a materiel developer, it becomes easy to lose focus in today's rapidly advancing technology environment and bring technological solutions to the field that have little useful purpose. The utility of a system on the battlefield is our reference point to keep this from happening. A new "widget" may do things that defy physics — but if it does not add significantly to our combat edge, we don't want it!

Digitization will lead to increased warfighting effectiveness, battlefield survivability, operational awareness, and intelligence gathering.

That is why our basic Required Operational Capability for digitization can be boiled down to Chief of Staff GEN Gordon R. Sullivan's statement at the Longbow Apache Roll-Out in 1993: "We know where you are ... we know where you're not ... and we're coming to get you — day or night."

We tend to throw terms around like "Battlefield Digitization" and "Winning the Information War" until they have a life of their own. But when the battle begins, what have we gained? That is what I'd like to explain. I'm going to do this through the most difficult scenario — the Early Entry.

We go in with short notice, after traveling a long distance, with little or no national communications infrastructure at our destination, and the mission must be successful.

In my scenario, our ally — Westland — has been having an increased level of tension with its neighbor, Hinderland. The United Nations' warnings to Hinderland leaders have been ignored and a recent buildup of Hinderland troops near the border is seen as a major threat to Westland.

The digitization impact begins now. In coordination with the Defense Mapping Agency, maps of the expected Areas of Operations are up-

dated to allow planning and execution using the 3-D digital maps linked to precise Global Positioning System (GPS) coordinates. At the same time, the Joint STARS aircraft begins wide area surveillance to track and record moving vehicles along the border and deep into Hinderland. From our analysis of the maps and vehicle tracks, such items of interest as resupply routes, supply storage facilities, and command and control sites can be located.

On 16 April, diplomatic efforts fail and the Hinderland troops move in force into Westland from two locations along the border. United States troops, serving on a UN Task Force, are ordered to Westland's aid. As the attack battalion is enroute, rapid analysis is being done on the Hinderland invasion. Anti-aircraft threats are identified and mapped.

The southern axis of the attack is being slowed by the aggressive tactics of the Westland troops, and their merger with the northern thrust can be stopped if the pass at Red Mountain is held. The plan to defend the Red Mountain Pass is relayed to the task force commander and individual units are assigned their objectives. While enroute to Westland aboard C-5 transport planes, Army aircrews use a laptop version of the Aviation Mission Planning System (AMPS) to preview their mission so they will be ready to fight as soon as their aircraft are assembled at destination — that's 18 minutes after landing for the RAH-66 Comanche.

The first flight of Comanches are immediately dispatched for reconnaissance of the Red Mountain area. If the opportunity exists, they will also spot targets for a flight of Harriers from a carrier steaming toward the Westland coast to delay the Hinderland forces from reaching the pass before reinforcements arrive. Although the line of sight communication distance is passed after ten minutes of flight, communications will be continued over the ARC-220 High Frequency Radio, as its Automatic Link Establishment (ALE) provides a reliable voice and data link back to the Aviation Command Post.

The J-STARS' higher altitude gives it a longer line of sight for use of its Have Quick II radio and the Improved Data Modem. The J-STARS aircraft alerts the Comanche flight to a convoy-type movement of vehicles traveling north on Route 7A. At maximum radar range, the Comanche's target radar verifies this to be a military convoy composed of tracked and wheeled vehicles and three anti-aircraft systems.

The Comanche flight leader evaluates the situation on his 3-D digital maps. He designates battle positions in a clearing 50 minutes up the road, coordinates the plan with the Navy Liaison Officer, and the Harriers are launched. Enroute coordination is done over the Have Quick/IDM combination and, at the proper time, the lead Comanche identifies targets from a protected position five kilometers away, passes the exact GPS position of each target to the "shooter" while a

second RAH-66 unmasks from behind a ridge at three kilometers and fires upon the anti-aircraft systems. After confirmation that the systems are down, the Harrier attack is initiated. The Comanches loiter in the area for Battle Damage Assessment (BDA), which they transmit back to the task force command post as video images for further attack planning and defense of the Red Mountain Pass.

Concurrently, the six Longbow Apaches of Attack Company Alpha have been assembled and are sent against Hinderland forces marshaled in the town of Con awaiting the southern force. Behind the attack company follows the Army Airborne Command and Control System (A2C2S) with the Attack Battalion Commander and the Intel and Ops officers. After an initial survey of the area, the decision is made to attack the unit south of town, rearm, then attack the unit to the west. The first attack is successful and the aircraft begin to exit the area of operations.

As aircraft Alpha 4 nears the treeline, the aircraft's Advanced Threat Radar Jammer alerts the crew to an incoming radar-guided missile. Even as the alert is sounded, the system has automatically locked onto the threat and destroyed its ability to home in on the aircraft. The aircrew takes evasive action to preclude attacks from the same location and exits the AO with the rest of the flight.

The Apache flight transits toward the Forward Area Rearm/Refuel Position (FARP). The FARP is easier to locate than in the past because its GPS coordinates allow a straight flight there. Enroute, the aircraft and the FARP "talk" digitally to allow the necessary fuel and ammunition to be pre-positioned at the pad for each aircraft, which allows for a quicker turnaround and return to combat.

After takeoff, the A2C2S is ordered to replan the attack mission. A gathering of unknown vehicles east of Con on Route 4 causes the planning staff to suspect that a mobile tactical missile launcher is possibly being set up. Using the AMPS onboard A2C2S, battle positions are evaluated and the Apaches given their flight plans digitally. Upon reaching the position, there is no launcher, just a gathering of refugees from the outlying areas. Instead of being forced to return, the A2C2s replans the attack on Con units, starting from their new position.

Hinderland's "overmatched" troops cannot stand up to the UN Task Force. A cease fire is quickly obtained, and Westland's national integrity is sustained.

In the matter of digitization, our goal is to overmatch any opponent to the extent that either a war will be deterred or won quickly. The six core avionics projects — GPS, Have Quick II, ARC-220, IDM, AMPS, and A2C2s — as installed and used in the modernized aircraft fleet give us that capability. Not new technology — but a new combat edge.

★★

COL Oler is the Project Manager, Aviation Electronic Combat PMO, St. Louis, MO.

DIGITIZATION **BY COL STEPHEN S. MacWILLIE, RET. and LTC JERRY BRECHER, RET.**

OPERATING IN THE INFORMATION AGE

How the findings of the 2003 Board can influence the Army's plans for digitizing the battlefield.

The attack battalion operations officer wasn't surprised when the warning order came in at 2300 hours. He had already received two contact reports. The MSG box in the lower corner of the large screen digital map display started to flash again. He rolled the cursor to the mailbox icon and clicked. A smaller window display opened and revealed the operational graphics he expected.

Clicking on the display and dragging it to the index point on the 3-D digital map gave him not only the control measures he needed, but also an appreciation for the terrain. Now it was time for the commander to put the battalion staff to work.

The Assistant S-2 double-clicked on the INTELLIGENCE PREPARATION OF THE BATTLEFIELD (IPB) icon on the Maneuver Control System (MCS) main menu. He selected ENEMY SIT from the sub-menu and began collecting the enemy situation from the data base.

On an adjacent reconfigurable workstation, the operations officer opened a mission folder on his Aviation Mission Planning System (AMPS). He quickly moved the cursor to MCS on the menu bar and called-up the friendly situation of the 2d Brigade. The combat vehicle, appliqué processors, integrated with GPS and SINCGARS radio, updated the database with location and direction of movement of every tank and Bradley at one hundred meter intervals.

Downloading this data and the 2d Brigade's operational graphics only took a couple of clicks on the Windows tool bar. The operations officer reentered his AMPS mission folder, merged the enemy situation and passed the target locations to the fire support officer to begin planning with AFATDS. Weather and aircraft specific performance data were added,

based upon the menu driven checklist. System configuration and weapons loading data based upon current availability were simultaneously recorded in the mission support folder and automatically forwarded to the logistics operations center for set-up and support. The operations officer selected PLAN ROUTE, then entered assembly area, release point, and verified target areas.

The AMPS software performed a terrain analysis and overlaid radius of detection and radius of engagement of known and suspected threat weapons. Clicking on the EXECUTE command caused AMPS to generate the best route with waypoints for survivability. Based upon this, the operations officer completed his assignment of engagement areas. The fire support plan was coordinated and merged. Not only was the mission electronically transmitted to each company where AMPS filled the data transfer cartridges for individual aircraft, it was also transmitted to the supported brigade for final coordination. Crews were completing the aircraft startup procedures as the data cartridges arrived to initialize the aircraft's computers.

The operations officer refilled his coffee cup and looked at his watch. It was 00:25 as he answered the flight operations call reporting that the attack companies were airborne and enroute to their objective. As he sat back and took a second drink from his coffee cup, he thought of the difference in mission planning effectiveness and speed since he first came into the Army as brand new second lieutenant platoon leader.

This vignette was developed to describe aviation operations using information age capabilities: electronic staffs, 3-D digital maps, talking FARPs, picture messages and pull-down data bases envisioned by the 2003 Board. So, what is the 2003 Board and how did it get its mission?

The Chief of Staff of the Army's vision for America's Army in the 21st century is one organized around information; the creation and sharing of knowledge followed by unified action based on that knowledge which will allow commanders to apply power effectively. The purpose of Force XXI must be to dominate, to control, and to win at minimum injury to our soldiers. Information will be the means to a more powerful end. It is information-based battle command that will give us ascendancy and freedom of action, for decisive results, in the 21st Century war and operations other than war.

The CSA has outlined three "axes of advance": redesign the warfighting force, re-engineer the TDA Army, and introduce information technology throughout the force. It is this third axis that formed the basis for the 2003 Board. The 2003 Board is a small panel of retired, senior, Army leaders (non-aviators). Their mission was to provide "an assessment of available opportunities in existing and planned technologies and its potential contribution to Army Aviation doctrine, operations, and TRADOC Combined

Arms concepts, training and leader development envisioned for the year 2003." The bottom line question was, "Is aviation spending its scarce resources on the technology which will provide the greatest return on the battlefield?"

The effort was commissioned jointly by the PEO Aviation and the Commanding General, U.S. Army Aviation Center. Doctrine developed in TRADOC Pam 525-5, *Full-Dimensional Operations For The Strategic Army Of The Early Twenty-First Century*, formed the operational foundation and the Aviation Restructure Initiative (ARI) provided the force structure. In ARI, attack and lift organizations were modified to retire old, obsolete, Vietnam era aircraft which no longer contributed to the warfight. The reduction of aircraft (7,713 to 4,993) freed up personnel to fill a recognized 8,000 personnel shortfall in the areas of maintenance, sustained operations and command and control. The major focus of the 2003 Report was aviation concepts and technology.

The final report addressed "Information Age" technology applications to the 2003 Comanche era fleet, and the combined arms team. Additional opportunities were identified in the areas of battle command, streamlining organizations, combat service support, battle lab integration, simulation, air traffic services, training and education. The report produced 176 recommendations. This article will address only three areas: battle command, streamlining organizations, and combat service support.

In battle command, the use of information as a weapon is based upon the tenet that situational awareness, coupled with the ability to be in the right place at the right time, will allow Information Age armies to observe, decide, and act faster, more correctly and more precisely than their enemies. Battle command is the art of decision-making, leading, and motivating informed soldiers and their organizations into action to accomplish missions at the least cost to the soldier. The smaller force of the future must have enhanced capabilities to focus direct and indirect fires, know where the enemy and friendly forces are, and provide battlefield support.

It is currently recognized that the communications systems available to support the exchange of all information are currently either inadequate or unaffordable. Therefore, commanders must define the minimum essential information "profiles" necessary to support battle command. Everyone on the battlefield doesn't need everything. The Board recommended a return to fundamentals. Both the users and the data communications systems must be disciplined. If we want to send video, we must know what it will cost in terms of priority of service, transmission time and contribution to the mission so the appropriate commander can make the tradeoff decisions. Additionally, traditional communications designs combine command and control and information on the same network links. The

distribution is hierarchical, focusing on the commander at each level. With the advent of the information age, this distribution method now becomes inefficient.

The Board report suggests command and control and information channels must be separate. Command and control remains hierarchical. This should not change. But, information must be widely available to all users in near real time. Reports will be sent automatically, transparent to the operator. Many of the manual functions of informing, controlling and evaluating are reduced. Common picture of the battlefield, information pull and continuous logistics visibility demand the separation of command and information flow.

Like battle command, the power of the microchip and an effective communications system provide an opportunity to streamline (not eliminate) staffs. Using information age technology to create orders, perform status keeping and analysis tasks supports smaller, more agile minded staffs. It substitutes grease pencils and knuckle drills with graphic displays on a computer screen. This is the concept of the "electronic staff". AMPS is a planning tool. It takes battlefield operational information and combines it with technical aircraft data and permits the staff to rapidly and accurately plan a mission.

MCS with AMPS gives staffs access to interoperable data bases that allow them to share information and pull only the data that is needed. Course-of-action decision aids and automated orders greatly streamline processes. Weather, terrain and aircraft performance factors can be quickly added or adjusted. In AMPS, digitized terrain data and 3-D perspective view eliminates map interpretation and permits step by step rehearsal of a mission. The Board's view is that AMPS is the key to unlock the power of information warfare. Rapid and accurate exchange of data with aircraft computers create a true ground-to-air system of systems.

Another important contributor, Army Airborne Command and Control System (A2C2S), will be an information node. This C2 Black Hawk helicopter, provides automated work stations for both the ground (corps, division, brigade) and aviation commander and his battle staff. They can command and control on the move, access intelligence and coordinate necessary mission changes. The cycle from planning to execution is compressed. Furthermore, A2C2S and aircraft like Comanche could be operated from the ground as a temporary command post using integrated communications and processors.

Finally, the fielding of fully integrated systems with embedded digitization provides the opportunity to automate many of the routine functions associated with combat service support. Weapons, fuel and ammo status as well as maintenance condition (prognostics and diagnostics) can be monitored and recorded. It can be collected and distributed on demand or by

preset parameter. One example might be a flight of six Comanches with one designated as the collector of logistics information. Each aircraft passes its maintenance and logistics condition to the designated system for consolidation and retransmission to a FARP.

Personnel in the FARP determine their capability to provide required support. If supplies are available, no further communication is needed. If not, the flight or select aircraft could be diverted to another location where the necessary fuel or ammo is available. Additionally, this information could be relayed through the logistics support system to alert the brigade executive officer and appropriate level maintenance personnel.

These three examples are only a few of the areas addressed in the 2003 Board final report dated 31 May 1994. One area addressed in detail was the technology offered by the Comanche mission equipment package. This technology provides futuristic operational opportunities which could be fielded in 2003. The Comanche is a system of systems which can assimilate and process information (four million operations per second) contributing to armed reconnaissance, command and control, intelligence, air defense, and logistics battlefield functions while conducting a mission. The Comanche system will have the ability to portray the future.

As an armed reconnaissance vehicle, it can record the movement of threat forces, determine the rate and direction of movement, and thus provide a portrayal of where threat forces will be in two hours. The system continually recalculates future location projections based upon sensor inputs. Provided with this information and the Comanche's target acquisition and pilotage systems, the commander can electronically send the mission to his forces while on the move and conduct a rehearsal of the future engagements in virtual reality prior to coming in contact with the enemy.

Comanche technology could provide the combined arms team a significant operational advantage in portraying future situations which permit course of action rehearsals.

The Board's overall findings are that aviation modernization is a leap ahead approach to meeting the Force XXI vision. Aviation has taken a bold step in reorganizing under ARI to retire old and obsolete aircraft which no longer contribute to the warfight. Finally, Aviation operates in the "Third Dimension" across all Battlefield Operating Systems (BOS) and is an integral and essential member of the combined arms team. Additional information and a copy of the final report can be obtained from Mr. Skip Fritz (314) 263-7633, FAX-1172 or E-Mail:

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BY COL DAVID L. AHEARN, JR.,
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ARMY AVIATION AND THE DIGITAL BATTLEFIELD

A report on NTC Rotation 94-07, the first test of the Army's effort to create a digitized battlefield.

Army Chief of Staff GEN Gordon R. Sullivan's vision for developing 21st Century warfighting capabilities is captured in a high priority program referred to as the Force XXI initiative. It centers on information warfare and the ability to defeat an opponent in three dimensions — faster, with leaner forces, and at greater distances. Central to the success of this initiative is battlefield digitization.

An Army definition of digitization is the application of information techniques to acquire, exchange, and employ timely digital information throughout the battlespace. It is tailored to the needs of each commander, shooter, and supporter, allowing each to maintain a clear and accurate vision of his battlespace to support both planning and execution.

The Army conducted its first large-scale digital exercise to experiment with battlefield digitization in April 1994 at the National Training Center (NTC). The Advanced Warfighting Experiment (AWE) was conducted as a piggyback, non-interference experiment during the 24th Infantry Division's regularly-scheduled NTC training rotation 94-07.

The AWE was a first attempt at tightly linking operations and intelligence functions through a common digital architecture to provide tactical unit commanders with a near real-time picture of the entire battlefield. Commanders had the unique ability to receive traditional "push" intelligence information, as well as to "pull" needed intelligence information. The experiment was successful, providing a good view of the *potential* for digitizing the battlefield. We confirmed that digitization can significantly enhance situational awareness, battlefield synchronization, OPTEMPO, logistics supportability, force protection, etc., and that modern

soldiers are readily adaptable to digital technologies. In fact, they thrive on it, thanks to home computers and video arcades. Even in the absence of comprehensive, formal training (in operations, maintenance, doctrine, tactics, techniques, procedures, etc.), soldiers found innovative ways to enhance combat effectiveness using digital technologies.

A variety of hardware and software was used during the AWE, including:

- ***Fielded Equipment*** — Airborne Target Handover System (ATHS), allowing digital transmission of messages;
- ***Commercial Equipment*** — Phototelesis (Photo-T), which allows transmission of FLIR and low-light TV images over SINCGARS, and;
- ***Developmental Equipment*** — Army Airborne Command and Control System (A^2C^2S), a unique C^3I console installed in a UH-60 used as an airborne tactical operations center. The Intelligence Center's Exercise DESERT CAPTURE II also supported the exercise, providing timely and realistic digital intelligence support.

Aviation was digitally connected to the ground maneuver brigade (Figure 1). Aviation and ground elements were provided unprecedented intelligence via digital systems such as the All Source Analysis System (ASAS), the Commanders' Situational Awareness Workstation (CSAW), and an Unmanned Aerial Vehicle (UAV). Enhanced Position Location Reporting System (EPLRS) provided automatic position locating and allowed digital electronic mail to be communicated between aviation and ground elements. However, due to the man in the loop, E-mail does not qualify as true digital connectivity and is better characterized as "swivel chair connectivity".

Unfortunately, the A^2C^2S could not be fully assessed. Prior to exercise initiation, a mishap precluded use of the A^2C^2S UH-60 during the AWE, and the powerful capabilities of an airborne Command and Control (C^2) console could only be partially replicated by a version mounted in a ground tactical vehicle, the aviation brigade jump TOC. It did not allow the aviation commanders the necessary flexibility and agility to keep pace with the dynamics of their missions — particularly during deep attack operations. However, even from a stationary TOC, the benefits were obvious. Digital C^3I enhances situational awareness and synchronization of combat power by providing commanders a more complete, timely, and accurate view of the battlefield. Even when ground mounted, digital C^2 is far superior to a conventional analog alternative.

Three OH-58D Kiowa Warriors and three AH-64A+ Apaches were outfitted with photo imaging equipment manufactured by Phototelesis, Inc. Photo-T allows digital images as seen with a FLIR or low-light TV to be transmitted to other Photo-T-equipped locations — to an aviation brigade or attack helicopter battalion TOC, to a ground maneuver brigade TOC, or Battle Command Vehicles

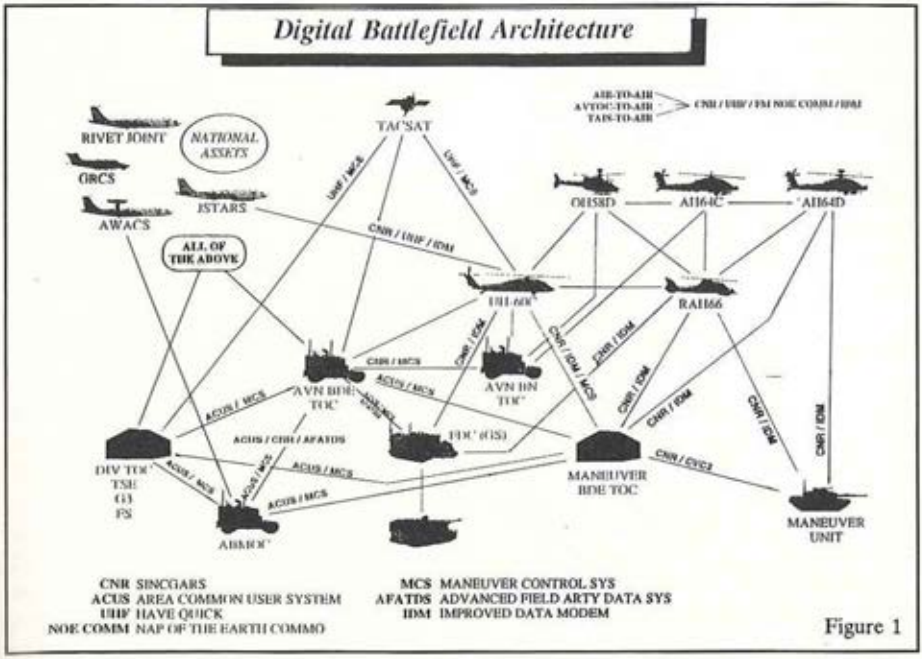

Figure 1

(BCV), to a ground scout vehicle (HMMWV with near-second generation FLIR), to the Tactical Analysis Facility (TAF) or the NTC "Star Wars Building", etc. Though operational shortcomings with Photo-T were identified, it demonstrated enormous potential for enhancing tactical intelligence, situational awareness, and synchronization on the battlefield.

The full power of digital imaging will emerge from materiel improvements and development of digital Tactics, Techniques, and Procedures (TTPs).

The OH-58D was invaluable in assessing the potential of more mature digital imaging capabilities because of its integrated cockpit, its digital data bus, and the extensive digital experience of its crews. Kiowa Warriors were also able to transmit Thermal Imaging Sight (TIS) or low-light TV images along with text information produced using the ATHS. In essence, what can be displayed on the multifunction display can be re-transmitted using Photo-T. Thus, the OH-58D had the capability to transmit photos and collaborating information simultaneously — such as aircraft/target locations, headings, target ranges, target descriptions, etc. Conversely, the AH-64+ required separate ATHS or voice transmissions in order to provide Photo-T recipients with collaborating information. (The AH-64+ is not configured with a digitally-integrated cockpit, a provision in the future Longbow Apache.)

Personnel at the aviation brigade discovered that they were able to superimpose text onto received Photo-T imagery prior to re-transmission over EPLRS radio. Thus, the brigade staff had the capability to synthesize collaborating information with Photo-T imagery.

Aboard the aircraft, recorded Photo-T images are stored in a digital memory buffer. However, they can only be transmitted in the sequence in which they were stored, adding pilot workload and "heads down" time in the cockpit. A minor system change applied in the field allowed Kiowa Warrior crews to scroll through (preview) stored images. However, images still could only be sent in the sequence in which recorded. No similar capability could be provided in the AH-64+.

A relatively simple modification reportedly can provide the capability for the OH-58D to *receive* Photo-T images in the cockpit. However, it exceeded field modification capabilities and was not applied during NTC 94-07. The added benefits are somewhat obvious, particularly if a "light pencil" capability allowing graphics to be drawn on the screen prior to transmission was also provided. Commanders and team leaders in essence could then conduct "electronic audibles", enhancing battlefield synchronization and situational awareness — like putting the power of John Madden's NFL press booth critiques in the cockpit.

On the down side, field results showed that transmission of a Photo-T image required approximately 20 to 90 seconds, depending on image detail. For tactical reasons, a ten second transmission capability is desirable and reportedly achievable. Also, during the AWE, photo imagery transmission was limited to single channel, non-secure SINCGARS radio operations. Secure mode transmission was not used due to NTC-imposed restrictions. Transmissions were limited to line-of-sight and, with the communications architecture used, could only be received by one specifically designated receiving station at a time. Broadcast (multi-station) receiver capabilities are needed to facilitate coordination and tactical operations. Multi-channel (frequency hopping) operation is also desirable — to facilitate operation security and reduce vulnerability to jamming. However, due to the potential for partial loss of imagery during frequency hopping, there is some question about its feasibility. Nonetheless, frequency hopping is a desirable end-state capability.

It became apparent that digital imaging TTPs are needed in order to derive maximum benefit from electronic imaging. Areas of special interest, such as Named Areas of Interest (NAI), should be routinely assigned for imaging in order to heighten situational awareness. In the absence of TTPs during the AWE, staffs overlooked opportunities to optimize potential in developing intelligence and as a tool to enhance situational awareness and to better synchronize the battlefield. As a result, the immense tactical value of photo imaging

technology was not fully realized.

Requirements for photo imaging capabilities should include:

- Greater resolution (FLIR resolution comparable to low-light TV).
- Onboard and ground station transmit *and* receive capabilities.
- Ability to superimpose free-text message information.
- Ability to preview stored images.
- Ability to delete and transmit photos of choice (irrespective of the order in which stored in a buffer).
- Ability to superimpose text and graphics on a digital image with a light pencil prior to transmission, providing an "electronic audible" capability.
- Ability to transmit standard formats of battle damage assessment imagery and related graphics.
- Minimum transmission time, less than 10 seconds per image.
- Secure, frequency hopping transmission capabilities.
- Ability to send/receive a digital map display (correlated to aircraft heading and position, it could provide a limited digital map capability).
- Ability to synthesize voice into a digital free text message for annotation onto photo images.
- A common communications protocol, perhaps the National Imagery Transmission Format Standard (NITFS).

It appears that maximum advantage will be gained by providing digital imaging capability in the A^2C^2S UH-60 airborne TOC; reconnaissance and attack helicopters; aviation and ground brigade Military Intelligence units; selected battalion and company TOCs and jump TOCs; and division and corps headquarters.

The ATHS and the Improved Data Modem (IDM) were used aboard aircraft and in various TOCs to allow digital communications links across the task force. Digital text messages are advantageous because they are fast, accurate, and lasting. In certain instances, they are more useful than voice messages — in terms of saving time, accuracy, and subscribing to given message formats. On occasion, they were more effective — digital communications sometimes succeeded where voice was not achievable.

However, there are still some bugs to be worked out. For instance, though non-secure ATHS communications were established with artillery's Initial Fire Support Automation System (IFAS — an interim fire direction C^3 system), secure ATHS communications were not established. In the future, IDM will be the system of choice to ensure joint/combined forces digital connectivity. Its protocols are compatible with Army Tactical Fire (TACFIRE), Air Force Application Program Development (AFAPD), and the Marine Tactical Systems (MTS). The IDM is a more powerful data modem with greater information handling characteristics.

At the time of the AWE, the Aviation Mission Planning System (AMPS) was an Army developmental program to provide aviators with a mission planning tool. It incorporates standard Defense Mapping Agency (DMA) Area Digitized Rastar Graph-

ics (ADRG), Digital Terrain Elevation Data (DTED), and standard Army map symbology.

AMPS provides the capabilities to determine intervisibility between separate geographic locations — facilitating selection of effective battle positions, prediction of line-of-sight to ensure communications and proper targeting, and selection of navigation routes. The system also generates hard copy mission data, such as route and communications cards, and it generates complete digital mission planning data which is directly loaded on the Kiowa Warrior's Data Transfer Cartridge and inserted into the onboard Data Transfer System.

During this AWE, AMPS was used most extensively to facilitate mission planning and to conduct detailed terrain analysis.

Use of the AMPS during the AWE provided significant insights into the need of and potential for digital mission planning. Additional capabilities needed for such a system include: networking via tactical modems, provisioning for standard ATHS/IDM messages, integration of video image transmit and receive capabilities, incorporation of standard reports formats (FRAGOs, OPORDs, logistics and tactical SOPs), etc.

By providing radio, modem, and wire or fiber optic cable communications links, full brigade-battalion-company digital connectivity is possible, reducing the need for "in person" coordination while enhancing operational effectiveness and standardization. As a result, parallel planning can occur so more mission planning time can effectively be allocated where needed, particularly to companies and platoons. An interim version of AMPS is being fielded to all Kiowa Warrior units.

The Commander's Situational Awareness Workstation (CSAW) allows access to near real-time intelligence projected on variable scale DMA digital map displays overlaid with battlefield graphics. Availability of this intelligence allows last minute, enroute changes in response to detection of air defense threats, enhancing mission effectiveness, and force protection capabilities. Low resolution three-dimensional virtual simulation is also provided, allowing mission aviators, planners, and commanders to conduct detailed terrain analysis while previewing a route much like the aviator sees from the cockpit. From the information gained by superimposing graphics and templated intelligence onto maps, flights can be vectored around identified enemy ADA/troop concentrations, opportune targets can be designated enroute, or other critical combat tasks can be conducted.

AMPS and CSAW each provide aviators, planners, and commanders with powerful digital planning tools. However, there are many advantages to be derived by combining the AMPS and CSAW into one device:

- Powerful intelligence gathering and mission planning in one workstation.
- Simpler training through a common

workstation and software.

- Simpler logistics supportability.
- Reduced acquisition costs.

Likewise, it may be beneficial to integrate the best capabilities from several hardware and software systems into one system. Perhaps we should also add the intelligence power of ASAS and the standard reports formats found in Brigade and Below Command and Control (B^2C^2) software. Through such a combination, not only would we have the best capabilities of each synthesized into one system, but we would also gain an affordable, trainable, supportable device.

In training for NTC 94-07, much of the digital training provided to participants was limited in scope, followed no standard program of instruction, and occurred late in the NTC preparation process. Some participating units received digital equipment late, and in some instances, hardware and software systems were provided after using units arrived at the NTC. Equipment fine-tuning occurred throughout the exercise. In practice, even the most proficient operators were using only a fraction of the power and capabilities achievable through digitization.

Interestingly, instances were observed when, even with all the best, timely digital information available, leaders would not believe the tactical situation presented. Some of their disbelief was manifested by the skill and cunning of the OPFOR. However, this finding also demonstrates that digitization provides such timely and clear situational awareness that, without digital doctrine, TTPs, and familiarity, much of its value is lost. It seems we must re-learn an old adage that is applicable in the air and on the ground — "When in the clouds, it is best to believe your instruments!"

Digitization will allow Aviation to keep pace with the rest of the Army and our sister Services, bolstering national defense, and the Army's combined warfighting capabilities. The U.S. Army Aviation Center, in cooperation with PEO Aviation, is firmly committed to digitization of the battlefield.

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BY PETER M. BARTOSCH
and ROBERT A. LEUTWYLER

THE ARMY AVIATION INFORMATION PROCESSING FACILITY

How the Aviation Tactical Operations Center can make the difference on the battlefield.

Army Aviation has never had a Tactical Operations Center (TOC) designed for field operations. The modified tables of organization and equipment provided the tools, but it was up to the commander to decide how he wanted to arrange the tools. The operations and communications platoons usually build the TOC out of plywood, plexiglass, aircraft intercoms, poster board, and butcher paper with guidance from the operations officer and unit commander.

On the other hand, Armor created the M577 as the TOC to accompany their new tank battalions in the late 1950s. The M577 has prescribed locations for radios, remote controls, tent extensions, heaters, entrance ways, antenna masts, etc.

The Aviation TOC will upgrade aviation tactical operations into the digitized battlefield, while integrating legacy systems, appliqué upgrades and new digital technology into an efficient battle staff planning facility. The first prototype is currently at CECOM with proposals to integrate shelters on HMMWVs for the Brigade 96 exercise.

Probably the best way to describe the value of a TOC and what it does for the commander is to provide a scenario in which it is used:

COL Pearson, commander of the 52d Aviation Brigade, has just finished his pre-mission briefing. He has chosen LTC Mitchell, the attack battalion commander, to repeat the same briefing he has just given. This is a verification technique Pearson uses to ensure that communications has taken place. In a few hours the 52d Aviation Brigade will conduct a daring extended range operation deep into the 4th Combined Arms Army (CAA) rear to destroy a 433d Motorized Rifle Division (MRD) in its assembly area. The enemy nations have formed a coalition of forces to defend

their homelands and reclaim the strategic areas previously surrendered. This army is equipped with mostly eastern Commonwealth equipment but has acquired western air defense and artillery systems.

COL Pearson has devised a plan of action based on the brigade intelligence officer's (MAJ Reeder) estimate of the threat situation. MAJ Reeder has a computer connected to the Ground Station Module (GSM) and special software which can rapidly display the positions of the 433d weapons. Based on LTC Mitchell's brief back, one change was made to the mission. COL Pearson has placed emphasis on timing and hitting the turning points precisely.

Using an electronic three dimensional map, he has chosen the routes carefully to take full advantage of terrain masking and avoid air defense systems. However, the high density Air Defense Artillery (ADA) umbrella the enemy has arrayed cannot be avoided completely; one ZSU-23-4B lies along the route. The time of exposure of the flight will allow a well trained ZSU crew to attack several aircraft.

LTC Mitchell recommended taking the ZSU out with the lead aircraft at the risk of prematurely exposing the operation. The remainder of the route will zigzag to confuse the enemy as to the intentions of the force. Hopefully, the enemy will not be able to determine the size or composition of LTC Mitchell's force: an attack helicopter battalion with reconnaissance, command and control, and MEDEVAC aircraft. If exposed, the enemy will have time to formulate a hasty defense, orient their weapons, or worse, disperse the assemblage of their forces.

LTC Mitchell's force will conduct a passage of lines into enemy held territory. The force will observe radio listening silence from the passage point to the release point. Friendly coalition forces to the west will conduct an electronic and artillery barrage simulating a penetration along the battle line.

The flight will ingress through the 1st Battalion, 52 Infantry Brigade's sector. CPT Reger, in an OH-58C Kiowa, will launch a half hour before the main body and liaison with the mechanized infantry battalion's S3, MAJ Stensky. They will exchange battle graphics, battle positions, and route information. MAJ Stensky wants to know the routes, number of aircraft and the time of arrival of LTC Mitchell's flight and the crossing site. LTC Mitchell will communicate via voice radio with COL Pearson any changes to the ingress plan, based on MAJ Stensky's force distribution and/or recommendations.

It will take one hour for LTC Mitchell's flight to get to the attack positions. All the pilots in command rehearsed the mission on their company mission planning computer at double speed to check the exposure of the flight to the reported ADA sites. Because of radio silence, LTC Mitchell will not respond to messages sent to him by the brigade operations center via a Nap-of-the-Earth Communications (NOE COMM) radio until he reaches the release point. Once there, he will make a short digital burst transmission back

to the brigade's TOC, acknowledging all messages and advising of his status. This message is formulated on his on-board computer and will take just a few keystrokes to revise before transmission.

If something should change during the course of the flight such as movement of the target, loss of more than 50% of his force, mission abort, shifting ADA concentrations, or other complications that would force LTC Mitchell to alter his route or target, he will acknowledge the message and transmit the change to his fighting forces. Code words, spread spectrum techniques, and secure transmissions will minimize the enemy's ability to acquire the flight electronically. The enemy has a large variety of electronic listening and jamming devices — a lesson learned from DESERT STORM.

The brigade has planned for every conceivable contingency. The potential of losing much of the attack battalion is high, but the target's value is worth the risk. The loss of the armor and fighting vehicles of an entire motorized rifle division would break the back of the enemy, forcing them to withdraw.

It will take 15 minutes to service the target once the aircraft are in their fighting positions. The commander has taken great pains to ensure that the crews know their sectors of fire. Commanders and platoon leaders make arrangements for target handover, remote designation contingencies, laser code exchange, radar target list exchange, and alternate firing positions. These variables were loaded into their aircraft via a data loading cartridge prepared by the brigade TOC, using a mission planning computer.

The initial Hellfire shots from CW3 Jackson's Apache took out the ZSU communications van. The second missile, 15 seconds later, took out the radar. Accurate 30mm cannon destroyed any remnants of the position. The main body observed the activity through their FLIR sights. CW3 Jackson's instructions were to report only an unsuccessful engagement. The radios remained silent, and the flight continued its mission. Finally, LTC Mitchell's flight reached the release point and dispersed.

LTC Mitchell called up the release point message on his multi-function display, made adjustments to the rounds expended, and pressed the send button. The HF radio on his aircraft immediately began bursting automatic linking messages sequentially over ten different, carefully chosen frequencies. The 120 mile distance back to the battalion TOC with little ionospheric activity makes it difficult for communications. After ten seconds the radio determined that channel 4, 2.310 mhz, was the best frequency but the noise level would not allow voice communications. Instead the radio automatically selected 75 bps and sent the burst message on the flight's status to the TOC. The message went out using a jam-resistant frequency hopping scheme, encrypted, in two bursts, 2.7 seconds each.

After receiving the message, the brigade TOC swung into action. It activated the silent rearm refuel point to prepare to receive the returning aircraft. The TOC will shut down the active

point and direct its movement back to an alternate position. They will also send messages to search and rescue and MEDEVAC units on the progress of the operation to heighten their state of readiness. The intelligence officer concentrates on his computer screen where he observes live Joint Surveillance and Target Attack Radar System (JSTARS) feeds for indications of enemy movement into attack positions.

LTC Mitchell's right and left flank Apaches are equipped with Longbow. These two aircraft expose their radar to the assembly area and begin their scan. After a few seconds they return to defilade positions. The target files are sent to COL Pearson in his command and control aircraft. He correlates these with the constant intelligence information he has been receiving through his automated intelligence processing/dissemination system.

There will be just enough fuel remaining to egress back to the refuel point. The battalion forms up at the agreed assembly point. The enemy is alerted now, but radio listening silence will prevent radio location. Again, critical information on ADA and other traps that the flight may encounter are relayed to COL Pearson so he can make a decision to bypass, overfly, or eliminate them. The route of egress will be to the west into the friendly coalition sector. With the enemy oriented to the friendly coalition, they will not notice the attack helicopter force to their rear, trying to conduct a passage of lines.

Passage of lines is perhaps the most difficult phase of this operation. CPT Reger will fly forward to make the initial contact with the 2d Battalion, 3d Armor Brigade's S3, MAJ Corry. Again an exchange of graphics and firing positions takes place. CPT Reger will verify/count the aircraft as they come across. The command selected the passage point carefully to provide maximum masking of the operation and to stay away from the open areas where the major exchange of fire is occurring. Again communications must be brief, spread spectrum, and secure to affect the necessary coordination and timing, so critical to such an operation.

In his briefing, LTC Mitchell instructed his flight crews to tune one SINCGARS radio to the ground maneuver battalions' Intra-Vehicular Information System (IVIS) frequency. The armor battalions' fighting vehicles automatically pass digital data bursts between vehicles every 15 minutes or every 100 meters change in position. This allows the company and battalion commanders to have situational awareness of their forces. Anyone on the frequency, with the correct crypto and modem, can receive this burst. This data burst contains the vehicle position, speed, and direction of movement. Each of LTC Mitchell's aircraft have the crypto codes and modem which can interpret this burst and provide the pilot a pictorial of the position of these vehicles on his multi-function display. Crew members know exactly which ones are friendly. After having been through a large fire fight, LTC Mitchell's men have a high tension level and are prone to shoot first and ask questions later. With this dis-

play they can ensure they are not shooting friendly vehicles.

This fictional scenario resembles present Army Aviation doctrine. Despite the radio listening silence, communications is critical to the conduct of the operation. The hinge pin technology which will make this mission possible is a Non-Line-of-Sight (NLOS) radio system which offers security and low probability of intercept, and requires little crew member interface. The Aviation Center has named this technology Nap-of-the-Earth Communications (NOE COMM). Until recently, long range communications techniques such as Guardrail relay, satellite communications, or command and control aircraft flying in a relay position were the only available technologies.

All these techniques have problems. Guardrail, or any high flying aircraft, must fly far behind the battle area because of its vulnerability to ADA. Guardrail radio assets are limited and usually dedicated to its primary mission of intelligence data relay.

Satellite channels are very limited, vulnerable to jamming, and are reserved for high priority units. Army aircraft other than command and control assets do not have satellite antennas nor half duplex radios to use satellite channels. Because of the dynamics of helicopter flight and main rotor masking, satellite antenna positioning on helicopters is difficult.

Command and control aircraft should stay up with attacking forces in order for the commander to see and make on-the-spot decisions on the course of battle. When flying in a relay position the commander's ability to make decisions is hindered. He might as well be on the ground.

Recent technology, demonstrated by a number of manufacturers, has confirmed that High Frequency (HF) radios, with data modems, automatic link establishment, and other techniques have made this frequency spectrum usable 90% of the time both day and night for voice or data. At the same time this new technology has eliminated most of the pilot workload and acoustic anomalies normally associated with HF radio.

NOE COMM is the critical path for achieving the necessary communications for a combat arm which by its speed and range is always out of communications range with its information processing source: the TOC. The Aviation TOC (AVTOC) is not unlike the Intelligence Information Processing Facilities (IPF) of other command and control systems. The Airborne Warning and Control System, the Forward Area Air Defense's Command and Control node, and Armor's M577 command track are examples of systems that were designed as mobile TOCs to compliment their fighting elements. With the capabilities, expense, and technological developments of Comanche and the Rotorcraft Pilots Associate (RPA), aviation must rethink its responsibilities towards the ground component of its systems.

The Army has recognized the need

for a standardized TOC and has taken measures to produce basic models. There are four models of the Standard Integrated Command Post Shelter (SICPS):

- a HMMWV with a Rigid Wall Shelter (RWS) and accessory tent;
- a tracked vehicle (M577),
- a five ton expandable van, and,
- a Tent Command Post.

These contain the core needs of a TOC, regardless of branch or echelon, such as map boards, intercoms, work tables etc. The shelter units contain generators, environmental units, and the CHS computers. Users will add their own equipment to make the TOC fit their needs.

The TOC, whether airborne or ground, is the work area for the staff which does the following functions: information collection, current plans/operational execution, flight following, future plans, information dissemination, and after action review.

Staff personnel perform information collection using the Maneuver Control System (MCS) computer and oral reports from subordinate units. All these reports follow the United States Message Text Format (USMTF). This information includes operations orders, fire registration, barrier plans, close air support sorties, task organization, etc.

Once collected, the staff in the TOC then does future battle planning. They devise their order of battle based on the division operations order and the commander's intent. The TOC uses a process which evaluates Mission, Enemy, Terrain, Troops, Time (METT-T) and logistics available. TOC personnel use two maps for this process. The operations officer (S3) maintains a friendly unit situation map with operations overlay. The intelligence section (S2) maintains an enemy disposition map. The MCS contains the core data bases for everyone in the division.

Operations personnel use the Aviation Mission Planning System (AMPS) to plan and rehearse aviation missions in three dimensions. The operations section distributes mission plans via data cartridges to units which do not have MCS interface. Aviation companies, for example, would receive operations overlays, orders, and flight information via data cartridge from their battalion.

Once the commander and operations officer begin executing the plan, the TOC performs two functions:

- Acquiring updated information for dissemination to the commander;
- Flight following to track the progress of the battle and to account for aircraft.

The TOC personnel will request or direct MEDEVAC and downed aircrew missions. Flight following is accomplished by using the aviation brigade's Tactical Airspace Integration System (TAIS), a semi-automated facility with the NOE COMM system for unattended (no pilot action required) aircraft position reporting. TAIS operators receive information directly from MCS passing battlefield information to aircraft as needed.

The TOC formulates the aircraft, crew, personnel, special equipment status, closing, and sensitive items reports to higher headquarters. This is done electronically through MCS via SINCGARS or Mobile Subscriber Equipment (MSE). The TOC also collects, edits, and publishes the after action report or lessons learned. Standard operating procedures can be updated and new personnel can learn from previous mistakes.

The U.S. Army Aviation Center (USAAVNC) is preparing the necessary requirements documentation to man and equip the SICPS to make it an Aviation IPF or AVTOC. The Command and Control Systems Integration Directorate (C2SID) of CECOM is developing a prototype of the AVTOC with SICPS mockups and actual shelters to evaluate these concepts.

In addition to supporting the conceptual definition and implementation of the future Army Aviation Command and Control infrastructure, the AVTOC will participate as a major Aviation player in Force XXI Task Force. Four AVTOCs will be fabricated to support Force XXI Task Force by 1 JAN 96 through cooperative integration efforts supported by the CECOM Research, Development and Engineering Center (RDEC); the Aviation and Troop Command (ATCOM) RDEC, St. Louis, MO; the Aviation Applied Technology Directorate (AATD), Ft. Eustis, VA; USAAVNC; PEO Aviation; and PEO CCS.

The Force XXI Task Force AVTOCs will be designed according to the functional requirements of the AVTOC Operational Requirements Document (ORD). The AVTOC configuration will be implemented with the S3 and S2 functions located in SICPS RWS shelters mounted on heavy HMMWVs. The SICPS will be connected to a series of interconnected tents which will provide the facilities for AMPS based mission planning, operations planning, staff operations, and electronic briefing capabilities.

The hardware will be Common Hardware/Software (CHS) products where feasible. The Comm system will be designed to support both the Aviation unique needs along with the ground maneuver forces. There will also be a sophisticated intercom system which will enable all personnel to communicate with each other and provide work station access to any of the communications assets for digital data transmission. In effect any operator can access any radio for both voice and data through the intercom system. All the operator stations will be connected via a LAN for the exchange of vital information.

The AVTOC software will come from the CECOM RDEC and PEO CCS software developments. The RDEC is currently supporting the PEO CCS in the development of the MCS version 12 software and Force XXI Task Force Applique acquisition. The S3 software package will be predicated on this along with the links to

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BY SFC(P) JOHN H. REMSON, JR.

THE KING AND THE WING

How Army Aviation and Artillery can combine forces to become the most lethal element on the battlefields of the 21st Century.

Field Artillery, the King of Battle, advances into the 21st century combined arms battlefield with lethality and effectiveness aided by the OH-58D Kiowa Warrior.

The OH-58D has been operating effectively with the Field Artillery since 1987 in digital communications and highly complex target acquisition technology. This valuable combined arms team continues to train together at the core of the Kiowa Warrior Program at Ft. Rucker, AL.

The Fire Direction Center (FDC) of C Company, 1-14th provides this training. Students learn to use the Airborne Target Handover System (ATHS), an integrated digital communications system to conduct the five basic artillery missions; Adjust Fire, Fire for Effect, Suppression, Immediate Suppression and Copperhead.

After four days of ground training, students fly to Molinelli Aerial Gunnery Range Complex where they detect, identify, and locate targets using the Mast Mounted Sight (MMS), then engage with indirect fire through the FDC. They also learn how to adjust rounds, store and repeat missions and send Artillery Target Intelligence (ATI) and spot reports.

As the only tactical digital Net Control Station (NCS) on Fort Rucker, the FDC of C Company, 1-14th provides a continuous voice and digital link for over 30 OH-58D aircraft during various stages of training ranging from tactical employment to gunnery, working a 4,000 square kilometer training area.

The FDC equipment of C Company, 1-14th consists of two Battery Computer Systems (BCS), one Light

Weight Computer Unit (LCU), two SINCGARS (AN/VRC-92) long range radio sets, and three antennas (OE-254) mounted on a 60 foot pole. A 28 volt AC to DC power supply provides power to the Center. The LCU has the capability to operate using C cell batteries, AC or DC power.

The LCU with the Initial Fire Support Automated System (IFAS) is replacing the heavy Tactical Fire Direction System (TACFIRE). The LCU gives field artillery National Guard and United States Army Reserve units complete digital capability. The fielding of the LCU is scheduled for completion by the end of FY95. The LCU is an off-the-shelf 486 microprocessor with 32 megabytes of random access memory.

The heart of the system is essentially a laptop computer with numerous capabilities depending primarily on the external device it operates and the hard disk drive installed. Though the artillery uses it for fire support functions, it is also used by other branches to form a command and control network. One LCU can operate a field artillery battery FDC or Fire Support Element, and two LCUs can be linked together to operate a field artillery battalion FDC.

The FDC software setup for C Company 1-14th emulates two field artillery firing batteries. However, with simple software upgrades, the system could emulate battalion, brigade or corps field artillery systems. The old BCS has a data base for one firing unit with a maximum of 12 guns, and can only process three active fire missions. The LCU with IFAS can be programmed with 60 firing units to include the Multiple Launcher Rocket System, processing 30 active fire missions at once. The BCS can store a maximum of 80 targets, the LCU with IFAS can store up to 2,000 targets.

The 260th Field Artillery provides four personnel, MOS 13E, on a 90 day rotational basis to support the Kiowa Warrior training program. This training hones the 260th's fire direction and radio communication skills, incorporating the new technology of the LCU. During 1993, C Company, 1-14th, FDC conducted 6,769 fire missions in support of OH-58D field artillery training.

The OH-58D helicopter communicates with the field artillery digital network through the ATHS. The ATHS and MMS on the OH-58D allows a pilot to detect targets with the Television Sensor or Thermal Imaging Sensor, locate the target with the laser (eight digit grid) and digitally call for fire with a first round, fire-for-effect, accuracy. The Co-Pilot Gunner adjusts rounds as necessary using the same system. The MMS and ATHS are fully integrated.

Target location automatically transfers from the MMS laser to the ATHS. Therefore, the crew can rapidly transmit target locations with

each fire mission on the secure, digital, frequency-hopping radio net.

The Army OH-58D Kiowa Warrior plays a vital role in support of the field artillery mission. The capabilities of the OH-58D as an armed reconnaissance/attack aircraft enhance both air cavalry squadron and attack battalion effectiveness. It will also provide precise, accurate battlefield information to the maneuver commander through the field artillery digital network.

The OH-58D Kiowa Warrior and the Field Artillery continue to work closely as a lethal combined arms team in the acquisition and destruction of enemy targets. It is imperative that the Field Artillery maintain its Kiowa Warrior training representation and continue to provide artillery instruction and guidance to new aviators operating this technologically advanced aircraft.

Its capability to adjust artillery and provide real-time battlefield intelligence is unmatched. Its use as an aerial platform for artillery interface in the combined arms team has been validated in training and on the battlefield. The future of this effective combined arms team will be determined by continued emphasis on quality training and education of aviation officers during basic and advanced aircraft qualification courses.

This awesome task falls squarely on the shoulders of seasoned noncommissioned officers in the school house, and the C Co FDC and the instructor pilots on the flight line.

★ ★

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AVTOC

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the lower echelons, i.e. the Soldier System. The S2 will utilize the ASAS Remote Work Station War Lord software with links to the JSTARS GSM.

The AVTOC prototype currently being fabricated by the CECOM RDEC presents a unique opportunity for Industry to evaluate new or improved products within the Military user community without the need for structuring independent demonstrations or exercises. The AVTOC's ability to interact with the User community's simulation worlds as a man-in-the-loop reaction will be a unique asset for performance evaluations.

Longbow, Comanche, and RPA will require semi-automated TOCs to efficiently utilize available information and become the force multiplier the Army envisions. AVTOC will be the catalyst between aviation and the ground forces which will allow this to happen.

★ ★

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SGT Timothy E. Hoover
SGT Jeffry N. Hopkins
SP4 John F. Hoppman
PFC Todd W. Horn
SFC Robert F. Horne
SGT Sidney L. Hudgins
SFC Robert Allen Hudspeth
SFC William Henry Hudspeth
PFC Peter J. Huelmstad, Jr.
SGT Brian A. Hughes
SGT Douglas D. Hunt
PV2 Sylvia R. Hunter
SGT Mark Perry Huntley
PFC Richard A. Hutton
Mr. BoYeon Hwang
PFC Christopher R. Ingram
PFC Charmin L. Irvin
SSG Kevin G. Irwin
PFC Calvin Ivy
SGT Jerline Jackson
SGT Jimmy L. Jackson
SP4 Keith O. Jackson
SGT Ray E. Jackson
SGT Richard B. Jacobs
PFC Anthony Jaiman
CPT John E. James, Jr.
SGT Jeffrey P. Jamison
SFC Dell Jankowski
PFC Jorge M. Jimenezvargas
SPC Edwin C. Jimmerman
SGT Frederick D. Johnson
SSG Freddie Johnson III
SGT Lance D. Johnson
SGT Carlos D. Jones
PFC Delbert E. Jordan
SP4 Bernard A. Juarez
Mr. Jin Woo Kang
PFC Aaron M. Kennedy

SP4 Ryan M. Kernan
SP4 William R. Kerstens
PV2 Roy M. Ketchum
SGT Jonathan G. Kight
SGT Chris E. Killingsworth
SPC Lesia D. Killingsworth
SSG Donald C. King
SGT Larry S. King
SPC Stephen R. King
SFC Tami L. King
SGT Ronnie L. Kino
SSG Dana J. Kleinman
SSG Ralph Eugene Klinestiver
SGT Jason R. Kling
SGT Jason J. Kolde
SGT Myron J. Kurtiak
SGT Michael O. Laclair
PFC John C. Langley
SP4 Gary Eugene Langshaw
SP4 Steven Gilbert Lavigne
PFC Philip E. Lavin
PFC Joo-Young Lee
Mr. Young-Tae Lee
PFC Emery Lehew
SGT Brian A. Lese
SFC Elzie E. Lester
SSG Gregory Lewis
PFC Jeremy D. Lewis
SGT Raymond D. Loyola
PFC Stanley M. Lutz, Jr.
SPC Angelia M. Lynard
SGT Alberto M. Macias
SPC Julie A. Mackenzie
SGT Morris C. Mackey
SGT Martin O. Manuel
PV2 Zenita N. Marbury
SFC Allen Marshall
SGT Darlene S. Martin
SGT Jon A. Martin
SGT Newton M. Martin, III
SPC Steven Maszkiewicz
SPC Keith Matthews
SGT Edward E. May
SPC Robert P. McCaskill, III
SGT Timothy D. McChesney
PFC David G. McCreery
PFC Angela L. McDaniel
SGT Paul C. McDonald
PFC Eric B. McDougal
SPC Jeffrey A. McGhee
PFC Michael K. McGowan
SSG Timothy Allen McGrath
PV2 Andreau V. McKenna
SGT David E. McLaughlin
PFC Gary W. McLemore, Jr.
SGT David W. McLuckie
SSG Joseph A. McNally
PFC Christina M. Meeks
PFC Nick A. Meeks
SFC Ignacio Mejia
PFC Steven Mena
PFC Johnnie Lee Mercer, Jr.
SGT Victor E. Metcale
SPC Larry E. Meyers
SGT Adrjan A. Miera
PV2 Charles J. Miller
SFC Michael M. Miller
SFC Randy J. Miller
SPC Randy L. Miller

1SG Byong H. Min
CW3 Mike E. Mittlebeeler
SGT Michael A. Mobley
PFC Ivan O. Moffett
SSG Lori A. Moffit
SGT John T. Mosley, Jr.
PV2 Marc I. Muroff
SPC George L. Nealy
SSG Craig V. Neeley
SPC Carl E. Newhouse
SGT Thomas Nowacki, Jr.
Mr. Young Suk O
SGT Anthony L. Ocasio
PV2 Justin M. Ochs
SGT Jonathan C. O'Connor
SGT Juan Oliva
SGT Joni N. Olson
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SP4 Anthony D. Papa, Jr
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CSM Lawrence Peeples
SP4 Amos Isaac Peltrey
SP4 Geraldo A. Peralta
1SG Agustin Perez
SPC Ricardo R. Perez
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PFCRobert Pettis, Jr.
SGT Eduardo O. Peza, Jr.
SGT Lawrence C. Pittman
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SFC Jerome D. Ray
SFC John J. Raychel, Jr.
PFC Shanikaa D. Raynor
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SGT Ronald L. Rollins
SP4 Ismael Rosa, Jr.
PV2 Chris S. Rose

SGT Georgia L. Rose
PV2 Harold Ruiz-Rodriguez
PFC Anthony W. Russell
SFC Kenneth E. Russell
PV2 Lequecia N. Ryan
SP4 Andy F. Salas
SGT Christopher K. Salek
SFC Curtis R. Samuels
SSG Ruben L. Santos
SFC Kristopher R. Sarpy
SP4 Sean Allen Savery
SSG Ruth A. Savoy
PFC Shane C. Saylor
SSG Terry R. Schmille
SPC Paul J. Schuster
SPC Paul F. Schweikert
PV2 Tanya M. Scott
SPC Troy S. Scott
SGT Cristopher Sears
PFC Gary D. Seaton
SPC Dennis M. Seeley, Jr.
SPC William E. Self, Jr.
SP4 Anthony B. Sessions
PFC John C. Shackelford
SGT Jay D. Shaeffer
SGT Harry Shaffer
SPC Joseph W. Shaffell
SSG Steven Shanks
SGT Alan R. Shelton
PV2 Jason W. Shiner
SP4 Maurice D. Shingleton
SP4 Lou W. Shipman
PFC Shawn Clifton Silva
PV2 Daniel A. Simons
SGT Sean C. Sink
SGT David L. Smith
SSG Edith L. Smith
SP4 Eric L. Smith
PV2 Heather S. Smith
SP4 Jeremy J. Smith
SGT Samuel C. Smith
CPL Dennis J. Snider
PFC Kevin Verline Snipes
SGT Romeo V. Soriano
PFC Jason Edward Spinner
SPC Steven Splechter
SP4 Marissa R. Stark
PFC Gary Thomas Stash
SGT Scott Steele
SGT Kurt Steller, Jr.
SGT Jeffrey R. Stemann
SGT John W. Stewart
SPC Mark T. Steward
SPC Roderick G. Stewart
SGT Eric D. Stith
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SPC Henry M. Suggs
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SFC John Philip Sundermann
SSG Mark J. Sutherland
PFC Erica D. Sutton
PFC Jason P. Swartwood
PFC Scott L. Swartz
SPC Steven E. Taskey
SSG Christopher P. Taylor
SGT Richard L. Taylor
SPC Linda M. Terrell
SP4 Napoleon M. Terrell, II
SP4 Thuno Thepsiri

PV1 Jimmie L. Thessin
SP4 Dwayne Thomas
SPC Christopher Thompson
SSG Clarence Thompson
PFC Bryan R. Tillery
SSG Joseph M. Tindal
SPC Douglas G. Tolbert, Jr.
PV2 Brandon D. Tolley
CSM David D. Tomblison
SFC Alfredo Torres Rivera
SGT Israel Torres, Jr.
CSM Luis M. Torresvillegas
SP4 James R. Towle
SSG Douglas M. Townsend
SSG Lyndell Townsed
SGT Shawn T. Triplett
PFC Jason P. Tucker
SSG Randy H. Turnage
SFC Michael J. Turner
SFC Stephen P. Turner
SGT Jaime L. Tuvera, Jr.
SFC John Tyson, Jr.
PV2 Vashion L. Tyson
PFC Robert S. Urvina
SGT Dennis R. Utz
PFC Mario Valdivia
SFC Antonio S. Valenzuela
SGT Lee F. Valliant
MAJ Richard W. Van Allman
PFC David J. Vandermark II
SPC Christopher M. Vargas
SSG Michael J. Vargo
PFC John A. Vaughn
SSG Benjamin Vega
SGT Luis M. Velazquez, Jr.
SP4 Shawn M. Vick
SSG Rolando A. Villanueva
SGT Robert Villarreal
PFC Jesus Antonio Villegas Jr
PFC Jordan W. Walma
SPC Stephen C. Wanlig
SPC Charles W. Ward
SSG Michael G. Ward
SP4 Derrick D. Warren
SGT Dennis F. Watson
PFC Daniel B. Watts
CPL Leslie R. Wearing
SGT Randall D. Webster
PV2 Sonna D. Webster
SP4 Clayton W. Weikel
SGT Thomas A. Weiss
SPC Michael K. Wells
SGT Jason W. Werner
SPC Harold B. West
SGT Ray C. Wharton
SSG Robert J. Whelan
SPC Avery J. Whetstine
SFC Robert E. White
SPC Daniel L. Whittenburg
SPC Jonathan D. Wickes
PV2 Elena D. Wilczewski
SSG David A. Wilkinson
SSG Charles B. Willard
PFC Aaron D. Williamson
SGT David S. Williams
PV2 Gretchen L. Williams
PFC Jason M. Williams
SFC Tanya Y. Williams
SGT Uriel J. Williams

PV2 Willians L. Williamson
PFC Jeffery L. Willis
PFC Leon N. Wilson
SGT Steven A. Winn
PFC Clayton L. Wolfe, III
SGT Christopher A. Wolsifer
PFC Esteban M. Wong Wong
SP4 Prescott P. Woodard
SP4 Christopher L. Woodburn
SPC Catrina D. Wright
SGT Nancy L. Wright
PFC Jinsung Wu
PFC Robert E. Wyant, Jr.
SP4 Chad M. Yaney
SPC Darrell D. Yankaway
Mr. Dong Soo Yoo
SSG Ricky D. Younger
SP4 Aaron Todd Zak
PFC Russel R. Zander

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N. KINGSTOWN, RI
WO1 Mark R. DeSouza
CPT Gene K. Lambrecht
MSG John F. McCoy
SSG Kevin W. Payne
CW2 Frank A. Puleo
SGT Christian O. Sorensen III
CPT Brian C. Trapani
WO1 Richard L. Uva
CW2 Daniel R. Walus
SPC Robert P. Wood

NORTH TEXAS CHAPTER
DALLAS/FORT WORTH
CPT Stanley S. McGowen, Ret.

NORTHERN LIGHTS CHAPTER
FT WAINWRIGHT/FAIRBANKS AK
CW3 John E. Holbrook

OLD BILL CHAPTER
FORT BLISS, TX
2LT Daniel E. Gallagher

OLD TUCSON CHAPTER
MARANA, AZ
SSG Donald W. Dussetschleger
SGT John H. Hendricks, II
MSG Gary A. Nelson
SFC Ronald E. Robinson
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FORT HOOD, TX
LTC Charles K. Hunt

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CPT Jeffery W. Hayman
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POTOMAC CHAPTER
ARLINGTON HALL STATION VA
CDT Matthew W. Braman
CDT William P. Braman
MAJ Heyward G. Brown, Jr. Ret.
Mr. Terry L. Owens
PFC Michael L. Scott

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FT STEWART/HUNTER AAF
SGT James Richard Hall
CW2 Timothy L. Hardy
1LT Patrick C. O'Brien

TARHEEL CHAPTER
RALEIGH, NC
Mr. Walter P. Gray

WASHINGTONDC CHAPTER
WASHINGTON, DC
Mr. Richard J. Bartnik
COL Richard Beauchemin
Mr. Gary Bernknopf
Mr. Mason Botts
LTC Gale P. Carlile
Mr. Shmuel Falik
COL Charles F. Feldmayer
Mr. Isaac Frucht
SPC David M. Gaisser
Ms. Lisa D. Gordon
Mr. David R. Headley
Mr. Jim Hutchison
Mr. Marvin Kemow
Mr. Remo J. Nicoli
Mr. Bill B. Seely
Mr. Baruch Shelef
Mr. Yoram Shimoni
Mr. John Walls
SPC Alex Werner

WESTERN NEW YORK CHAPTER
ROCHESTER, NY
Mr. Robert L. King

WINGS OF THE WARRIORS
CAMP STANLEY, KOREA
CPT Daniel E. Thiebaud

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SPC Roderick C. Delacruz
WO1 Parag A. Desai
CDT Bryan T. Eberhardt
SGT Dominick A. Fernandes
Mr. Robert W. Green
Mr. Herb Haggard
Mr. Jeffrey Haggard
Mr. Michael E. Johnson
Ms. Joy Jones
CDT Maura K. McGrane
Mr. David McPhee
SGT David W. Mohon
Mr. Jay R. Nelson
CDT Michael A. Obadal
Mr. Bert E. Otterson
Mr. Michael G. Parker
Mr. Kirk Rhodes
Mr. Dave Savidge
SGT Richard W. Scheffing, II
MSG James R. Sitter
WO1 Thomas Sled
Mr. Ashok Sood
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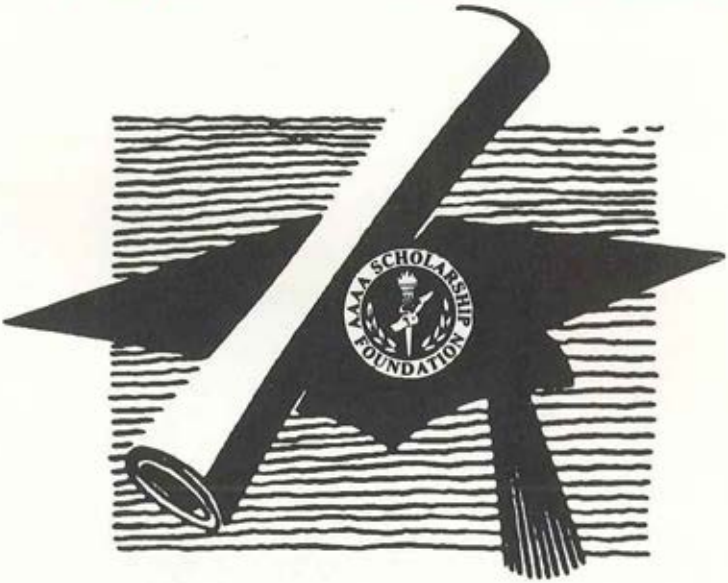

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Application Deadline: May 1, 1995

New AAAA Chapter Officers

Corpus Christi:
Mr. Frank A. Sijansky (VP, Scholarship).

Edwin A. Link:
CW4 Parker R. Goodwin, Ret. (Pres); Mr. Randal S. Monroe (SrVP); Ms. Mary C. Lucas (Secy); Mr. Samuel N. Knight (Treas); CW4 Robert J. Monette, Ret. (VP, Memb); MAJ Thomas E. Burch, Ret. (VP, Renew); LTC James E. Jenks, Jr., Ret. (VP, Prog); Mrs. Nancy Ellor (VP, Promotions).

Narragansett Bay:
COL Joseph G. Labrie (Pres); 1LT William P. D'Albora (SrVP); 1LT Andrew J. Chevalier (Secy); CW2 Don Hartley (Treas); CPT Christopher P. Callahan (VP, Memb); 1LT Laurie Ludovici (VP, Prog); SSG Kevin W. Payne (VP, Enlisted); CW4 Thomas I. Magnan (VP, WO).

North Texas:
Mr. Alan W. Moffatt (Secy); Mr. Ralph E. Pineo, III (Treas); COL William A. Howard, Ret. (VP, Industry Affairs).

Taunus:
COL Roger I. Anglin (Pres); LTC Johnny L. West (SrVP); MAJ Glenn T. Iacovetta (Secy); CPT Ruth M. Rymal (VP, Prog); LTC Michael T. Inman (VP, Memb); CSM Timothy L. Fosque (VP, Enlisted Affairs).

USAREUR Region:
COL Stephen K. Cook (Pres); COL William M.

Above: BG(P) John M. Riggs (left), Director of Requirements, Force Development, Office of the Deputy Chief of Staff for Operations, presented COL Jan E. Callen (center), Chief, Aviation Division, ODCSOPS with an Order of St. Michael Bronze Award during an October 1994 ceremony in Washington, D.C. Also in attendance was COL Callen's wife, Karen.

Below: Distinguished Graduates from the Army's Initial Entry Rotary Wing Course 94-10 pose with BG Ted F. Mallory III, Chief of Staff, Tennessee Air National Guard. Pictured are, left to right: WO1 Jeff Starritt; WO1 Martin Fish; BG Mallory; and WO1 Jim Stidfole, II. WO1s Starritt and Stidfole received a set of sterling silver basic aviator wings for excellence during their flight training from AAAA.

Above: COL John J. Stanko, Ret. (left), AAAA National Member-at-Large Emeritus and MAJ David A. Mitchell III (right), President of the Old Tucson Chapter, AZ, presented Order of St. Michael Bronze Awards to CW4 George Egbert and CW4 Paul Hendricks (center). The ceremony was held at the Western ARNG Aviation Training Site (WAATS) on 3 October 1994 in recognition of CW4 Egbert and CW4 Hendricks' two time championships at the World Helicopter Competition.

Below: MG Thomas A. Schwartz (left), Commanding General, 4th Infantry Division (Mechanized) and Ft. Carson, CO, presented an Order of St. Michael Bronze Award to COL Robert JH Anderson, then Commander, 4th Aviation Brigade, Ft. Carson, CO on 7 July 1994. The presentation was held just prior to the 4th Brigade's Change of Command Ceremony.

Smith (SrVP); LTC Jeral E. Pawley (Secy); LTC William L. Wimbish, III (Treas); COL Roger I. Anglin (VP, Memb); LTC Alan D. Swain (VP, PR); LTC Johnny West (VP, Medical Aff); CW3 Ronald L. Underhill (VP, WO Aff); CSM Sanford C. Tanna (VP, Enlisted); MAJ Mark E. Valentine (VP, Awards).

AAAA Aviation Soldiers of the Month

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

SGT Douglas W. Dalton
November 1994

SPC Paul M. Munninghoff
SPC Thomas S. Wegner
December 1994

SGT Brian K. Winner
January 1995
(Central America Chapter)

AAAA Aviation Soldier of the Quarter

SPC George W. Park
4th Quarter 1994
(Mid-America Chapter)

AAAA NCO of the Quarter

SGT Thomas W. Khron
4th Quarter 1994
(Mid-America Chapter)

New AAAA Industry Members

Lyon Metal Products, Inc.
Beltsville, MD

RIX Industries
Oakland, CA

AAAA NEWS

COL James T. Stewart, Ret.

COL James T. Stewart, Ret., 59, died 8 January 1995 in Chesterfield, MO. He had been a AAAA Member since 1960 and a former President of AAAA's Arizona Chapter.

COL Stewart served 26 years in the Army, including two tours of duty in Vietnam. He was involved in the development of the Black Hawk and Apache helicopters.

After retiring, COL Stewart joined McDonnell Douglas Helicopter Systems in 1984. He was Manager of the St. Louis Field Office at the time of his death.

Among the survivors are his wife, Barbara; a son, Scott; two daughters, Tenley and Sandra; a brother, William; a sister, Dorothy; and five grandchildren.

Honorable Order of St. Michael

The following individuals have recently received the Honorable Order of St. Michael:

Bronze Award:

COL Kenneth O. Boley
MSG Rodney L. Nash
Chaplain (LTC) Kenneth J. Knutson
CSM Marvin E. Horne
BG Francis L. Briganti
SFC Michael S. O'Neill
SFC Quinten High
SFC Stephen P. Gamache
SFC Lisa M. Deere
SFC Douglas N. Addington
CSM Gary W. Crisp

Above, left to right, are the Army Aviators from the U.S. Army War College Class of 1994-1995. Top row: LTC Zach Patterson, LTC Jay Tisserand III, LTC Lee Gore, LTC Bill Thresher (MS), LTC(P) Jim Pillsbury, COL Howard Yellen. 2nd row: LTC Steve Ferrell, LTC Red McKennon, Jr., LTC(P) Leonard Sly (MS), LTC(P) Dan Fleming. 3rd row: LTC Cash Striplin, LTC Robin Walker, LTC Ray Nelson, LTC Butch Erickson, LTC(P) Mark Wentlent, LTC Fred Naigle, LTC John Finlay IV, LTC Wayne Sears. 4th row: COL Pete Holmberg, LTC Ken Quinlan, LTC Dennis Miner, LTC Pat Thomas, LTC Mike Stark, LTC Jim Cozine, and LTC(P) Marv Metcalf. Not pictured: LTC Charles Atkins, LTC(P) Chaz Davis (MS), and LTC(P) Jerry Henderson.

AAAA Annual Essay Contest

The third Annual AAAA Essay Contest is underway. The contest is designed to encourage the writing of original essays on topics that further the general knowledge of U.S. Army Aviation. Suspense date is **1 July 1995**.

DOCUMENTATION

The official application form should be used and is attainable from the AAAA National Office, 49 Richmondville Avenue, Westport, CT 06880-2000; Telephone (203) 226-8184; FAX, (203) 222-9863. The form may be reproduced locally.

AWARD PRIZE

First prize earns a $500 honorarium; second prize earns a $300 honorarium; and third prize earns a $200 honorarium.

PRESENTATION

The three winning essays will be published in ARMY AVIATION Magazine. Essays not awarded prizes may also be published in ARMY AVIATION. The winning essay may also be considered for presentation at the AAAA Annual Convention.

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AAAA CALENDAR

A list of upcoming AAAA Chapter and National events.

AAAA NEWS

March 1995

✔ **Mar. 29 - Apr. 2.** AAAA Annual Convention, Georgia World Congress Center, Atlanta, GA.

✔ **Mar. 29.** AAAA National Executive Board Meeting, Georgia World Congress Center, Atlanta, GA.

✔ **Mar. 30.** AAAA Scholarship Board of Governors Annual Meeting, Georgia World Congress Center, Atlanta, GA.

April 1995

✔ **Apr. 20-22.** AAAA USAREUR Convention, Wiesbaden, Germany.

July 1995

✔ **Jul. 14.** AAAA Scholarship Board of Governors Executive Committee Meeting, Best Western, Arlington, VA.

✔ **Jul. 15.** AAAA National Scholarship Selection Committee Meeting to select 1994 scholarship recipients, Best Western, Arlington, VA.

October 1995

✔ **Oct. 16.** AAAA National Executive Board Meeting, Sheraton Washington Hotel, Washington, D.C.

✔ **Oct. 16.** AAAA Scholarship Board of Governors Executive Committee Meeting, Sheraton Hotel, Washington, D.C.

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