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ARMY RD&A

MARCH–APRIL 1999

Providing Force Protection

AIR AND MISSILE DEFENSE

FROM THE ARMY ACQUISITION EXECUTIVE

Asymmetric Challenges To U.S. Military Superiority

Nearly all potential adversaries and challengers—state and nonstate—recognize the demonstrated conventional military superiority of the U.S. armed forces. After watching our forces in the Gulf War, what rational adversary would wish to challenge them on open terrain, at least in the near term? We would, quite frankly, annihilate them.

This doesn't mean that our enemies are abandoning plans to oppose us. On the contrary, a number of them, regardless of their conventional military limitations, are determined to oppose the United States. Our military excellence forces them to adopt asymmetric approaches to achieve their ends either by negating our conventional capabilities or by preventing us from bringing those capabilities fully to bear. This asymmetric approach pits an opponent's strength against a perceived U.S. military weakness or seeks to nullify our advantage by changing the nature of the conflict. The classic case was the Vietnam War, where North Vietnam chose to fight a war of attrition that was intended more to influence American public opinion rather than to win on the battlefield.

In today's world, we face a wide variety of asymmetric challenges that exist at the strategic, operational, or tactical levels and involve both conventional and unconventional weapons. These challenges include transnational terrorism; illicit drug operations; exploitation of ethnic, religious, and regional hatred; and other tactics to undermine international stability and security. None, however, is more troubling to our nation and our deployed forces than the use of weapons of mass destruction (WMD): chemical, biological, nuclear, and radiological weapons, along with the missiles that can deliver them.

The logic of asymmetry was apparent decades ago, well before the current focus on WMD and ballistic missiles. It was clear to states like Iraq, Iran, and North Korea, long before the end of the Cold War, that their conventional arsenals were not adequate for challenging the United States. Some of these states actually entered the unconventional arena out of concern for regional rivals, but they quickly realized that missiles and WMD could fill an important niche in their troubled security relations with the United States. Interest in ballistic missiles is virtually inseparable from interest in WMD themselves.

This asymmetric logic can apply on a purely regional basis, as with Pakistan's investment in WMD and missiles to counteract India's conventional superiority. India instituted a permanent strategic arms race on the subcontinent by investing in WMD. Anti-U.S. asymmetrical strategies and regional rivalries provide a powerful set of motivations toward acquiring WMD and ballistic missiles. Unfortunately, our counterproliferation efforts have not significantly tamed those motivations.

The end of the Cold War intensified these dynamics. According to the Defense Intelligence Agency, the threat posed by regional WMD is now the greatest threat to deployed American forces—and this threat will increase. It is also not limited to our forces overseas. Ominous changes in the strategic threat to our homeland have appeared on the horizon. Today, only Russia and China are capable of targeting the United States with ballistic missiles. *However, we now face the prospect that less dependable, hostile nations—particularly North Korea and Iran—will develop that capability during the next several years.*

Weapons of mass destruction pose a most serious challenge to the security of the United States. At least two dozen nations around the world already possess chemical and biological weapons or have active development programs to build them. Globalization of the world economy and increasing ease of information transfer make knowledge of these weapons available to even more states and nonstates. Even more alarming is that more than 20 nations have theater ballistic missiles to deliver WMD.

The U.S. missile defense program reflects the urgency of this immediate threat. Through our Theater Air and Missile Defense Programs and our National Missile Defense Program, we are developing, as quickly as possible, a highly effective defense system against emerging rogue nation strategic ballistic missiles. We also continue development of technology to improve ballistic and cruise missile defense systems.

I am pleased to see this issue devoted to air and missile defense and the Army's role in protecting the United States and our deployed forces. We must maintain our vigilance to defend our citizens, our allies, and our friends from this growing threat.

Paul J. Hoeper

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FEATURES

COVER

The PATRIOT Advanced Capability-3 missile is shown being launched during a missile guidance flight test at White Sands Missile Range, NM. The other photos show the missile intercepting a tactical ballistic missile test target.

IMPORTANT ANNOUNCEMENT

Effective Feb. 16, 1999, Secretary of the Army Louis Caldera directed that the logistics missions and functions of the Assistant Secretary of the Army (Installations, Logistics and Environment) (ASA(IL&E)) be placed under the operational control of the Assistant Secretary of the Army (Research, Development and Acquisition) (ASA(RDA)). *As such, the Office of the ASA(RDA) is renamed ASA (Acquisition, Logistics and Technology), and the Office of ASA(IL&E) is renamed ASA (Installations and Environment).* Caldera specifically noted that the A-76 Waiver Authority does not transfer to the ASA(RDA) with this action. Because this announcement was made concurrent with press time, the articles in this issue of *Army RD&A* do not reflect these changes.

INTERVIEW WITH LTG JAMES M. LINK DEPUTY COMMANDING GENERAL U.S. ARMY MATERIEL COMMAND (AMC)

Army RD&A: **Can you give some background regarding AMC's involvement with Army acquisition programs?**

LTG Link: The Army Materiel Command has a long history in acquisition management. We built this command in 1962 by combining the functions of the Chief of Ordnance and the Quartermaster General and the other technical services into a single command that became AMC. All the major weapon programs and upgrades we had up through the 1980s resulted from the process begun in the early 1960s. A major change came with the Goldwater-Nichols Act in the late 1980s. At that time, we saw the advent of program executive officers and program managers (PMs) in charge of major programs outside AMC. The idea was to streamline the structure and the Army acquisition process to reduce levels of review and shorten the time it takes to get weapon systems into the hands of our soldiers. By 1992 or so, the major systems had gone to program executive offices and we in AMC managed the Acquisition Category (ACAT) III and ACAT IV systems. Most of those systems have been in the field for a long time, but some still involved research, development and engineering efforts.

In 1996, the Army saw a need to revisit the PM structure. AMC established a position called Deputy for Systems Acquisition (DSA) at each of our three major buying commands: the Tank-automotive and Armaments Command, the Communications-Electronics Command, and what became the Aviation and Missile Command. That allowed us once again to bring programs under AMC that require significant research and development (R&D) in the acquisition process. In fact, some ACAT IC programs came to AMC, and we now also manage 10 ACAT II programs.

Army RD&A: **How many acquisition programs are now managed by AMC?**

LTG Link: We currently have 60 board-selected PMs managing or overseeing 372 programs, a significant piece of the business. Of course, some programs are so stable they are managed by our integrated materiel management centers (IMMCs) as a logistical function. In addition, the way we are structured to provide matrix support to program executive officers and PMs is essential because a large PM office in the program executive office structure usually has a relatively small core of folks—maybe 25—who belong to that PM. The remainder are matrixed from AMC. AMC also provides general support to PMs from our research, development and engineering centers (RDECs); our IMMCs; our acquisition centers; lawyers; public affairs offices; and safety offices. A whole myriad of matrix support comes from AMC.

Army RD&A: **What other efforts has AMC made to support PMs?**

LTG Link: Well, we have intentionally collocated much of our AMC matrix support so that the PM is able to build a team. The PM knows that the AMC folks he is paying for in a reimbursable fashion are in fact working for him on his project. That matrix support has been very successful and, of course, those AMC employees often feel they are working for the PM, and that's OK. The important thing is that we are able, from a larger, big Army standpoint, to shift resources from one program to another to accommodate the system's life cycle. We can also accommodate changes in resource streams to be able to tailor the matrix support we provide to the PM to match his needs.

Army RD&A: **When you talk of shifting resources, does AMC receive criticism for moving money around that people think is not yours to move?**

LTG Link: There are times, and it's not surprising, that a PM, just like a battalion or a brigade commander, looks at his program as being all-important because that's what he's paid to do. The role that the DSAs and HQ AMC play is to take a broader view from a total Army perspective. Now, what we perhaps have not been as successful in doing is ensuring that each PM is cognizant of where major dollars are spent in support of his program. Those are usually operations and support (O&S) costs—the operations, the supportability, the logistical tail, or if you will, the logistical muscle—that take place after the R&D, after the fielding of the equipment. Recently, there has been an attempt to get PMs more involved in design-

ing in supportability, designing in diagnostics through built-in test and built-in test equipment (BIT/BITE). This causes the PM to be involved in the total life cycle of a given program. With that comes the recognition that the PM is responsible for all costs tied to his weapon system, that he does not just hand it off or throw it across the transom to AMC. Now, a caution. We cannot have every PM learning how to build his own AMC and going through the learning curve of what's involved in supporting a system from the standpoint of maintenance engineering, provisioning, total package fielding, item management, and RDEC work such as engineering services and software engineering. So we in AMC, in partnership with the PMs and program executive officers, have created a series of memoranda of understanding that outline the services we provide PMs. We recognize that we have to provide the best value to a PM so he wants to do business with us.

Of course, we are experimenting with different methods to provide best value. Apache prime vendor support is an example, and fleet management for the M109 family is another. The important things we in AMC provide are the expertise and decades of experience in supporting a particular commodity. We have world-class scientists, engineers and logisticians whether you are talking about automotive and armaments technology, communications-electronics, bio/chemical defense, or the aviation and missile business. This is the kind of expertise we bring to any particular program, and we do this by significantly leveraging industry rather than building a duplicative capability in-house. For instance, at our RDECs, about 60 percent of their resources go to contractors, to industry, rather than to in-house efforts. In some areas such as software engineering, it's about 80 percent contractor work and only 20 percent in-house. AMC is moving to become a manager of suppliers rather than a supplier ourselves.

Army RD&A: **Has milestone decision authority been delegated for ACAT systems managed by AMC?**

LTG Link: Paul Hoeper, Assistant Secretary of the Army for Research, Development and Acquisition (ASARDA), and the Army Acquisition Executive, has retained milestone decision authority (MDA) for ACAT IC programs. That's true for Kiowa Warrior and the Blackhawk, and for two other ACAT II systems: the Close Combat Tactical Trainer managed by the Simulation, Training and Instrumentation Command; and Land Warrior, at the Soldier and Biological Chemical Command. Other than those exceptions, MDA rests with AMC, and specifically with the DSAs we put in position in the commodity commands.

Army RD&A: **Officers seeking to be PMs feel that being an AMC PM is not as career enhancing as being a program executive office (PEO) PM. Can you comment on this?**

LTG Link: Yes, in fact LTG Paul Kern [the Military Deputy to the ASARDA, and Director, Acquisition Career Management] and I have worked closely together to dispel that perception. We've done this by jointly sponsoring quarterly Acquisition Workshops, and we have gone out of our way to assure PMs who work for AMC that they are just as important as the other PMs we have in the Acquisition Corps. Now I think because ACAT I programs are often very large with a great deal of visibility, they get more attention because of their inherent resources and development risk. Those programs are key to modernizing the Army, so some think they are better PM jobs. But in the Acquisition Corps business, all our Army programs are tremendously important and we recognize the contributions those programs make to our Army. Our intention is to reward those contributions appropriately.

Army RD&A: **What is the annual RDA budget managed by AMC?**

LTG Link: Within AMC, our research, development, test, and evaluation (RDT&E) and procurement dollars are approximately $4.4 billion. A lot of people don't understand that AMC manages a great deal of the Army's money and a great deal of DOD's money in support of the other Services. For example, this past year we spent $17.7 million in support of the other Services. Thirty-four percent of that came from non-Army sources. Then, a great deal of our money—about 50 percent—is reimbursable from Army sources such as PEOs and PMs. The remainder is directly funded.

Army RD&A: **How are you involved in the acquisition programs?**

LTG Link: I'm very much involved in that we have put the AMC Deputy Commanding General in the rating chain of our major PMs, many of whom have subordinate product managers. I also oversee, with our DSAs, the execution of those programs for which AMC is responsible. I meet quarterly with all the PMs I senior rate. Along with the DSAs, I attend conferences and various other fora to ensure that I know what our folks are doing. I also work with MG John Caldwell, AMC's RD&A chief, to keep tabs on how our programs are being managed. We take very seriously our responsibility in making sure we have a handle on how AMC is doing its job in the business of program management.

Army RD&A: **What challenges face AMC and its PMs?**

LTG Link: Our major challenge is to manage, with the scarce resources we have, those programs—the Army's programs—that will continue to be required into the next millennium. We are managing about 80 percent of the Army's legacy systems. These are the systems that will have to be maintained and perhaps modernized to support Force XXI and the Army After Next. We are the folks who will have to ensure that we are able to meet those challenges, and we are actively involved with Headquarters, DA, in pursuing a variety of initiatives. Some of those efforts include modernization through spares, horizontal technology integration, and various forms of contractor logistical support. There is also a myriad of initiatives that fall under the aegis of total ownership cost reduction, a DOD initiative. I'd say our toughest challenge is to "think outside the box" about how to support every system.

Protecting Our Nation And Its Soldiers . . .

ARMY AIR AND MISSILE DEFENSE

BG Daniel L. Montgomery,
James M. Tinkham, and
Keith A. Godwin

The Army must adapt its air defense technology to defeat the primary current and future threat: ***missiles.***

Introduction

Today, extremely powerful weapons of mass destruction are in the hands of reckless people who will not hesitate to use them. Declared enemies of the United States like Osama bin Laden and Saddam Hussein have the will and the resources to obtain weapons of mass destruction. Iran has recruited Russian scientists with experience in chemical and biological warfare. North Korea has apparently continued its own nuclear weapons program, despite pledges not to do so. Approximately 25 other countries have developed or are developing nuclear, biological or chemical weapons and have the means to deliver them. Terrorists, religious zealots, and organized crime groups are also trying to acquire these weapons either directly or through supportive countries.

As part of a joint acquisition team responding to this ever-increasing threat of weapons of mass destruction, the Program Executive Office for Air and Missile Defense (PEO AMD) is developing systems that provide theater air and missile defense (TAMD) for the protection of deployed troops and assets, as well as technologies for national missile defense of the United States.

Unique Challenges

The PEO AMD is unique among Army PEOs. Because air and missile defense is not an Army-only mission, the PEO AMD has both Service-specific and joint-Service responsibilities. There are many joint and combined interoperability requirements that Army air and missile defense systems must satisfy. Coordination with the Army staff, other Services, and the Ballistic Missile Defense Organization (BMDO) is maintained to ensure the necessary interoperability for total force protection. The PEO AMD participates in the joint theater air and missile defense (JTAMD) process, which includes interaction with the staff of the Joint Chiefs of Staff, BMDO, and the commanders-in-chief (CINCs).

The PEO AMD works for Army Acquisition Executive Paul J. Hoeper, the Assistant Secretary of the Army (Research, Development and Acquisition), but also reports to and receives significant program direction and funding from LTG Lester Lyles, Director, BMDO, who is the Acquisition Executive for Ballistic Missile Defense. This working arrangement is defined in a memorandum of agreement between the Army and BMDO. The majority of the PEO AMD administrative, research and engineering staff is provided as matrix support from the U.S. Space and

Missile Defense Command and the U.S. Army Aviation and Missile Command.

Protecting Our Soldiers

0430, Local Southwest Asia Combat Zone: Taking a short break from the road march, tired and dusty, MAJ Reeves lumbered into the Tactical Operations Center (TOC). In the corner he heard the CNN announcer droning on "... Army spokesperson stated ... fighting is over ... fewer losses than expected ... related story ... militant movement, ... all means available ... punish the United States ..." Given the success of the offensive, not much was going on in the TOC.

Suddenly the dark morning sky filled with blazing light and earshattering explosions. Chaos erupted as vehicles loaded with fuel and munitions exploded. Cries of pain could be heard from every direction. Trying to get back to his unit, MAJ Reeves was struck in the leg by hot shrapnel. Later at the aid station, he learned that four Scud-class tactical ballistic missiles (TBMs) had been fired at U.S. forces. Two had hit near the TOC. The only good news was that they were not carrying any biological or chemical agents. Nevertheless, the results were devastating.

The PEO AMD is working to prevent this scenario from ever occurring. The PEO AMD is responsible for developing and fielding systems to defend our deployed forces whenever and wherever needed while negating lethal ground effects that can result when a missile warhead is not completely destroyed. In other words, systems that not only engage the threat, but also provide total protection for our forces from air and missile attacks.

The Army's legacy air defense systems, with roots in the 1960s and 1970s, were primarily designed to counter massed air power, which is no longer the dominant threat. The Army must adapt its air defense technology to defeat the primary current and future threat: *missiles*. Although the Phased Array Tracking To Intercept Of Target (PATRIOT) Advanced Capability 2 (PAC-2) missile provided limited defense against Scuds during the Gulf War, the continued evolution of our existing air defense systems today cannot provide the Army with weapons that will effectively protect ground forces from missile attacks.

As a consequence of the recent proliferation of ballistic missile technology, our potential adversaries can engage our forces at a fraction of the cost of acquiring and maintaining a traditional air force. Magnifying this danger is the use of these missiles to deliver weapons of mass destruction. Our current TAMD systems cannot effectively counter this emerging threat. Characterized by reentry speeds of more than 10,000 mph, evasive maneuvering capabilities, and decoys, the TBM threat is driving the need for new TAMD technologies.

The PEO AMD is responsible for providing the Army with the Theater High Altitude Area Defense (THAAD), PATRIOT, Medium Extended Air Defense System (MEADS), and the Joint Tactical Ground Station (JTAGS) weapon systems.

The THAAD system defends ground forces and high-value assets from TBM attack. With its high-power radar and long-range missiles, it will conduct high-altitude engagements of ballistic missiles that threaten the entire theater.

The PATRIOT is a medium-range, all-weather TAMD system to counter advanced aircraft, TBMs, and cruise missiles. A series of enhancements, including a new missile, will be incorporated into the PATRIOT system beginning later this year. This PATRIOT Advanced Capability 3 (PAC-3) will increase the effectiveness of the PATRIOT against ballistic and cruise missiles.

The MEADS will protect the maneuver force from TBMs, cruise missiles, and other air-breathing threats (unmanned aerial vehicles, and fixed- and rotary-winged aircraft). It will be designed as a highly survivable system fully capable of accompanying the maneuver forces wherever deployed. It is the only system being developed to protect the front-line maneuver forces.

The JTAGS provides the theater CINC a deployable in-theater capability to receive and process ballistic missile launch data collected by space-based infrared sensors. Using this data, JTAGS disseminates warning, alerting and cueing data to other systems. JTAGS cues the active TAMD systems, provides launch points for attack operations, and issues timely warning for passive defense.

New Scenario

Let's revisit MAJ Reeves, this time with these new TAMD systems in place.

0430, Local Southwest Asia Combat Zone: Taking a short break from the road march, tired and dusty, MAJ Reeves lumbered into the TOC. In the corner he heard the CNN announcer droning on "... Army spokesperson stated ... fighting is over ... fewer losses than expected ... related story ... militant movement, ... all means available ... punish the United States ..." Given the success of the offensive, not much was going on in the TOC. In fact, the only cell fully manned appeared to be the Air Defense Coordination Cell. Suddenly his blood froze as he heard "TBM Alert" from a speaker. JTAGS was providing warning of a TBM launch. Quickly donning his protective mask, MAJ Reeves was drawn to the situational awareness display at the front of the TOC. Overlaid on the troop positions, it now showed tracks of four missiles, two of which were predicted to impact at the TOC! Suddenly he heard a cheer from the Air Defense Cell "THAAD just got one!" "Make that two!" Two of the tracks disappeared from the display. Still there was one headed for the TOC. Nearby, he heard a couple of small explosions. MEADS was engaging. Seemingly an eternity later, he saw a third missile track disappear from the display. MEADS got it! He later found out that the fourth missile, targeted for the seaport, was destroyed by PATRIOT. Well, enough excitement for 1 day, time to get his unit on the move again. After all, he had a mission to accomplish.

Development Objectives

While developing these systems, the PEO AMD must satisfy critical core objectives as follows: provide a strategically deployable and tactically mobile TAMD capability, provide a "near-leakproof" TAMD through a two-tier concept, maximize the lethality at the point of missile intercept, and support the JTAMD vision. The TAMD two-tier (upper and lower) engagement concept uses systems designed to

Figure 1.
The Army components of the air and missile defense family of systems will protect the highly mobile forces of future battlefields.

complement each other. Integration and interoperability between upper and lower tier systems provide the greatest number of engagement opportunities during the incoming ballistic missile's trajectory. Although complementary, each TAMD system has a specific role in protecting the force (Figure 1). PATRIOT defends the rear area against aircraft and engages ballistic missiles in the lower tier. MEADS, like PATRIOT, engages threats in the lower tier while defending the maneuver forces, and THAAD engages missiles launched from greater ranges, in the upper tier throughout the theater area.

The lower tier systems engage targets in the atmospheric region below 25 kilometers in altitude. The upper tier THAAD system engages targets in the exoatmosphere (at an altitude of 100 kilometers and beyond) and in the high endoatmospheric region above the dense atmosphere (at an altitude between 40 and 100 kilometers). Although engagements can occur at any altitude, the high endoatmospheric region can be viewed as the "sweet spot" for TAMD. Within this region, threat countermeasures are least effective. The threat's infrared signature is increasing as it re-enters the atmosphere, making it easier to acquire. The air is still too thin, however, to allow for effective threat warhead maneuvers but is thick enough to strip away the lighter debris, decoys, or other penetration aids that may be accompanying the threat. Therefore, engagements within this sweet spot provide the greatest opportunity for success. Taking advantage of this, the THAAD missile is designed to engage in both the exoatmospheric and this high endoatmospheric region. However, the incoming missile must not only be intercepted, it must be engaged with sufficient force to fully destroy the warhead. In other words, we must provide a "quality kill" of the threat.

An engagement that protects the primary asset but results in a damaged (but potentially lethal) warhead falling on friendly forces is unacceptable. The need for an extremely lethal engagement is most critical when the missile is delivering a weapon of mass destruction.

Key TAMD Technologies

The technology that will provide TAMD systems with the required lethality for countering ballistic missiles is called hit to kill. This technology is the cornerstone of the future effectiveness of PATRIOT, THAAD, and MEADS.

Hit to kill works. In a series of tech-

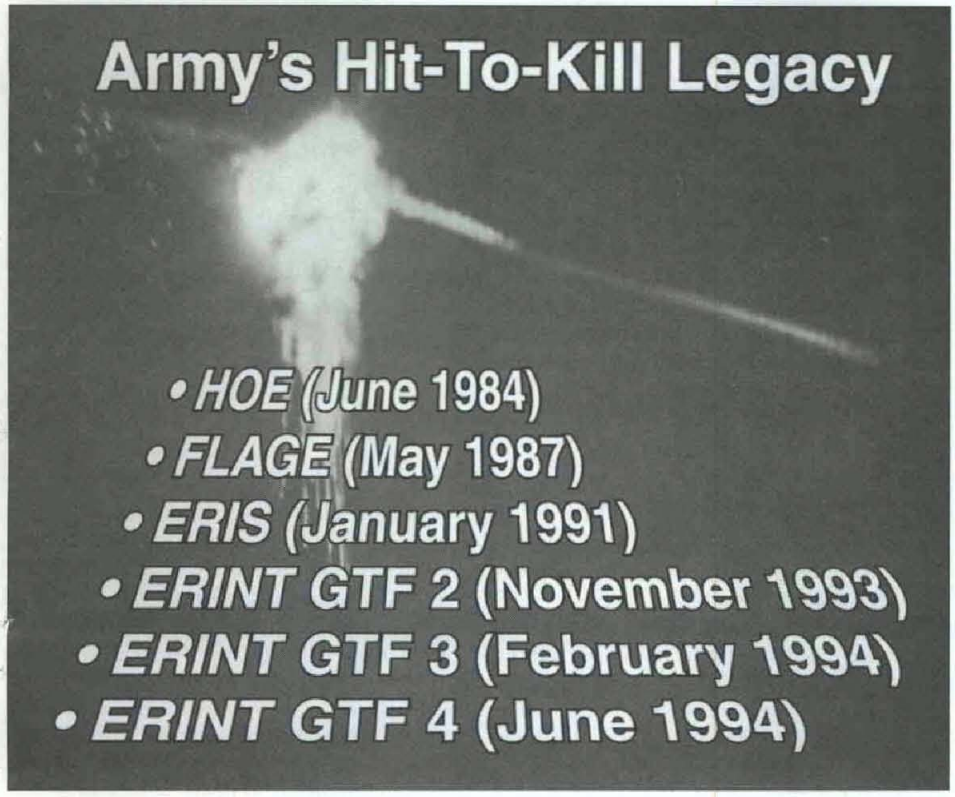

Figure 2.
Shown is the evolutionary development of hit-to-kill technology. This includes the Homing Overlay Experiment, the Flexible Lightweight Agile-Guided Experiment, the Exo-atmospheric Re-entry Vehicle Interceptor Subsystem, the Extended Range Interceptor (ERINT) Guided Test Flight (GTF) 2, the ERINT GTF 3, and the ERINT GTF 4.

nology demonstrations, beginning with the Homing Overlay Experiment (HOE) in 1984, the Army has consistently shown the effectiveness of this technology as the best means to counter ballistic missiles (Figure 2). The tremendous kinetic energy released at the point of impact results in a near-total destruction of the ballistic missile and its payload. This minimizes the potential for collateral damage that could result from a viable payload falling on ground forces following an otherwise "successful" intercept.

The legacy of interoperability among air defense systems is facilitating their integration with other digital elements of the Army. Through these integration efforts, TAMD systems will provide alerting and warning information to the maneuver force commanders. Integration with specific Army Battlefield Functional Area components will empower the commanders with situational awareness of the air battle.

Protecting The Nation

As technology evolves, the ballistic missile threat will no longer be constrained to the tactical battlefield. This reality is not lost on those forces throughout the world that oppose the United States. They already have the will and, with the proliferation of missile technology, they soon will have the means to directly attack the United States. Given the ever-increasing range, accuracy, and lethality of ballistic missiles, a direct attack on the United States will no longer be limited to the traditional military powers. Rogue nations, accidental launches, and sophisticated terrorists will threaten the United States with ballistic missile attack.

In response, the Department of Defense is pursuing missile defensive technologies as part of the National Missile Defense (NMD) Program. Each Service has been given specific responsibilities in developing this defense. The PEO AMD is designated to oversee development of the Army contribution to NMD: ground-based interceptor, ground-based radar, and related components of battle management/command, control, and communications. The Ground-Based Elements Program Office reports to the NMD Joint Program Office for the development and integration of these elements in the NMD system.

Conclusion

The PEO AMD is responding to the potential threat on both the theater and national levels by creating air and missile defense systems that will help shape the battlefield of the future and by preparing state-of-the-art systems that will give the Army even greater capabilities to defend itself and the nation.

As we face the challenges of the 21st century, it is vital to the defense of the United States and to our deployed forces that we develop and field the best possible air and missile defense systems.

The PEO AMD's aggressive application of emerging technologies to increase lethality and interoperability will result in air and missile defense weapon systems that can defeat this formidable threat, interoperate with our joint forces, and most importantly, protect our soldiers.

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WHY 'HIT TO KILL'?

Anthony W. Cosby

Introduction

The primary objectives of theater missile defense (TMD) are the protection of defended assets and negation of the lethal effects on the ground that can result from the intercept of theater ballistic missiles (TBMs). This has led the Army to demand the highest possible "quality of kill" from its TMD systems, like the Phased Array Tracking To Intercept Of Target (PATRIOT) missile and Theater High Altitude Area Defense (THAAD). The necessary quality of kill to ensure minimization of lethal effects on the ground can best be attained with hit-to-kill (HTK) weapons. Although the chance of hitting a TBM somewhere along its body may be better with a blast-fragmentation warhead, the ability to ensure the survival of defended areas is much greater with HTK weapons. The Army's key discriminator in pursuing HTK weapons rather than blast-fragmentation warheads is the robustness of HTK weapons against a broad spectrum of TBM threat payload types and configurations. This lethality is especially critical when payloads are weapons of mass destruction (WMD).

HTK Versus Blast Fragmentation

Both blast-fragmentation warheads and HTK weapons are effective against TBMs from the standpoint of potential energy deposited on the target. However, controlling the placement of the blast fragments on the payload is no less complex and may prove a more daunting technical challenge than HTK technology. This is a particular challenge for engagements in the endoatmosphere (up to an altitude of 100 kilometers).

Nuclear, chemical and biological payloads constitute the principal WMD of TMD concern. Of these, nuclear payloads are the easiest to kill. By penetrating and disrupting the "physics package" or firing mechanism of these weapons, they will either fail to detonate or will have their yields reduced to the point that their effectiveness is greatly diminished. Also, by making the intercepts high in the endoatmosphere, there will be no appreciable effects on the ground (particularly given the yields expected in TBMs).

While blast fragmentation will have some success against these payloads, it is not as effective as an HTK weapon. This is because it is much more difficult for a potential enemy to counter an HTK weapon by manipulating or hardening the internal structure of the payload or to evade the defensive missile (assuming equivalent lethality requirements). Although HTK weapons are dependent on a demanding guidance scheme to ensure body-to-body contact between interceptor and TBM, blast-fragmentation warheads have an even smaller tolerance for error in their fuzing function.

The necessary quality of kill to ensure minimization of lethal effects on the ground can best be attained with hit-to-kill weapons.

Chemical and biological weapons have proven to be the most challenging WMD. When constructed with multiple-tiered submunitions or bomblets, they must be countered by delivery of sufficient energy and penetration of the tiers at high altitudes to ensure minimal lethal effects on the ground. HTK weapons deliver orders of magnitude more destructive energy than even the most efficient blast-fragmentation warhead (Figure 1). Although blast-fragmentation warheads will deliver enough energy to rupture simple bulk chemical warheads, they lack sufficient penetration to destroy submunition payloads. Penetration performance has been assessed via ground and flight tests as well as hydrocode simulations.

HTK Success

Former President Ronald Reagan's Strategic Defense Initiative, beginning in 1983, provided the funding and focus necessary to advance the state of the art in key areas of HTK technology. The Army's Space and Missile Defense Command (SMDC) was at the forefront in the development of these technologies and their application in kinetic kill interceptors.

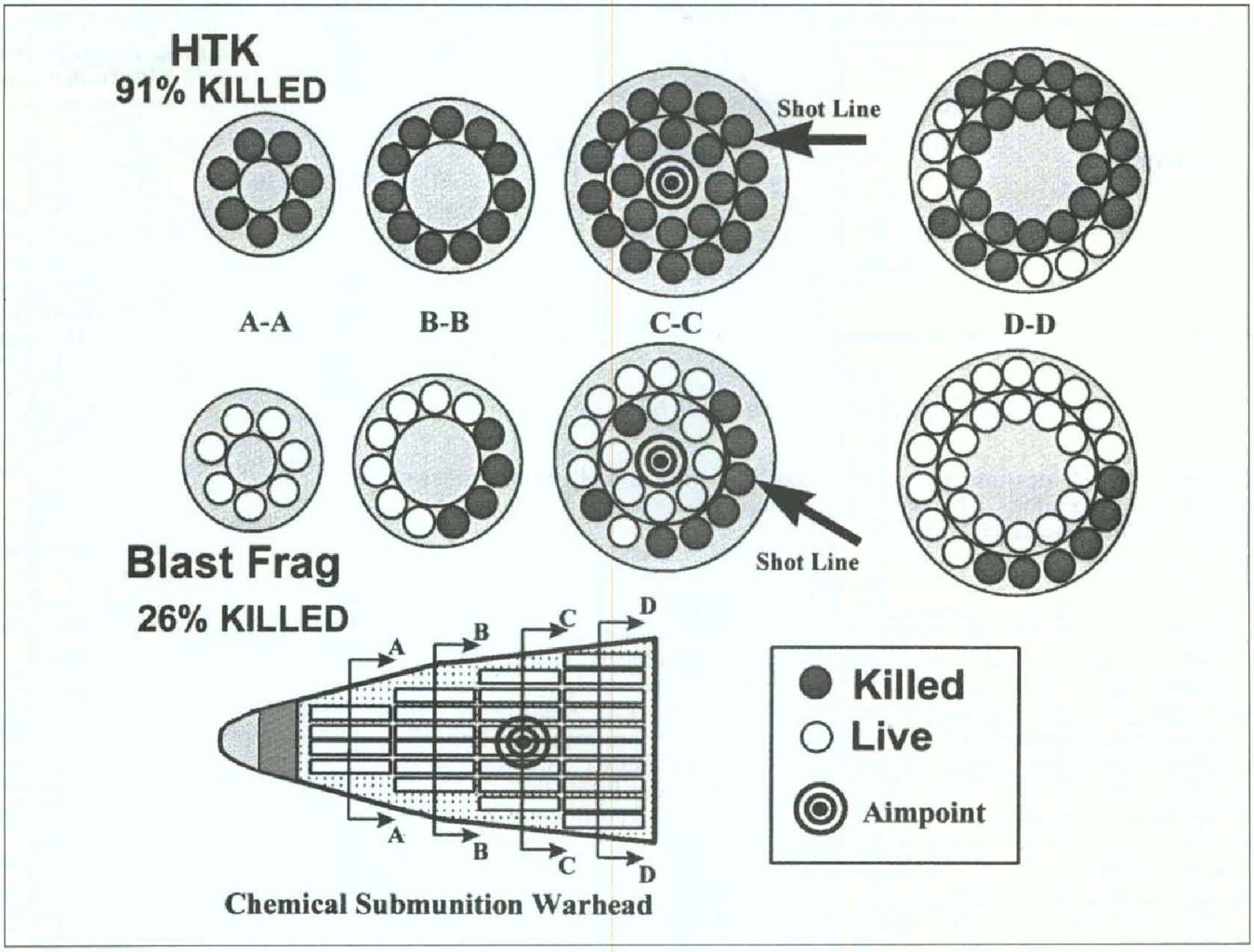

Figure 1.
Sled test results confirm that HTK provides superior energy and penetration for robust kill of chemical submunitions.

Through a series of programs conducted by SMDC and its predecessors, the technologies of HTK were improved. For example, the Homing Overlay Experiment (HOE) resulted in successful interception of a long-range strategic missile in June 1984, and the Exo-atmospheric Re-entry Vehicle Interceptor Subsystem (ERIS) successfully intercepted a TBM in 1991. In addition, the High Endo-atmospheric Defense Interceptor (HEDI), Flexible Lightweight Agile-Guided Experiment (FLAGE) and the Extended Range Interceptor Technology (ERINT) Programs improved HTK technologies. In fact, all, except HEDI, which never flew an intercept test, achieved HTK intercepts during flight tests. These tests demonstrated the ability to achieve HTK intercepts in both the endoatmosphere and exoatmosphere.

HTK Technologies

The principal technical challenge that must be met for HTK technology to become a battlefield reality is the need to achieve sufficiently small "miss distances." Miss distance is the distance between the actual impact point and the impact point that will result in greatest damage to the target. Historically, the lack of maturity in the technologies that would result in sufficiently small miss distances led to ballistic missile defense interceptors using nuclear warheads to overcome guidance inaccuracies. The main challenge for these 1960s and 1970s systems was to ensure that the interceptor's airframe was capable of enduring the stresses of high dynamic pressure and thermal loading to which all ballistic missile defense interceptors are subjected.

To achieve the accuracy necessary to ensure acceptable miss distances at closing velocities in excess of 4 kilometers per second, researchers had to make advancements in five key technology areas: very accurate seeker measurement devices; high-speed signal processors to process the seeker information; small, accurate inertial measurement units (IMUs); high-speed data processors for guidance and course correction computations; and a fast control system (and agile airframe) to steer the interceptor. A block diagram of these components and their interaction are shown in Figure 2.

Seekers

To achieve an HTK capability, an interceptor must actively "seek out" the threat using onboard measurements of

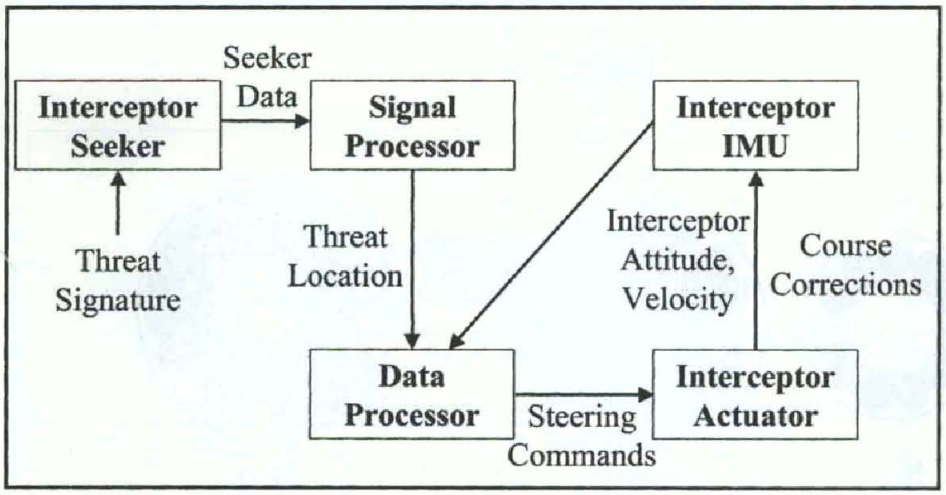

Figure 2.
Key interceptor components to achieve hit to kill.

the target. These measurements are performed using the interceptor seeker(s). These measurements must be accurate and be provided at a high data rate. HTK interceptors have used either millimeter wave (MMW) radio frequency seekers (FLAGE, ERINT, PATRIOT Advanced Capability (PAC)-3) or infrared (IR) seekers (HOE, ERIS, HEDI, THAAD). The main difference between these seekers is that IR seekers are smaller and lighter weight. MMW seekers are considerably heavier but provide range-to-target data at low altitudes where clouds could block the threat IR signature. Both of these seeker types can provide target direction information to the signal processor up to 100 times per second with an accuracy of 100 to 300 μrads. Data rates and measurement accuracy on this order of magnitude are required for HTK interceptors and are now achievable.

Signal And Data Processing

Improvements in speed of data and signal processors, as seen in today's desktop computers, is another essential technology development for an HTK interceptor. The signal processor must process raw seeker data consisting of many thousands of pieces of data and determine very accurately the location and direction of the threat and where to impact to destroy the payload. The data processor uses seeker and IMU data to determine the course corrections needed to impact the threat. These complex computations require the processors to make tens of millions of calculations per second while updating the interceptor steering commands at 50 to 100 times per second. This is well within today's technology.

Inertial Measurement Units

The interceptor IMU provides feedback to the interceptor data processor regarding the interceptor's attitude and velocity. This feedback is necessary so that guidance computations can be made to determine steering commands that will cause precise impact with the threat payload. Data from the IMU are provided 50 to 100 times per second and must be very accurate. Great advancements have been made in the miniaturization and accuracy of IMUs. IMUs that support today's HTK weapons are about the same size as a baseball and can achieve an accuracy of about 1 degree per hour of gyro drift rate. Twenty years ago, a similarly capable IMU was about the size and weight of a basketball filled with water. This size reduction and accuracy was essential to have reduced interceptor size, weight, and cost.

Control Systems

Finally, tremendous progress has been made in interceptor actuator technology, allowing the interceptor to respond rapidly to steering commands from the interceptor's data processor. Interceptor actuators are small rocket engines (thrusters) that are directed to fire in response to the steering commands. An HTK capability requires the interceptor actuator to respond to steering commands within 10 to 50 milliseconds, which is achievable with current thruster technology. In addition, thruster technology advancements have resulted in miniaturization of actuator systems that have thrust-to-weight ratios up to 1,000-to-1. These rocket engines can operate equally well in and outside the atmosphere, allowing HTK interceptors to make intercepts at significantly higher altitudes than those interceptors (such as the PATRIOT PAC-2) that use the atmosphere for aerodynamic steering using airvanes.

Conclusion

Since 1946 when Werner Von Braun selected Huntsville, AL, as the site where he would continue his missile development career, the U.S. Army has led the nation in defensive missile developments. During the past 53 years, many air and missile defense systems have been successfully developed and fielded by the U.S. Army. Notable among these are the Hawk, PATRIOT, and Stinger. These systems provide the backbone of the free world's existing air and missile defense capability. To provide the technology for the next generation of HTK weapons, the Army will continue to lead the nation in defensive missile development.

All of the technologies to achieve HTK intercepts have been developed and demonstrated as a result of Strategic Defense Initiative Organization/Ballistic Missile Defense Organization-funded, Army-managed programs during the past 15 years. Today's Army TBM weapons, PATRIOT PAC-3 and THAAD, incorporate stringent requirements for HTK weapons to ensure a kill of the highest quality.

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Applying Technology For Better Force Protection . . .

THEATER HIGH ALTITUDE AREA DEFENSE

COL Louis P. Deeter

Introduction

The threat posed by Tactical Ballistic Missiles (TBMs) to U.S. forces and assets throughout the world has grown steadily during the past decade. Many nations now possess short- and medium-range weapons capable of targeting military and political assets of our allies as well as U.S. forces deployed to defend them. TBM development efforts are underway by several other nations to enhance their military position. These efforts include the development of longer range missiles, indigenous missile production capabilities, accurate delivery systems, and warheads of mass destruction (i.e., chemical, biological, and nuclear).

The documented increase in TBMs, coupled with an unpredictable and potentially hostile environment, represents a serious threat to U.S. national security. TBMs are rapidly becoming the "terrorist" weapon of choice. They inflict widespread damage without regard to retaliation by a superior U.S. military force. Within the decade, the United States could be held hostage by the threatened use of these weapons. Presently, the Phased Array Tracking To Intercept Of Target (PATRIOT) System represents the only defense against this rapidly growing threat.

Theater High Altitude Area Defense (THAAD) not only bolsters our defense against the TBM threat, but also represents a more comprehensive approach to theater air and missile defense (TAMD). Whereas PATRIOT focuses on defending individual assets or small areas, THAAD is designed to defend a large area containing many assets. Indeed, the Army's approach to fulfilling the THAAD mission is to establish a tier of defense above that provided by PATRIOT, thereby increasing the effectiveness and robustness of current air and missile defenses. This approach will allow a key component of Army Vision 2010—Protect the Force.

The quality of kill characteristic of THAAD further increases the effectiveness of current defenses by providing a hard kill, virtually destroying delivery systems and greatly reducing the possibility of collateral damage to defended assets.

THAAD not only bolsters our defense against the tactical ballistic missile threat, but also represents a more comprehensive approach to theater air and missile defense.

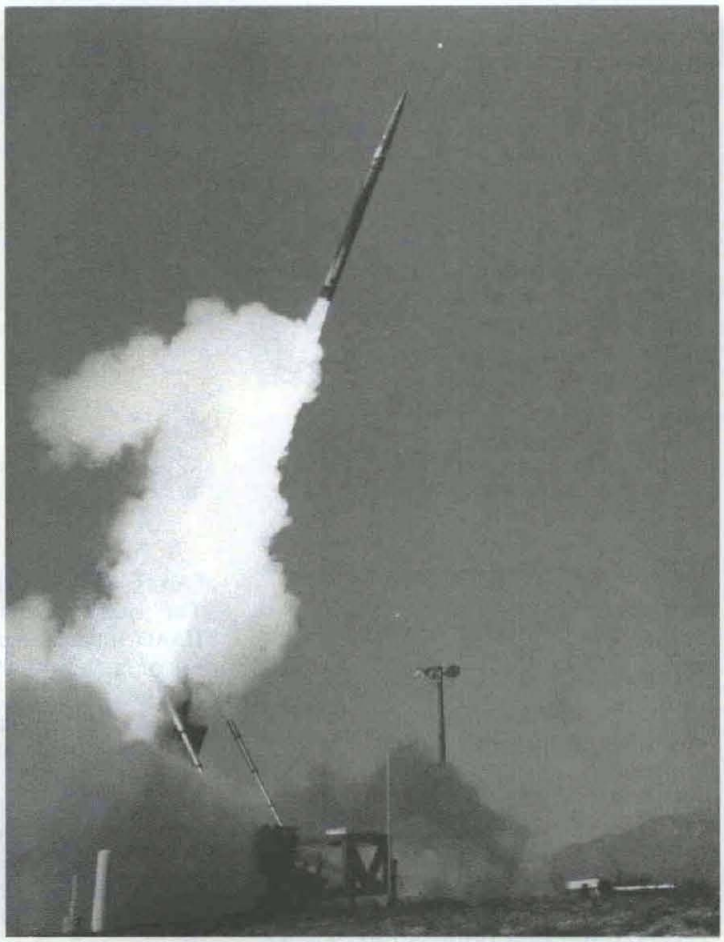
Operational Concept

The THAAD System will provide upper tier intercept response for the Army's two-tier TAMD concept. The higher altitude and theaterwide protection furnished by THAAD combines with lower tier PATRIOT, Medium Extended Area Defense, and Navy areawide systems to provide a near-leakproof air and missile defense of critical and high-value assets. The THAAD System provides increased effectiveness over any other upper tier system in development because it intercepts enemy TBMs in both the exoatmosphere and endoatmosphere. That capability allows THAAD to destroy incoming TBMs at a farther range from defended assets, allows for multiple shot opportunities, and minimizes the likelihood of damage caused by weapons of mass destruction and falling debris.

THAAD System Overview

The THAAD Program will be a complete integrated weapon system consisting of radars; battle management/command, control, communications, computers, and intelligence (BM/C4I) systems; launchers; and missiles. These elements are currently being designed, developed and tested during the THAAD Program Definition and Risk Reduction (PDRR) effort.

Radar. The THAAD radars developed



Theater High Altitude Area Defense test flight at White Sands Missile Range.

for the Army by the Raytheon Co. are unique pieces of equipment. They are unequaled in capabilities or complexity. These state-of-the-art radars represent significant advancements that incorporate multifunction or multitarget operation, flexible data-driven software, solid-state transmit/receive (T/R) modules, massively parallel signal processing, and road and air transportability. They are the first radars developed specifically to meet the TBM defense mission, and are the first large, ground-based radars to use X-band T/R modules. These radars were developed on a very aggressive schedule, and included production of more than 60,000 T/R modules in three separate manufacturing facilities. The radars have been successfully tested against dedicated ballistic missile targets as well as targets of opportunity at both White Sands Missile Range (WSMR) and the Kwajalein Missile Range.

These radars excel in precision track and target discrimination capabilities at long ranges. In September 1998, a User Operational Evaluation System (UOES) radar successfully participated in a National Aeronautics and Space Administration (NASA) launch test (Terrier/Black Brant) conducted at WSMR. The THAAD radar tracked the Black Brant missile throughout the entire flightpath within the radar's field of view and established some 180 tracks on various mission payload objects as well as large amounts of debris. The collected data were so accurate that NASA requested the impact points for the 11 test objects dispensed during the mission.

The two full-sized radars currently in operation are part of the THAAD UOES. They are being operated in concert with Raytheon by the 1st of the 6th Air Defense Artillery Battalion at WSMR as part of the PDRR phase of the THAAD Program. The UOES radars will be available for deployment with THAAD at the conclusion of PDRR as an interim capability against TBMs.

The THAAD radar design provides high-power output and exceptional waveform agility to support the long-range functional requirements of the THAAD mission. The engineering and manufacturing development (EMD) and objective THAAD radars currently being designed will incorporate numerous improvements over the PDRR version. These include greater performance, producibilty enhancements, improved reliability, improved transportability, enhanced survivability, and ruggedization modifications.

THAAD radars will perform functions that include surveillance, target track, missile track, classification, discrimination, target object map, and kill assessment. In addition, these radars provide in-flight uplink and downlink communication to the missile. Radar data are supplied to the BM/C4I to support engagement planning and conduct. Radar data may be provided to external users through BM/C4I external interfaces, and the radar may receive external data as well to enhance target acquisition. The BM/C4I controls operation of the radar through premission initialization and real-time sensor management.

BM/C4I System. THAAD command and staff elements use the BM/C4I system to execute THAAD battle command. Battle command includes battle management of the THAAD target engagement process and command and staff operations associated with the planning and control of operations. The BM/C4I system provides connectivity and is interoperable with the TAMD command and control system elements and other Army and joint systems.

The BM/C4I system consists of modular elements housed in standard Army shelters mounted on High Mobility Multipurpose Wheeled Vehicles (HMMWVs). These shelters are configured to form tactical operation shelters (TOSs), launch control stations (LCSs), and communication relays. The TOS contains computers and displays for command and staff personnel. The LCS contains an extensive suite of communication equipment and associated processors to provide radio communication functions.

THAAD radars and launchers are connected to the BM/C4I system to form a netted, distributed, and replicated command and control system. The communications network has multiple connections between components so that the loss of any element will not isolate any other element. The distribution of critical BM/C4I software functions and hardware throughout the system ensures that the loss of an element will not result in system failure. This architecture results in a highly survivable and reliable system.

The THAAD missile design incorporates various technologies developed in past Ballistic Missile Defense Organization Programs to achieve hit-to-kill accuracy and yet maintain a small configuration well suited to THAAD operational requirements.

Launcher. The THAAD launcher uses the M1075 Palletized Loading System (PLS) truck. Both the launcher and missile round pallet can be transported on a single C-141 or larger aircraft. Using its standard PLS, the launcher can load the complete missile module within minutes after arrival in theater.

Once emplaced, the launcher is powered by a standard Army generator mounted on the vehicle. The launcher electronics package allows built-in test capability and communication with the command and control system. A Global Positioning System receiver and dynamic reference unit provides location and azimuth data.

Missile. The THAAD missile design incorporates various technologies developed in past Ballistic Missile Defense Organization Programs to achieve hit-to-kill accuracy and yet maintain a small configuration well suited to THAAD operational requirements. The missile consists of a single-stage solid rocket booster and a kill vehicle (KV) that separates from the booster prior to intercept.

The missile is protected prior to launch by the missile canister. Eight missile canisters will be fastened together on a missile round pallet that is transportable on C-141 or larger transport aircraft and can be easily handled in the field by standard ammunition resupply vehicles.

System Operation. The THAAD System elements work in concert to detect, discriminate, assign, and destroy incoming TBMs. For each engagement, the THAAD radar searches for incoming targets. After acquisition, the target is tracked and discriminated to distinguish warheads from other associated objects. The radar reports the detection and track data to the BM/C4I system, which correlates the data with other track files and develops an engagement plan. The BM/C4I system determines the weapon target assignment and transmits the engagement message to the selected launcher over the BM/C4I network. At the appropriate time, the missile is launched and inertially guided to the intercept point.

During missile flyout, the radar tracks both the target and the missile. The radar provides updated missile position and predicted intercept point data to the missile periodically throughout the flight. Shortly before intercept, the radar provides an updated target position. The KV onboard processor uses the seeker image data and radar-generated target image to determine the desired aimpoint. Final maneuvers guide the KV to impact. The TBM warhead is destroyed by the force of the hypervelocity impact, without the use of an explosive warhead.

THAAD Program

The THAAD Project Office and the Program Executive Office for Air and Missile Defense, located in Huntsville, AL, manage the THAAD Program. The THAAD Project Office is developing the design for the objective system and will demonstrate the THAAD System capability in a demanding test program.

The PDRR phase contract was awarded to Lockheed Martin Missiles and Space Co. in September 1992 to develop the system and integrate the radar being developed by Raytheon.

The PDRR flight test program is being conducted at WSMR to demonstrate the effectiveness of the current system design and to prepare for meeting objective system requirements. Quality assurance measures are currently being implemented to allow THAAD flight test personnel to demonstrate system performance and satisfy PDRR requirements prior to entering the EMD phase of the program.

The THAAD UOES Program will satisfy congressional guidance to develop a missile defense capability as soon as technically feasible. The UOES is prototype equipment made available after testing. Sufficient functionality will be included in the UOES to fully demonstrate system capabilities and resolve technical issues to support advanced development.

Because the UOES launcher, BM/C4I, and radars are currently in place and being used by the UOES Battalion at Fort Bliss, TX, the information learned in the UOES design and development process is being applied to the objective system design effort and will benefit the overall objective system maturity.

Summary

The THAAD System will provide critical wide-area coverage to defend large theater areas against an ever-proliferating threat of longer range ballistic missiles. This capability will complement PATRIOT's point defense of high-value land areas. THAAD is an optimized system that balances the functionality of a world-class radar and battle manager with an onboard missile processing capability to provide superior robustness and the greatest confidence of threat missile intercepts.

THAAD's hit-to-kill missile ensures the lethality required to defend ground forces and civilians against weapons of mass destruction. The near-term UOES capability has successfully integrated soldiers into the early system development and can provide a limited defense in a national emergency, if required, until the objective THAAD System development is completed.

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PATRIOT: COMBAT PROVEN, STILL IMPROVING

COL Stephen J. Kuffner
and Dr. George A. Foust

Introduction

Originally conceived in the late 1960s to counter the massive Soviet bloc air threat to central Europe, the Phased Array Tracking To Intercept Of Target (PATRIOT) missile was first fielded to U.S. forces in 1984. PATRIOT's long list of firsts—first totally software-driven weapon system, first tactical use of a phased array radar, first "Track-Via-Missile" application—provided a revolution in air and missile defense. PATRIOT combined the functions of surveillance, acquisition, target tracking, and missile tracking into a single multifunction radar. Previous air and missile defense systems had used up to four separate radars for these functions.

Prior to PATRIOT, air and missile defense philosophy was grounded in the concept of one radar tracking one target and engaging that one target with one or more missiles to intercept. PATRIOT introduced the concept of multiple simultaneous engagements from its single multifunction radar, with an ability to conduct more than six separate engagements simultaneously.

PATRIOT has been fielded to 10 U.S. Active duty and 2 National Guard battalions and 7 allied countries with nearly 150 total firing batteries. A continuous product improvement program has kept the system viable against emerging threats and encouraging further international sales.

PAC-2

Shortly after PATRIOT's initial fielding, efforts were initiated to develop an antitactical ballistic missile (ATBM) capability in PATRIOT. The value of a software-driven system was apparent when an initial ATBM capability was fielded in 1987 through software-only changes. More extensive changes were incorporated into a missile ATBM modification (PATRIOT Advanced Capabilities (PAC)-2) that increased warhead fragment size and provided a faster reacting fuze. These capabilities were fielded as PATRIOT was being deployed in Operations Desert Shield and Desert Storm.

PAC-2 was designed to be highly effective against the Intermediate Nuclear Forces (INF) Treaty-compliant Tactical Ballistic Missile (TBM) threat likely to be encountered in a central European environment. However, in the Persian Gulf conflict, PATRIOT faced a far more stressing TBM threat when it conducted the world's first ATBM engagements. The Iraqi TBM threat was faster than the INF-compliant TBM. It had a smaller warhead, executed spiral maneuvers in the atmosphere, and entered PATRIOT's coverage in a debris-masking environment.

PAC-2 Improvement Program

PATRIOT performed admirably in Operation Desert Storm, achieving a success rate of preventing damage to the protected asset in 70 percent of its engagements in Saudi Arabia and 40 percent in Israel. However, the Army recognized through lessons learned that improvements to the PATRIOT were essential if PATRIOT were to fight in future wars outside of the central European environment. In the Iraqi conflict, the PATRIOT battlespace was inadequate primarily because of shortfalls in surveillance operations. PATRIOT lethality was also insufficient to ensure destruction of the Iraqi TBM warhead primarily because of PATRIOT's too-slow fuzing, the end-game maneuver of the Iraqi TBM, and the lack of fragment penetration through the steel-hardened Iraqi TBM shell. Battlefield integration in Operation Desert Storm was achieved primarily through specially designed interface boxes, slowing the reaction of battle management software and human control of engagements.

These recognized shortfalls led to a four-stage product improvement program for the PATRIOT System. This program was designed to incrementally field advanced capabilities into the PATRIOT force. Soldiers could then reap increased protection against air and missile threats in a timely manner and without waiting until PAC-3 is available to receive any increased capability. The first stage was called the Quick Response Program (QRP), and

succeeding stages are called PAC-3 Configurations 1, 2, and 3.

QRP fielding began in 1993. Today, all U.S. PATRIOT units have fielded capability through PAC-3 Configuration 2. A number of fielded improvements have been made to the PATRIOT since Operation Desert Storm.

This combination of ground system, battlefield integration, and missile improvements provides today's soldiers with nearly 100-percent improvement in capabilities to defeat the Iraqi TBM—a combination of better lethality (about 50-percent improvement), more battlespace (greater than 250-percent improvement), greater surveillance (nearly 60-percent improvement), and the incorporation of non-PATRIOT sensor and intelligence data to reduce the reaction time to counter an incoming threat. All major end items within PATRIOT have significantly improved since Operation Desert Storm.

The PAC-2 missile has further evolved into the Guidance Enhancement Missile (GEM). The GEM incorporates a low-noise receiver to enable better tracking against small signature targets and an improved fuze that has a faster response against fast TBM targets. This fuze also enables the GEM to operate at lower altitudes against cruise missiles. The GEM is the primary element in achieving the 50-percent improvement in PATRIOT lethality since Operation Desert Storm by enabling smaller miss distances. In addition, with the faster responding fuze, it allows more warhead fragments to impact the TBM warhead.

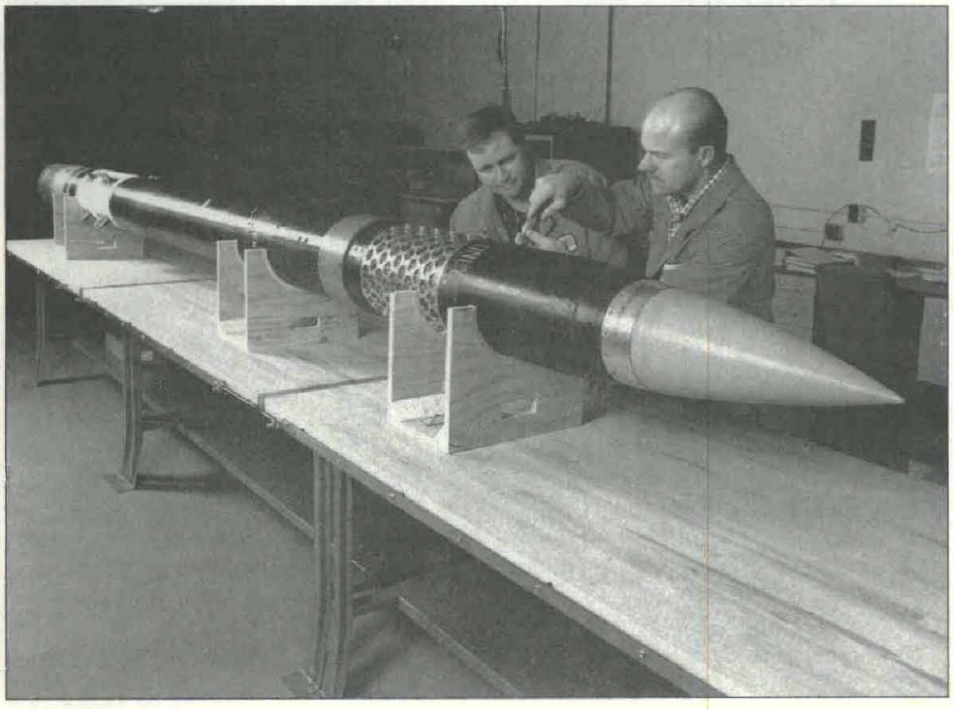
An "automated emplacement" capability has been incorporated into the Launching Station and Radar Set (RS) through the use of Global Positioning System downlinks and a north-seeking gyro. Automated emplacement reduces the reliance on field survey processes when emplacing fire units and eliminates the opportunities for human error when inserting emplacement data into the weapons control computer.

RS improvements through PAC-3 Configuration 2 also include an improved low-noise receiver and better antenna sidelobe rejection to improve detection, acquisition and tracking capabilities against small-signature targets. When combined with improved pulse Doppler processing, the RS is significantly more capable against low-altitude threats than the version used during Operation Desert Storm. Although PATRIOT was not used to engage any low-altitude threats in Operation Desert Storm, the United States' success with low-altitude Tomahawk cruise missiles did not go unnoticed by other countries. Cruise missiles may be a significant threat to U.S. forces in the next conflict.

The radar shroud provided a means of blocking spurious signals from entering the RS backlobes. This eliminated spurious targets caused by these signals and further increased the sensitivity of the RS against small-signature targets. Radar improvements coupled with a new capability to displace launchers up to 10 kilometers from their controlling radar provided the increased defended area battlespace.

Interoperability and battlefield integration were improved by providing improved communications (Communications Enhancement (CE) Phase I) and better integration of all command and control functions (Tactical Command Set integration with Information Coordination Central (ICC)). CE Phase I provided the embedded communications, digital switching, and multiplexing equipment to enable PATRIOT to link to the full spectrum of theater-level tactical command and control systems and information sources. Data from information sources are now fully integrated into the situational awareness and engagement decision processes in the ICC through the Classification, Discrimination and Identification Phase I logic. Improved software-driven capabilities to withstand an antiradiation missile attack have also been fielded. The lack of high-fidelity data to verify PATRIOT performance in Operation Desert Storm led to improved recording devices (optical disk and embedded data recorders). These data recorders enable faster software transfer and recording of all actions within the PATRIOT control vans for post-engagement assessments and playbacks, both to understand PATRIOT performance and improve operator training. The magnitude of software changes required to upgrade the PATRIOT of Operation Desert Storm to a full PAC-3 capability led to fielding of an enhanced weapons control computer at both battalion and battery levels.

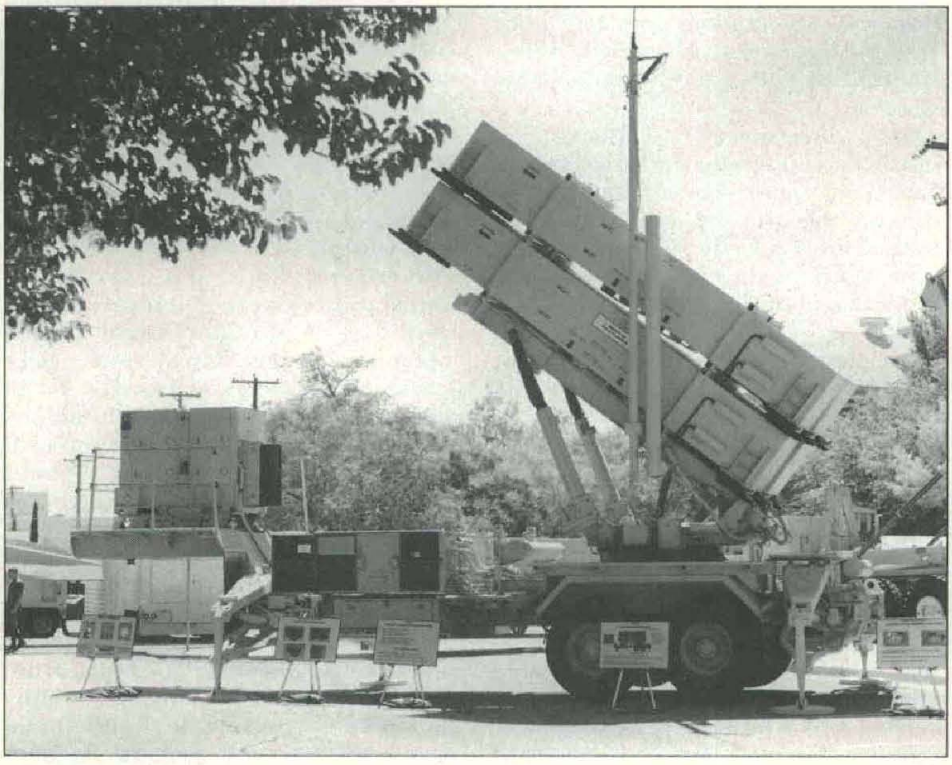
Since Operation Desert Storm, all U.S. PATRIOT battalions have seen nearly a doubling of fielded capabilities. These improved capabilities are also being made to PATRIOT units owned by the seven PATRIOT international partners. However, the most significant improvement to PATRIOT is still to come.



PAC-3 on a test bench.

PAC-3

PAC-3 Configuration 3, the final stage in the time-phased incremental fielding of PATRIOT improvements, will once again touch every major PATRIOT end



PAC-3 launcher.

item and will add a new technology called "hit to kill" (HTK). All the ground-system elements for a PAC-3 capability have been fielded in a test battalion at Fort Bliss, TX. Only the completion of the new missile and operational testing of the complete configuration remain before soldiers will see another quantum increase in PATRIOT capabilities.

The RS will have double its current time power budget and improved signal processing to detect, acquire and track smaller targets farther out. Communications throughout the battalion will be digitally multiplexed and switched and will be fully compatible with a variety of theater communications means: Army Common User System, Troposcatter Long Range communications, satellite relays, commercial telephones, Joint Data Nets, and tactical intelligence broadcast networks.

Classification, discrimination and identification will be improved both by extracting the data generated by PATRIOT radars using mid- and high-range resolution waveforms and by better exploitation of intelligence services available within the theater. Battlefield integration will be fully automated through improved communications processing and better Tactical Data Information Link message sets.

Interoperability with Army (Theater High Altitude Area Defense) and other Services' systems (such as Aegis with Navy Area Defense capabilities) will be achieved by encoding detailed interface control plans and exploitation of the Joint Data Net. Enhanced launcher electronics will provide flexibility, improved functionality, and greater reliability of launchers. Launchers can then be deployed more than 25 kilometers from controlling radars.

The net result of these improvements will be better than a sevenfold improvement in battlespace and a 75-percent improvement in lethality compared to the PATRIOT that fought in Operation Desert Storm.

Hit To Kill

Only completion of PAC-3 missile development remains for soldiers to realize this tremendous improvement in fielded PATRIOT capabilities. The PAC-3 missile will enable PATRIOT to claim another in its long list of firsts—the first tactically deployed HTK air and missile defense system.

Other air and missile defense systems as well as the earlier PATRIOT Systems rely on some form of a blast fragmentation warhead to ensure a "kill" of the threatening target. Blast fragmentation has proven to be an effective means of countering relatively "soft-skinned" targets such as manned aircraft. PAC-2 and GEM refined the use of blast fragments to kill the much harder skinned TBM threat, but test results and analyses have confirmed that the challenge in achieving proper fuzing and adequate penetration against small, fast, and "hard-skinned" targets is daunting.

The Army therefore selected emerging HTK technology as the basis for the new PAC-3 missile. The very high-energy coupling that occurs when an HTK missile impacts a target vehicle virtually ensures destruction of the target, irrespective of soft or hard skin.

HTK technology has been successfully demonstrated in flight test demonstration programs, where HTK missiles have successfully destroyed targets six of seven times when the HTK missile successfully entered the terminal phase of guidance.

Conclusion

Compared to the capabilities available during Operation Desert Storm, the PATRIOT System currently fielded with our soldiers has a battlespace more than 250 percent larger, and the final PAC-3 Configuration 3 will provide our soldiers with more than a sevenfold increase in battlespace. PATRIOT was indeed combat proven during Operation Desert Storm and continues to improve.

Fielding of the PAC-3 Configuration 3 system with its new HTK missile should commence in early FY00, following operational testing in FY99.

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The Future Of Air And Missile Defense . . .

MEDIUM EXTENDED AIR DEFENSE SYSTEM

LTC Richard P. De Fatta

Introduction

In 2010, the United States will protect deployed forces with the Medium Extended Air Defense System (MEADS). Roll-on/roll-off deployable from a C-130 aircraft, MEADS will provide airfields and deploying assets with 360-degree protection against the full spectrum of air and missile threats: short-range ballistic missiles, low-altitude cruise missiles, unmanned aerial vehicles, large-caliber rockets, and fixed- and rotary-winged manned platforms. Once MEADS is deployed, the theater strike force is under a continuous "blanket" of air and missile defense (AMD).

This protection is provided by a tailored MEADS task force consisting of the "right" mix of surveillance and fire control sensors, missile launchers, and fully netted and distributed battle management/command, control, communications, computers and intelligence (BM/C4I) elements. The accompanying figure highlights the key MEADS components.

As the Department of Defense steps into the 21st century and begins implementing Army Vision 2010, MEADS will be a critical enabler for the protection of modern corps operations. MEADS is designed with the strategic deployability to get to the fight and establish the AMD necessary for theater force buildup and to provide sufficient tactical mobility to continuously protect the joint Army and Marine Corps maneuver forces. It is fully modular, allowing the commander to tailor the AMD task force for each mission. For example, early entry minimum engagement, fixed-asset protection, and maneuver force protection are all different missions and are most efficiently addressed with different numbers and types of equipment. Minimum engagement may include a single launcher, a single fire control radar, and a BM/C4I element. Add a surveillance radar and additional launchers, and a robust fixed-asset defense is available.

Maneuver force protection requires additional radars and BM/C4I elements so that seamless, continuous coverage is maintained despite the "leapfrog" movement of the maneuver force during deployment along a maneuver corridor. This modular approach and a desire for flexible mission coverage is causing the Army's AMD communities to critically examine traditional organizational structures to best use this capability.

Multinational Program

MEADS is a multinational cooperative development program with Germany and Italy participating as full government and industrial partners. MEADS evolved from the corps surface-to-air missile requirement validated in 1994. A major success of the international program is fully harmonized system requirements common to all three nations as well as two U.S. Services. For the United States, MEADS initially fills the AMD gap between theater and corps assets (Theater High Altitude Air Defense (THAAD) and the Phased Array Tracking To Intercept Of Target (PATRIOT) missile) and short-range divisional assets consisting primarily of the Sentinel radar and a variety of Stinger missile-based platforms. When MEADS is fielded, it will displace PATRIOT units and may ultimately replace the entire PATRIOT force.

Germany plans to replace its aged Hawk missile systems with MEADS while Italy plans to replace legacy NIKE-Hercules systems. All MEADS units are required to be interoperable among the combined forces of allied nations as well as with their nationally unique systems.

The MEADS Program is chartered by the North Atlantic Treaty Organization (NATO) and directed by a trinational steering committee. The program was established under a memorandum of

understanding (MOU) signed by each nation's national armaments director. In the United States, this is the Under Secretary of Defense for Acquisition and Technology.

The Program Executive Officer for Air and Missile Defense represents the United States on the steering committee. The U.S. MEADS Product Manager reports directly to the Program Executive Officer for Air and Missile Defense and is responsible for the design, development, production, fielding, and sustainment of MEADS in the United States. Germany and Italy also maintain product offices to execute their national programs. Management of the overall program is accomplished under the auspices of the NATO MEADS Management Agency reporting directly to the MEADS Steering Committee. This agency is the first of its kind in the United States.

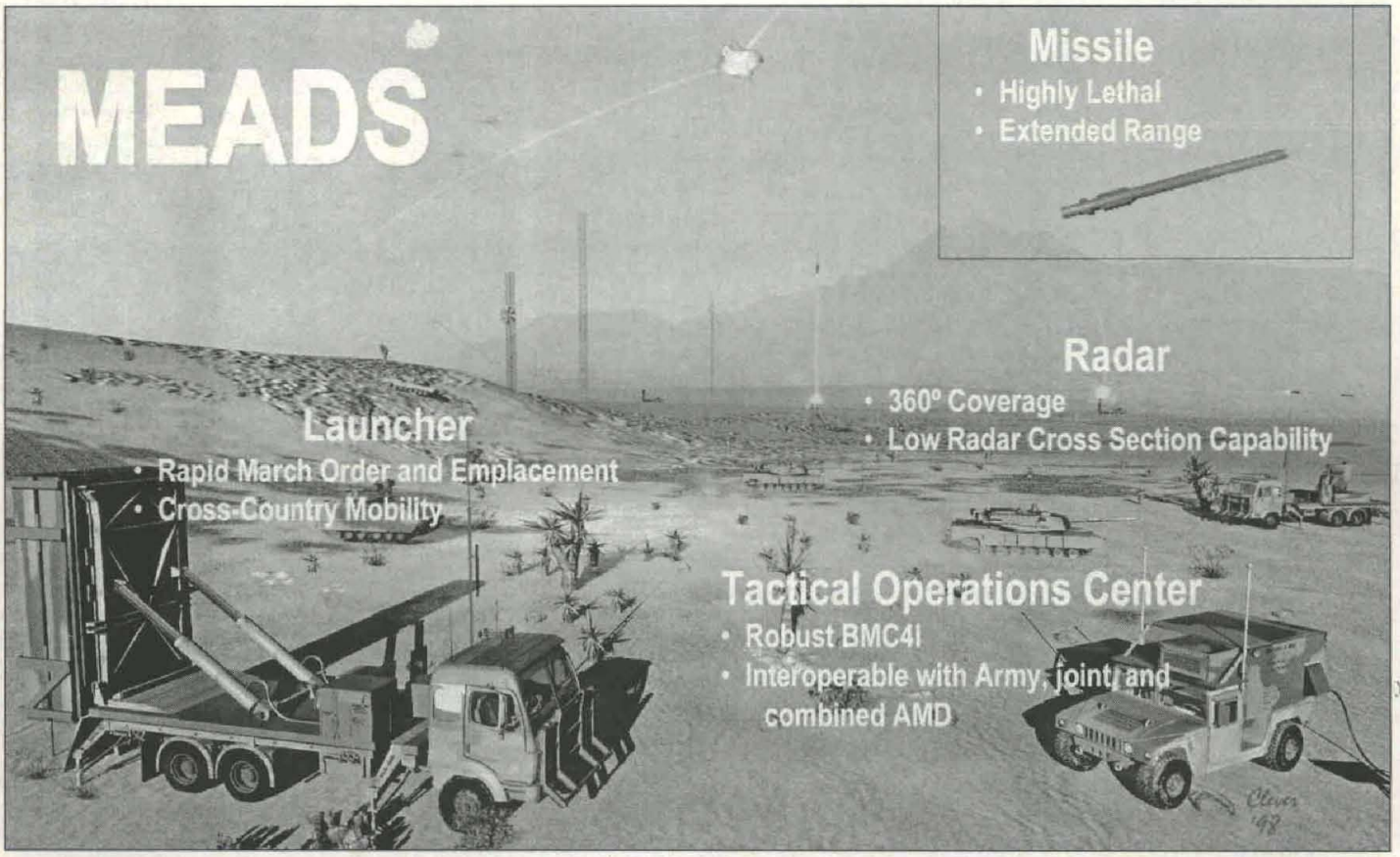
The MEADS Program completed the first phase of development, Project Definition/Validation (PD/V) (similar to Concept Definition in a U.S. program), during FY98. Two trans-Atlantic industrial entities (TAIEs) competed for selection as the contractor team to go forward into the next phase, Design and Development (D&D). Each TAIE consists of a major U.S. contractor teamed with a consortium of European contractors for the MEADS PD/V competition. Prior to PD/V, a competition resulted in narrowing prospective U.S. offerors from five to two. D&D proposals are the product or deliverable of the PD/V competition. D&D combines the U.S. Program Definition and Risk Reduction and Engineering and Manufacturing Development phases into a single phase similar to a typical European program structure.

The MEADS Steering Committee is currently evaluating the PD/V source selection findings, deliberating the program structure for the next phase to satisfy national decision processes, and preparing an MOU for D&D. A major benefit of this international program is the shared financial contribution by each nation in the development process. PD/V was funded 60 percent by the United States and 40 percent by the European partners. D&D funding shares are being negotiated, but once decided will be carried over into production work shares.

MEADS is a critical component of the Ballistic Missile Defense Organization's family of systems approach to providing a near-leakproof capability against a broad spectrum of AMD threats.

Capabilities

Like PATRIOT, in a mature theater, MEADS is a lower tier system that will defend against threats piercing the upper tier that is protected by THAAD or the Navy Area Defense System. MEADS will also defend against air-breathing threats (unmanned aerial



MEADS will include a highly capable, 360-degree coverage radar system; a lethal, extended-range missile; launchers capable of cross-country mobility and rapid emplacement; and a robust BM/C4I element that ties the components together and is interoperable with other Army, joint, and combined AMD systems.

vehicles, and fixed- and rotary-winged aircraft) that upper tier systems are not intended to handle. Because MEADS only requires the C-130 or the comparable NATO C-160 airlift, it frees up other airlifts for the theater commander-in-chief (CINC) to apply to other critical elements, or to bring even more air defense to the theater on fewer sorties.

MEADS will require, for example, approximately 50 percent of the C-5 sorties necessary to move a similar contingent of PATRIOTs. MEADS can also be transported by ship or be carried by all U.S. heavy-lift helicopters such as the CH-47 and CH-53.

MEADS is also capable of the cross-country mobility necessary to keep up with the modern rapidly maneuvering corps while also providing continuous coverage of that force and such critical assets as forward refueling and ammunition points, forward-operating aviation bases, and potential chokepoints.

Employed forward, MEADS protects against the threat spectrum in conjunction with the Bradley Linebacker, Avenger, and other short-range air defense (SHORAD) capabilities. Its long-range sensors support forward engagement of the threat, often over hostile territory or before a carrier platform releases its weapons. In a typical deployment, MEADS will have the unique capability to classify, discriminate, and identify potential threats at extended ranges to provide cueing information to other systems or provide engagement options with the most cost-effective AMD asset.

Admiral Harold W. Gehman Jr., the Supreme Allied Commander, Atlantic, Commander-in-Chief, U.S. Atlantic Command, recently described information superiority as the most critical aspect of Joint Vision 2010. The MEADS architecture enables the Army's AMD contribution to this tenet by supporting the concept of information dominance as described in Army Vision 2010.

Employing the next generation BM/C4I, MEADS is joint and allied interoperable and incorporates a netted and distributed architecture that eliminates the traditional air defense artillery reliance on unit-centered operations and deployment.

The BM/C4I design allows MEADS elements to "plug and fight" similar to the "plug-and-play" capability of modern computers. It does not rely on specific shooter-sensor-command couplings and eliminates the vulnerability of critical BM/C4I nodes.

MEADS' forward-deployed, long-range sensors provide quality intelligence well forward of friendly deployments.

MEADS' forward-deployed, long-range sensors provide quality intelligence well forward of friendly deployments. This is especially important given the anticipated use of weapons of mass destruction and the desire to successfully engage these threats over hostile territory. A key element in the desire for information dominance is development of a joint theater Single Integrated Air Picture (SIAP).

MEADS will be a significant contributor to the envisioned SIAP. Its netted and distributed architecture results in an integrated air picture internal to the MEADS force. That is, all MEADS elements share the same target information and can create a composite track for fire control not dependent on individual acquisition and tracking by a unique sensor.

MEADS' forward-deployed, long-range sensors will provide early inputs to the SIAP and forward-deployed SHORAD units. Enabling a SIAP provides the opportunity to develop and share among shooters fire control data that are of sufficient accuracy and update rate to free weapons from reliance on organic sensors and permit engagements independent of the data source.

At the theater level, SIAP can tailor engagements by specific platforms and provide multiple shot opportunities to engage along the entire flightpath of a threat.

The MEADS' integrated air picture allows it to conduct complex battle management procedures such as early engagements of targets "over the hill" using target tracks passed from sensors that have visibility (engage-on-remote data).

Another MEADS capability is "forward-pass" operation: the missile is launched on air picture data and "handed off" to a forward sensor for midcourse correction and guidance to the target. Again at the theater level, MEADS is required to accept fire control data from any available external asset. With a SIAP, therefore, MEADS functions as the land-based component of an air-directed surface-to-air missile engagement where the missile is launched and directed from external aerial source data.

Conclusion

MEADS represents the future for Army air and missile defense. It not only provides a robust capability against rapidly proliferating and advancing air and missile threats, including weapons of mass destruction, but also serves as the air defense artillery technology carrier for the 21st century.

To achieve the goals in Joint Vision 2010, the United States must modernize its air defense artillery forces with systems such as MEADS. The six patterns of operation described in Army Vision 2010 that support attainment of Joint Vision 2010 are Information Dominance, Project the Force, Protect the Force, Shape the Battlespace, Decisive Operations, and Sustain the Force. The Army Air and Missile Defense Master Plan describes MEADS as a critical link and enabler to support the air defense artillery's contribution to Joint Vision 2010.

LTC RICHARD P. DE FATTA is the Product Manager for MEADS. He has a B.S. degree in engineering from the U.S. Military Academy, an M.S. degree in laser physics from the Air Force Institute of Technology, and an M.S. degree in systems management from the Florida Institute of Technology. He is also a graduate of the Advanced Program Management Course at the Defense Systems Management College.

THE JOINT TACTICAL GROUND STATION AS A JOINT SERVICE MODEL

Charles E. Rayner and
LTC Donald A. Gutknecht

Background

In 1988, the U.S. Army Strategic Defense Command initiated a study to determine if satellite early warning system observations could be used to detect tactical ballistic missile (TBM) launches. Based on positive results, a Tactical Surveillance Demonstration System was successfully tested at White Sands Missile Range, NM, in August 1992. The system was composed primarily of commercial off-the-shelf (COTS) hardware integrated with legacy software. The system successfully received data from two Defense Support Program (DSP) satellites and quickly passed this data to a Phased Array Tracking To Intercept Of Target (PATRIOT) fire control system. A follow-on enhanced system incorporated hardware and software for processing data from three DSP satellites, provided improved communications, and added mobility. A transportable prototype system incorporating these enhancements was delivered and successfully demonstrated in late 1993.

Based on the immense success of the technology demonstrations, the Army Vice Chief of Staff directed that the Army "aggressively pursue acquisition and near-term fielding of a deployable JTAGS [joint tactical ground station] capability." To comply with this direction, JTAGS transitioned from an Army technology demonstration program to a formal Acquisition Category (ACAT) III program in May 1994.

Because of real-world events and the growing theater missile threat, the technology prototypes were forward deployed to sites in European Command (EUCOM) and Pacific Command (PACOM) and remained operational until tactical JTAGS units replaced them in mid-1997. Data gained from the prototypes fed real-world experiences into the development program and provided significant influence on system design.

Overview

JTAGS was developed to resolve deficiencies in missile warnings identified during Operation Desert Storm. JTAGS provides the theater commander-in-chief (CINC) a deployable in-theater capability to receive and process space-based infrared data on TBM launches and disseminate warning, alerting and cueing information to the warfighter. The currently fielded JTAGS is the source of theater missile defense (TMD) warning for theater CINCs around the world.

Not only was JTAGS developed and fielded in less than 5 years, it was accomplished ahead of schedule and below cost. GEN Dennis Reimer, Army Chief of Staff, stated at the JTAGS prototype delivery in May 1995, "I'm struck by how fast we've brought it on ... maybe here's a model we ought to build on."

JTAGS is an exceptional example of rapid program acquisition using numerous initiatives resulting from acquisition reform. JTAGS was acquired under a nondevelopmental item acquisition strategy promoting maximum use of COTS and government off-the-shelf hardware and software. Government specifications and standards were deleted from the production contract. Legacy software from prior prototype systems formed the software baseline, and a preplanned product improvement program was developed early in the life cycle to maintain coexistence with other evolving systems.

JTAGS current and future application to joint Service needs was validated by its selection as the baseline for the remote terminals component of the Space Based Infrared System (SBIRS) Program. SBIRS satellites are being developed by the Air Force to replace the aging Defense Support Program (DSP) satellites that now supply space-based data to JTAGS. This transition is planned for the early 21st century.

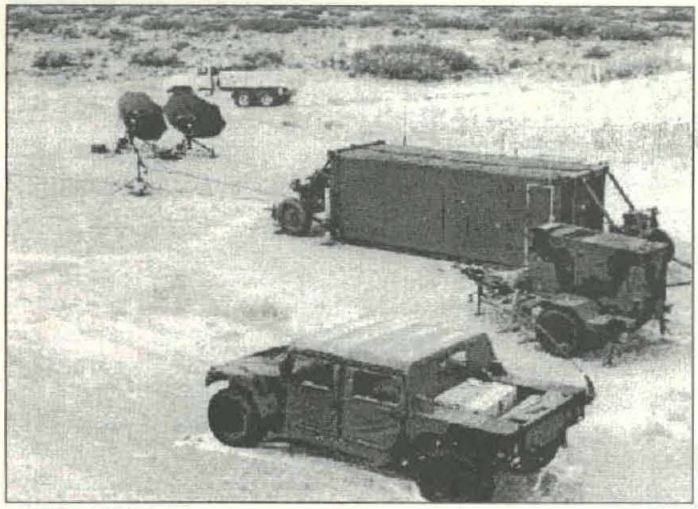
Joint Service Collaboration

JTAGS satisfies both Army and Navy Operational Requirement Documents and was therefore established as a joint interest program under Army leadership. A 1992 Memorandum of Agreement (MOA) signed by the two Services documented this agreement. The Navy participated in the JTAGS development and fielding process as members of review forums and provided personnel to oversee the JTAGS units fielded outside the continental United States. The Navy also provided critical support within the Department of Defense (DOD) in defense of the theater CINC's retention of the direct downlink capability.

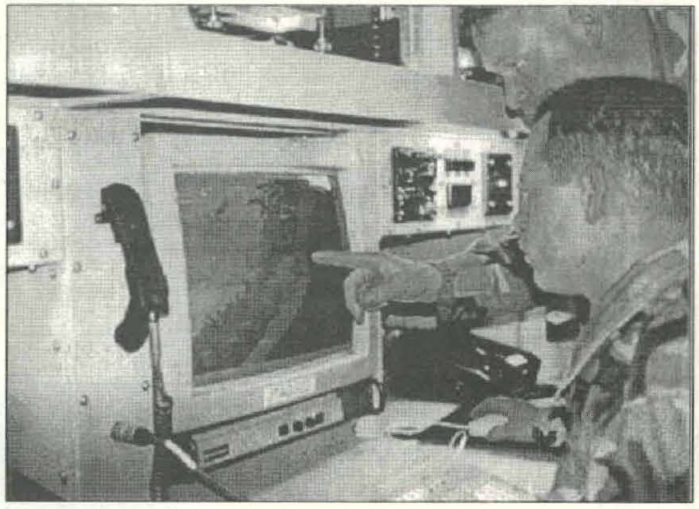
The JTAGS Product Office supports Navy operational requirements to perform early boost phase detection and to develop the capability to provide warning to Navy tactical forces. JTAGS also provides assistance to the Navy in demonstrating and evaluating architectures to provide DSP data for Navy shipboard operations.

As a result of threat growth, existing satellite system limitations and the proliferation of proposed new sensors, Congress directed in the early 1990s that the Services jointly develop a complementary suite of satellites and sensors. An Office of the Secretary of Defense study, undertaken in mid-1994, defined an approach for the new satellite/sensor system. The study recommended that the DSP constellation of space-based satellites be replaced with new satellites called the SBIRS.

The new system provides an integrated ground and space architecture of geosynchronous orbit satellites, highly elliptical orbit satellites, and low earth orbit satellites. The Air Force was designated lead Service for this effort. During SBIRS pre-engineering and manufacturing development (EMD), an Army JTAGS unit demonstrated the capability of existing ground processors to potentially meet the SBIRS mobile ground processing requirement. Demonstration of JTAGS capabilities captured the concept of a highly integrated and mobile processor meeting all mobile mission requirements. This led the acquisition executives of all Services to sign an MOA in September 1996 agreeing to pursue use of JTAGS as the baseline for the SBIRS mobile ground processor. The SBIRS contractors subsequently proposed systems that used



Deployed JTAGS system consisting of a standard military shelter containing three operator consoles and related processing equipment.



Operators monitoring situational awareness inside JTAGS shelter.

JTAGS as the SBIRS Multi-Mission Mobile Processor (M3P) baseline. The M3P, as one mobile configuration, will perform the Army in-theater missile warning and defense missions and the Air Force strategic survivable and endurable mobile missions. This integrated ground concept resulted in elimination of seven mobile processors from the original baseline and significant cost savings at the DOD level.

The Army subsequently altered their planned upgrade of JTAGS to operate with SBIRS satellites from a single Service acquisition to a joint acquisition with the Air Force. The JTAGS Product Office will manage the upgrade of five Army JTAGS units to M3Ps and the procurement of four M3Ps for Air Force use. In addition to significant cost savings, this unique alliance ensures that the JTAGS upgrade is integrated into the Air Force SBIRS EMD contract.

Current Status

JTAGS units deployed in 1997 are currently performing their joint Services role worldwide. The Army force structure of five sections (one JTAGS shelter and associated equipment per section) provides coverage for two major regional conflicts plus one contingency section. As part of a deployment to a major regional conflict, a detachment with a headquarters element and two JTAGS sections provide the required 24-hour wartime operational availability. For peacetime forward deployment of Army forces, a detachment headquarters and one section are deployed in both EUCOM and PACOM. The two remaining detachment sections are at the U.S. Army Space Command Headquarters in Colorado Springs, CO, while the contingency section is located at Vandenberg AFB, CA, supporting the training base. These units will remain operational into the early 21st century when they will be replaced by M3Ps.

As a component to Commander-in-Chief, Space, Army JTAGS units are available and prepared to support regional conflicts throughout the world. In the theaters, the units are fully integrated into operations with theater communications and TMD systems. Operational plans are in place, fully trained Army and Navy personnel operate the systems, and the logistics support base is in place, fully stocked and operational. Use of contractor logistical support for all logistics above organization level lowers operating costs and improves response time to enhance system readiness. JTAGS, with its joint Service interfaces and industrial partners, is now available to support warfighters throughout the world.

Future Plans

Effort is ongoing to evaluate new proposals that will continue to leverage off the design and operational capabilities of JTAGS units and M3Ps. In the near term, the JTAGS Office is working closely with the Army and other DOD organizations to improve communications, processing, and fusion with other sensors. Additional operational concepts using the M3P may lead to the early retirement of older Air Force mobile ground stations required to maintain the DSP survivable link during the transition from DSP to SBIRS satellites. The Army continues to pursue these opportunities and challenges and to support all areas of TMD development and operations. Cooperation between the Army and the Navy continues to support both the JTAGS and M3P Programs via participation on review forums and joint operations for JTAGS tactical units. The JTAGS Product Office will also continue to support the Navy in evaluating sea-based variants of JTAGS for use on ships and provide integration of JTAGS data and messages to remote processors and theater tactical operation centers throughout the world.

Conclusion

JTAGS is a proven joint Service model of development and utilization across many mission areas providing a "system of ground processors for all Services." The basic JTAGS (supported by DSP satellites) and the next generation of M3Ps (to be supported by SBIRS satellites) have significantly reduced total costs of ownership for mobile ground processors in use throughout the world. These processors, originating from an Army ACAT III Program, are now serving as the baseline for other Service ACAT ID ground processors involving tri-Service coordination and integration. JTAGS is truly a meaningful example of joint Service cooperative efforts at their finest.

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LTC DONALD A. GUTKNECHT, the Deputy Director of the JTAGS Product Office, is a graduate of the Army Command and General Staff College and the Defense Systems Management College. He also holds a B.S. degree from the University of Wisconsin-LaCrosse and an M.B.A. from Middle Tennessee State University.

Secretary Of The Army Awards Presented . . .

ARMY CONVENES 1998 CONTRACTING CONFERENCE

Sandra R. Marks,
Army RD&A Staff

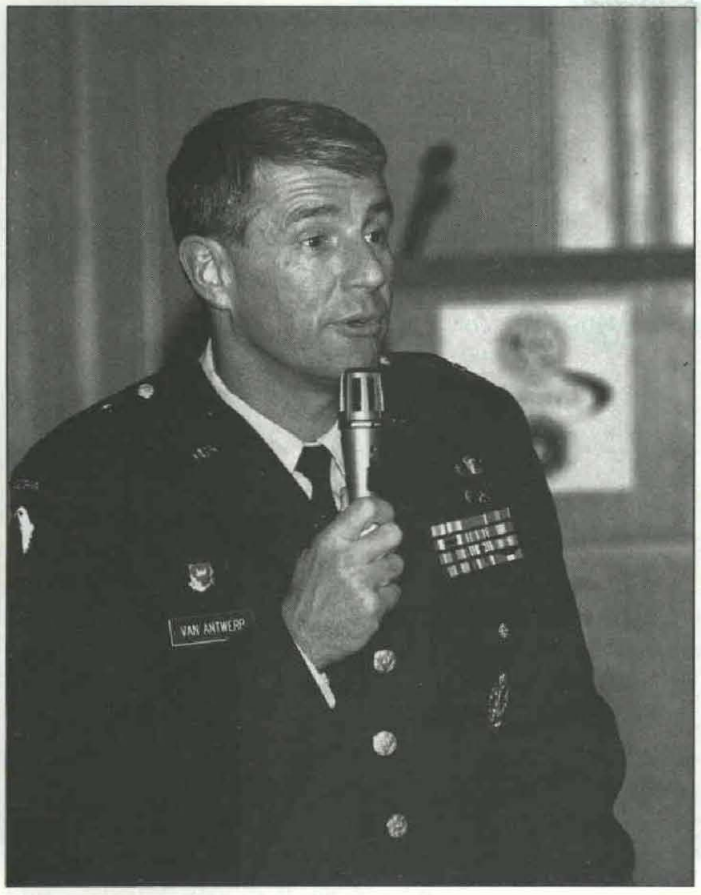
Referencing the Army Acquisition Vision "... to continuously innovate and improve processes to get the latest and best technology, goods and services, on time and at the lowest cost for our Soldiers," Dr. Kenneth J. Oscar, Deputy Assistant Secretary of the Army for Procurement, opened the 1998 Army Contracting Conference held Dec. 13-15, 1998, in Arlington, VA. The conference, which formally convened Dec. 14, included a contracting workshop comprised of the Principal Assistants Responsible for Contracting (PARCs) and a Contracting and Acquisition Career Program Advisory Council (CACPAC) workshop. Collectively, these workshops provided a forum for the discussion of key issues impacting the contracting community. The conference was highlighted by a Secretary of the Army Awards for Excellence in Contracting luncheon ceremony, which was held to honor individuals, units and teams for contracting accomplishments. (See accompanying article on Page 26.)

The conference agenda reflected recent accomplishments and future efforts needed to support the soldier and the nation in the 21st century. Opening day activities included briefings by several members of the Army acquisition leadership on current issues affecting the Army contracting community. Distinguished speakers included MG R.L. "Van" VanAntwerp, then Director for Competitive Sourcing, HQDA, who addressed the issue of competitive sourcing and privatization. He noted that in the absence of common guidelines, several commands—including the U.S. Army Training and Doctrine Command (TRADOC)—have tailored their own approach to implement outsourcing. For example, acquisition planning and source selection are being done at installations other than where the competitive sourcing process is taking place. Other commands are doing it at individual installations. He also addressed the issue of small disadvantaged business opportunities.

Esther Morse, a Senior Procurement Analyst in the Office of the Assistant Secretary of the Army (Research, Development and Acquisition) (OASARDA) and Army Policy Member on the Defense Acquisition Regulations (DAR) Council, examined trends and issues in procurement policies found in current updates to the Federal Acquisition Regulations (FAR) and the Defense Federal Acquisition Regulations System (DFARS). She also identified key players in the DAR System, outlining the acquisition rulemaking process by concentrating on individual and agency recommendations recently submitted for potential incorporation into the FAR System. In addition, Morse provided a legislative update. Language was recently incorporated into the FAR that more clearly defines year 2000 compliance regarding nonstandard warranty clauses and certifications. Other issues Morse addressed were contract bundling, modular contracting, very small business concerns, and contracting for commercial construction.

Morse identified 4 FAR cases and 13 DFARS cases currently being addressed by the DAR Council in connection with FY99 Department of Defense (DOD) Appropriation and Authorization Acts. Shortly, the FAR cases are expected to result in some proposed new rules. The DFARS cases are primarily cleanup actions. Relative to upcoming legislation, five major areas were identified: civil/military integration, the international arena, the small business arena, multiple award task order contracts, and other transactions where Congress will assess how DOD has used its discretionary authority and determine whether to extend it. Today, Morse says, industry plays a greater role than ever before in the FAR process.

LTC(P) (now COL) Bill Phillips, Director, Information Management and Assessment, Office of the Deputy Assistant Secretary of the Army (Procurement) (ODASAP), gave an update on the Army's effort to eliminate paper transactions within the Army contracting process by Oct. 31, 1999. One of the ongoing processes Phillips addressed was the Standard Procurement System (SPS), an electronic method of requirements handoff and contract closeout that features electronic commerce and electronic filing capabilities, document



MG R.L. "Van" VanAntwerp.

Dr. Kenneth J. Oscar.

routing, and access to all the library tools and electronic forms required by a contract specialist or contracting office. Phillips credits much of the Army's success with SPS to the accomplishments of the Space and Missile Defense Command (SMDC); U.S. Army, Pacific; the U.S. Army Medical Command; and TRADOC. For example, in the fall of 1998, SMDC became the first DOD organization to declare full operational capability with SPS, and firmly established the Army as the leading Service in the race to paperless contracting.

COL Robert Brown, Director, Acquisition Reform, ODASAP, discussed the importance of acquisition reform and how it fits into the continuous improvement philosophy. In referencing several current initiatives and goals, Brown noted that the pace of technology will drive us to do business differently in the future. As these enabling technologies develop during the next few years, the challenge to the acquisition community, he said, will be to capitalize on them. Brown was joined by two members of his acquisition team, Gregory Doyle and Geneva Halloran, both from ODASAP. Doyle outlined current legislative and executive branch acquisition reform initiatives. Acquisition reform is real, and the Army leadership understands that it must respond to the needs of the people in the field, said Doyle. Halloran outlined the current Procurement Management Assistance Program (PMAP) within the Army to lend field problem-solving assistance on reform initiatives.

Carol E. Lowman, Staff Member, PARC Office, Forces Command (FORSCOM), presented an overview on FORSCOM's efforts in market research training. Lessons learned from the field during contract management reviews indicate that much of the market research being done is often insufficient and unfocused. In response to requests for market research training, the proliferation of technology such as the Internet, and databases that have provided tools to improve market research, FORSCOM developed a course to teach the Acquisition Workforce how to use market research to explore the marketplace and make smart decisions about the goods and services needed by FORSCOM.

Dr. James H. Edgar, Director, Contracting Career Program Office, ODASAP, led off the CACPAC workshop with a discussion of change management and a new transformational leadership paradigm to ensure that Army contracting continues to deliver quality service in the 21st century. The Army contracting mission is growing in importance and the CACPAC must articulate a strategic vision for the contracting community. The contracting community's role is also changing, Edgar said, and it should not be viewed as just another part of the organizational structure. Edgar added that contracting is a strategic force multiplier for the military, particularly as the Army continues to commercialize and privatize. The CACPAC needs to give our professional workforce the tools they need to meet this challenge.

Edgar concluded with an analysis of

current efforts to apply Defense Reform Initiative Directive 20 (DRID-20), Review of Inherently Governmental Functions, as a baseline to ensure that each manpower authorization in the DOD has both a function code and a reason code. He emphasized the Army's position that contracting is an inherently governmental function.

Keith Charles, the Deputy Assistant Secretary of the Army (Plans, Programs and Policy) and the Deputy Director for Acquisition Career Management (DDACM), OASARDA, discussed the proactive agenda advocated in the career development arena. He outlined the latest career development initiatives of the Army Acquisition Corps such as the Naval Postgraduate School Regional Program For Civilians, offering an M.S. in program management; Civilian Training With Industry; a modified Corps Eligible (CE) Program now open to all qualified civilian Army employees regardless of grade; a modified Competitive Development Group Program to include GS-12 and -13 CE applicants; and more far-reaching operational experience assignments to allow the civilian workforce better opportunities to see what the real Army does.

Charles re-examined the continuing importance of completing Acquisition Civilian Record Briefs (ACRBs) and Individual Development Plans (IDPs). These documents help acquisition career management personnel establish the types of training, education, and experience necessary for the Acquisition Workforce to succeed. In summarizing future goals, Charles called for a "common language" in the civilian structure to link functions such as contracting, resource management, program management, logistics, and quality assurance.

MAJ Mike Williamson, Chief, Information Technology and Analysis, Acquisition Career Management Office, OASARDA, briefed on the relationship of ACRBs to IDPs and how they help identify skills sets of the population available to fill position requirements. Additional briefings were presented by Don Tucker, Procurement Analyst in charge of the Competitive Professional Development (CPD) Program, HQDA, and by Tom Crean, President, Defense Acquisition University. Tucker called the CP-14 CPD Program one of the best-kept secrets in Army contracting and one of the least utilized. Tucker outlined several outstanding professional development opportunities, including university

Esther Morse.

training, developmental assignments, Training With Industry, acquisition reform training, and management/executive training.

Edgar supplemented Tucker's briefing with mention of other long-term training initiatives: the Sloan MIT Fellows Program, the Army Congressional Fellowship Program, and the Secretary of the Army Research Fellowship.

In his briefing, Crean detailed specifics on a pilot offering of a new executive education program at the Darden Graduate School of Business, University of Virginia, intended to provide insights on how cutting-edge business practices

LTC(P) (now COL) Bill Phillips.

will affect the way the Army does business in the 21st century.

Edgar concluded the day's presentations underscoring the need to understand the CP-14 Strategic Plan and professional development models. He outlined the strategic planning framework and spoke about goal setting, planning strategies, and instituting action.

The concluding day of the conference was highlighted by six working groups that examined major issues and problem areas. Inspired by Dr. Oscar's appeal to provide conferees with feedback and recommendations to key issues of concern, the workgroups were the Professional Development Committee (PDC), the Program Effectiveness Committee (PEC), the Army Civilian Career Evaluation System (ACCES) Re-Engineering Process Action Team (PAT), the CP-14 Intern Re-Engineering PAT, the FA97 Status/Issues working group, and the Acquisition Reform Advocates working group.

Prior to outbriefs by working group leaders, Director of Defense Procurement Eleanor Spector presented the keynote address at the concluding day's luncheon. Introduced by Oscar as a "true expert in contracting," Spector concentrated on current goals and initiatives her organization is undertaking that may translate into policy beneficial to the workforce. Spector specifically urged successful deployment of the SPS with the ultimate goal of a paperless contracting system. The government purchase card has been a revolution in the way we buy, Spector said, urging its expanded use. Spector advocated removing barriers to participation by traditionally non-DOD commercial suppliers in DOD procurement, facilitation of international cooperation and competition in DOD procurement, and the reduction in the administrative burden often associated with doing business with the government. In acknowledging the inundation of reforms in the last several years, Spector called for expanded training of the procurement workforce to take advantage of the flexibility permitted by acquisition reforms. She also urged government teaming with the private sector in development of procurement regulations, and ensuring that regulations encourage greater participation of small, disadvantaged businesses. Spector praised the DOD procurement workforce as the fairest, best-trained contracting workforce in the world.

Eleanor Spector.

Keith Charles.

Afternoon working group outbriefs began with Principal Assistant Responsible for Contracting at the U.S. Army Communications-Electronics Command Ed Elgart speaking on behalf of the PDC. Elgart discussed an array of training opportunities that may be useful in formulating professional development plans. These include cross-functional training with other agencies, more commercially oriented broad-based training programs, university training, partnering with industry, certification training, and leadership training.

Mark Lumer, Principal Assistant Responsible for Contracting at the Army Materiel Command (AMC), spoke on behalf of the PEC. He warned about some of the deficiencies in current databases. He noted that inaccurate and missing data have created gaps in the ability to define the workforce and develop recommendations or validate performance goals.

Steve Bachhuber, Principal Assistant Responsible for Contracting, Defense Supply Service-Washington, addressed the current perception that the ACCES is outdated and inadequate for today's career program needs. It is felt that an alternative or replacement system is needed that provides a vacancy announcement system, an employee registration system, and a referral module or component. The ACCES PAT will conduct a comprehensive review of existing central referral programs and recommend policies, procedures, and goals for matters relating to vacancy announcements, position availability postings, and a registration and referral program for CP-14.

Emily Clark, Procurement Analyst at HQ AMC, outbriefed on the concerns about the CP-14 Intern Program. Clark noted that as the Army continues to downsize and age, it is imperative that an effective intern program be maintained that brings well-educated and motivated individuals into the contracting career field. Her PAT plans to address the types of incentives needed to retain interns and how best to advertise positions to reduce competition from industry and other agencies once they complete career programs.

COL Ed Cerutti, Director of the Acquisition Career Management Office, addressed several FA97 issues including command opportunities, contingency contracting, the Officer Personnel Management System for the 21st century, and low O-6 retention rates. Contingency contracting, Cerutti said, is a tremendous success story for the Army.

Gregory Doyle, OASARDA, reported on his group's discussion about acquisition reform advocacy. The group concluded that there is a need to better define what acquisition advocacy means and improve field level input into acquisition reform initiatives. There is also a continuing need for strong leadership to make acquisition reform an integrated Army initiative, not just a contracting or an acquisition reform initiative. The acquisition reform vision, as viewed by Doyle's working group, is to build an advocacy network, through cross-functional training, cross-functional awareness, and teaming.

In his closing remarks, Oscar noted the increased recognition of the Army's contracting people and contracting function. In particular, Oscar cited the presentation of Secretary of the Army awards, greater awareness of contingency contracting, and getting sergeants involved in this career field as part of the continuing "campaign" to increase knowledge of the importance of Army contracting. In addition, training and career development initiatives will help improve the professionalism of the contracting workforce. Relative to issues addressed in the breakout sessions, Oscar complimented the Army for its efforts in paperless contracting, calling it "the wave of the future." He called for prioritization of continued long-range training initiatives and urged the use of database information to conduct analyses. Oscar said automation will not only make the Army more efficient, but will reduce the bill paid to the Defense Finance and Accounting Service.

Finally, Oscar stated that the conference helped reinforce the notion that HQDA should not develop policies and reforms in a vacuum. Rather, the Army should gather valuable input from numerous sources such as electronic mail from the field, conferences, and integrated product teams. He termed the conference a tremendous success and thanked all attendees for their participation and enthusiasm.

SECRETARY OF THE ARMY PRESENTS AWARDS FOR EXCELLENCE IN CONTRACTING

Sandra R. Marks,
Army RD&A Staff

Presentation of Secretary of the Army Awards for Excellence in Contracting highlighted the 1998 Army Contracting Conference Dec. 13-15 in Arlington, VA. The awards luncheon, held Dec. 14 to honor units, teams, and individuals for outstanding contracting accomplishments during FY97, was hosted by Dr. Kenneth J. Oscar, Deputy Assistant Secretary of the Army for Procurement, and featured a keynote address by Secretary of the Army Louis Caldera. Caldera praised current acquisition reform efforts and the contributions made by the award winners to their various organizations. "Today's awardees are public servants who have given much of themselves for the benefit of others. They put in long hours, persisted in overcoming obstacles, and found creative solutions to complex problems—all for the benefit of our Army and our nation," Caldera said.

Background

The Secretary of the Army Awards for Excellence in Contracting Program was established in 1997 to recognize outstanding contracting accomplishments. Units, teams, and individuals may be nominated for consideration. An explanation of the award categories and a list of the award recipients and their achievements follow.

Editor's Note: Several of the award recipients listed in this article are no longer serving at the organizations indicated.

Unit/Team Awards

There are three categories of unit awards: *Installation-Level Contracting Unit, Systems Contracting Unit, and Specialized Contracting Unit.* Criteria for nomination for all three include demonstrated customer support, reducing contracting costs, human resource management including certification of the workforce and personnel training, and contracting innovation and process improvement including implementation of acquisition reform and streamlining/ reducing cycle times and nonvalue added processes.

Installation-Level Contracting Unit. Awards in this category are divided into two subcategories: outstanding installation-level contracting centers and installation-level contracting satellites.

Unit/Team Award For Installation-Level Contracting Center

Army Atlanta Contracting Center, U.S. Army Forces Command was recognized for demonstrated customer focus and reduced contracting costs.

Unit/Team Award For Installation-Level Contracting Satellite

Fort Campbell Kentucky's Directorate of Contracting, U.S. Army Forces Command was recognized for its mission accomplishment, customer support, and contracting efficiency.

Systems Contracting Unit. This category applies to contracting organizations or teams that support systems acquisition. This may include support to program and project managers in program executive offices or major subordinate commands of the Army Materiel Command, Army Space and Missile Defense Command, and the Army Medical Research and Materiel Command.

Unit/Team Award For Systems Contracting

The 2.75" HYDRA Rocket Acquisition Team, Industrial Operations Command, U.S. Army Materiel Command was recognized for its open and innovative approach to contracting for the HYDRA Rocket System, which resulted in notable program success. Team members are Richard Burns, Marshall Collins, Julie Coughlin, Sandra Crisp, Mark Haldeman, Wanda Malvik, Pat Martel, Charles Smith, and Chris Thompson.

Specialized Contracting Unit. This category applies to buying offices or teams with a primary mission to provide unique support in other than installation-level or systems contracting. It can include contracting in support of science and technology (S&T) programs, command or Armywide support functions such as transportation services, construction performed by the Army Corps of Engineers, or organizations with a mission to buy nonstandard supplies and services.

Unit/Team Award For Specialized Contracting

The Defense Travel System Contracting Team, Military Traffic Management Command was commended for exceptional performance of duties in support to the DOD Re-engineering Travel Transition Initiative. Team members are Francis A. Giordano, LTC Phyllis R. Cokley (U.S. Air Force), Kathleen T. Love, Carol J. Byrd, Joyce Grudzinski, Jacqueline C. Woodson, Douglas W. Packard, Susan Staats, Lauris Eek III, Anwar Ali, Daniel Carstens, Lexine V. Arthur, Norma Sue Kinsey, Mary Ann Weber, Unhui Young, Misuk Cox, and Cathy Golden.

Outstanding Contracting Officers

A total of 10 awards may be presented in this category including outstanding contracting officer for each of the four unit levels to include both centers and satellites. There are also two awards for outstanding contingency contracting officer (military and civilian). This applies to contracting officers assigned to deployable contracting positions or to those deployed in support of an operation during the fiscal year. Performance by both military and civilian contracting officers is recognized in each category. Individual achievement is considered for all awards. Criteria include timeliness and quality of customer support, procurement integrity, innovation and entrepreneurship, and self-development. In addition, integration of contracting into the logistics

requirement process is considered for contingency contracting officers.

Outstanding Contracting Officer (Civilian) At Installation-Level Center
Regina K. Miller, Chief, Acquisition Division, Directorate of Contracting, Army Forces Command, Fort Drum, NY, for commitment and dedication to timeliness and quality of customer support, procurement integrity, innovation, and entrepreneurship.

Outstanding Contracting Officer (Military) At Installation-Level Center
SFC Jerry A. Bost, Fort Hood Directorate of Contracting, Army Forces Command, was recognized for demonstrated exceptional customer support and selfless service in daily operations.

Outstanding Contracting Officer (Civilian) At Installation-Level Satellite
James M. Mack, Contracting Specialist, Osan Contracting Office, U.S. Army Contracting Command Korea, was recognized for extraordinary initiative, innovation, and consistent exercise of sound business practices, which greatly enhanced customer satisfaction.

Outstanding Contracting Officer (Military) At Installation-Level Satellite
MAJ Yewston N. Myers III, Chief, Osan Contracting Office, U.S. Army Contracting Command Korea, was praised for superb leadership, which helped the Osan Contracting Office set the standard for efficiency, innovation, and customer satisfaction.

Outstanding Contracting Officer (Civilian) In Systems Contracting
Allen J. Hale, Chief, Small Arms and Aircraft Armament Division, U.S. Army Tank-automotive and Armaments Command, won the award for demonstrated excellence and professionalism in contracting. His contributions have allowed the U.S. Army to procure items better, faster, and cheaper for the soldier in the field.

Outstanding Contracting Officer (Military) In Systems Contracting
MAJ Sean P. O'Day, Competition Advocate, U.S. Army Soldier Systems Command, U.S. Army Materiel Command, was recognized for outstanding achievements in innovative acquisition planning and procurement policy improvement as a Contracting Officer.

Outstanding Contracting Officer (Civilian) In Specialized Contracting
Kevin Loesch, Contracting Officer, Army Communications-Electronics Command Acquisition Center, was cited for outstanding performance, dedication, innovation, competence and management.

Outstanding Contracting Officer (Military) In Specialized Contracting
LTC Russell A. Catalano, Supervisory Contract Specialist, U.S. Property and Fiscal Office, New York National Guard, received the award for innovative and exemplary management of resources, integrity, perseverance, and keen foresight related to his organization's contracting workload.

Outstanding Contracting Officer (Military) In Contingency Contracting
CPT(P) William M. Boruff, Contingency Contracting Officer, XVIII Airborne Corps, Fort Bragg, NC, U.S. Army Forces Command, was recognized for demonstrated customer support, innovation, initiative, and integration of contracting into the logistical requirement process.

Outstanding Contracting Officer (Civilian) In Contingency Contracting
Mark C. Coniglio, Contingency Contracting Officer, U.S. Army Contracting Command Korea, was praised for his innovation, dedication, and selfless support in obtaining supplies and services for customers.

Secretary Of The Army Professionalism In Contracting Award

One civilian and one military awardee may receive this honor. Criteria include achievements in support of mission accomplishment during the fiscal year, innovative solutions to contracting challenges, demonstrated professionalism during one's career, contributions to professionalism of others, and actions to improve the contracting profession.

Secretary Of The Army Professionalism In Contracting Award (Military)
MAJ Richard Catignani, Chief, Division Contingency Contracting Section, Directorate of Contracting, Army Forces Command, was cited for unequaled performance of duty while serving as the Chief of the 101st Airborne Division Contingency Contracting Section. His contributions include the establishment of FORSCOM's first consolidated Contingency Section at installation level and revitalization of Fort Campbell's unique Division Ordering Officer Training Program.

Secretary Of The Army Professionalism In Contracting Award (Civilian)
Toni M. Gaines, Chief, Contracting Division and Army Forces Command's Principal Assistant Responsible for Contracting, was recognized for selfless leadership in FORSCOM's contracting mission, innovation and enhancement of the contracting profession, and mentorship.

Defense Certificate Of Recognition For Acquisition Innovation

In addition to Secretary of the Army Awards for Excellence in Contracting, Defense Certificates of Recognition for Acquisition Innovation were presented. These awards recognize outstanding, innovative acquisition practices that improve acquisition and logistics support systems. The following individuals and teams were recognized:

Beverly Y. Thomas, Supervisory Procurement Analyst, Army Forces Command, was recognized for leadership and management related to effective use of high-performance teaming.

Michael R. Keleman, Deputy Director for Contract Operations and Business Management, Army Communications-Electronics Command Acquisition Center, was recognized for initiating training and educational programs that resulted in an extremely proficient, efficient, and professional workforce.

Ruth Anne Ijames, Chief, Contracting Division, Sacramento District, Army Corps of Engineers, was praised for her initiative in providing emergency contracting support for the repair of flood damaged control levees in northern and central California and Nevada, and for significantly improving contracting professionalism in her organization.

John A. Culmer, Adminstrative Contracting Officer Team and Leader, Contract Administration Branch, U.S. Army Contracting Command Korea, was credited with demonstrating superb contract administration skills on complex contracts, which supported the soldier and saved the government thousands of dollars.

Georg Hoesl, Contract Specialist, Chief of Construction Branch, Grafeuwoehr Regional Contracting Office, U.S. Army Contracting Command Europe, was recognized for outstanding management and implementation of acquisition reform efforts, which has increased productivity and customer support.

Carol C. Rivard, Senior Contract Specialist, Artillery and Mortar Division, Armament and Chemical Acquisition and Logistics Activity, Rock Island, IL, was credited for efforts in reducing contracting and production lead times in the acquisition of critical spares to support the M119 Howitzer, the M198 Howitzer, and various mortar systems.

LTC Daniel J. Gallagher, Chief, Joint Contracting Center Croatia, was recognized for remarkable performance in support of Operation Joint Endeavor.

MAJ Mark A. Hicks, Headquarters and Headquarters Company, Division Support Command, Fort Drum, NY, Army Forces Command, was recognized for outstanding work as the Deputy Chief of Contracting in the unique environment of Qatar. His ingenuity, selfless service, and tireless efforts provided remarkable contracting support.

Neill G. Krost, Chief, Construction and Overhaul Branch, Contract Operations Division, U.S. Army Contracting Command Korea, was recognized for developing innovative techniques used in electronic contracting and best value source selection to streamline the contracting process. (*Note: Krost was not present at the awards ceremony.*)

Principal Assistant Responsible for Contracting (PARC), U.S. Army Forces Command was recognized for self-directed professionalism, acquisition expertise and innovative synergy to carry FORSCOM contracting and the U.S. Army into the 21st century.

U.S. Army Contracting Command Korea was cited for developing a superb program for electronic contracting that greatly increased efficiency, expanded competition, and saved millions of dollars.

Directorate of Contracting, Fort Drum, NY, was recognized for delivering timely, quality and professional support to all its customers.

Directorate of Contracting, Fort Sill, OK, was recognized for providing consistently outstanding mission support and service to its customers through innovative contracting initiatives and dedicated professionalism.

Huntsville Energy Savings Performance Contracting Team, Army Engineering and Support Center, U.S. Army Corps of Engineers was recognized for developing innovative multiyear indefinite delivery/ indefinite quantity contracts for energy conservation projects.

Medical Acquisition Team, U.S. Army Engineering and Support Center, U.S. Army Corps of Engineers was credited with providing remarkable support to the Army and Air Force Surgeons General in the delivery of unique fast-track facility support and complex medical equipment.

Defense Supply Service – Washington (DSS-W) was recognized for outstanding and innovative contracting service and customer support in a complex and demanding environment, and for implementing acquisition reform initiatives.

Defense Acquisition Executive Certificate Of Achievement

This award recognizes individuals, groups, and teams that have made exceptional contributions to impacting life-cycle costs and/or the acquisition process through innovative management techniques.

The Regional Contracting Office Seckenheim was recognized for establishing the Customer, Contracting and Commerce (C3) process. **Bill Mysliwiec, Steve Potoski, and Ron Tudor** were specifically cited for creating and successfully implementing the new C3 process that has resulted in increased contracting efficiency, reduced contracting costs, improved human resource management, and enhanced customer support.

EXCELLENCE IN CONTRACTING AWARD RECIPIENTS

Editorial Note: Shown on the extreme left and extreme right of each photo below are Secretary of the Army Louis Caldera (left) and Deputy Assistant Secretary of the Army (Procurement) Dr. Kenneth J. Oscar. The photos show recipients of Secretary of the Army Awards for Excellence in Contracting and their sponsors.

UNIT/ TEAM AWARDS

Recipient Ron Howell and Sponsor MG Robert D. Shadley. (Howell accepted the award on behalf of the Army Atlanta Contracting Center, U.S. Army Forces Command.)

Recipient Carl Heckmann and Sponsor MG Robert D. Shadley. (Heckmann accepted the award on behalf of Fort Campbell Kentucky's Directorate of Contracting, U.S. Army Forces Command.)

Recipient MAJ Dennis Bateman and Sponsor Sandra S. Crisp. (Bateman accepted the award on behalf of the 2.75" HYDRA Rocket Acquisition Team, Industrial Operations Command, U.S. Army Materiel Command.)

Recipient Francis A. Giordano and Sponsor LTC Brenda R. Jackson-Sewell (U.S. Air Force). (Giordano accepted the award on behalf of the Defense Travel System Contracting Team, Military Traffic Management Command.)

Individual Awards

Recipient Regina K. Miller and Sponsor MG Robert D. Shadley.

Recipient SFC Jerry A. Bost and Sponsor MG Robert D. Shadley.

Recipient James M. Mack and Sponsor LTC John A. Econom.

Recipient MAJ Yewston N. Myers III and Sponsor LTC John A. Econom.

Recipient Allen J. Hale and Sponsor MG Roy Beauchamp.

Recipient MAJ Sean P. O'Day and Sponsor Cheryl A. DeLuca.

Recipient Kevin Loesch and Sponsor Edward G. Elgart.

Recipient LTC Russell A. Catalano and Sponsor Dr. Thomas H. Kennedy.

Recipient CPT(P) William M. Boruff and Sponsor MG Robert D. Shadley.

Recipient Mark C. Coniglio and Sponsor MAJ Michael E. Schaller.

Recipient MAJ Richard Catignani and Sponsor MG Robert D. Shadley.

Recipient Toni M. Gaines and Sponsor MG Robert D. Shadley.

FORSCOM CONTINGENCY CONTRACTING WORKSHOP

LTC John L. Clemons and
CPT Jeffrey Peters

Introduction

The 1998 U.S. Army Forces Command (FORSCOM) Contingency Contracting Workshop was held late last year at Fort Bragg, NC.

An annual event, the workshop was hosted by the XVIII Airborne Corps Contingency Contracting Section, which is headed by LTC George Slagle. The purpose was to develop a plan for supporting FORSCOM's contingency contracting (CC) mission in FY99 and to discuss the latest changes in CC. Attendees included personnel from FORSCOM; U.S. Army Pacific Command (USARPAC); Third Army; Office of the Assistant Secretary of the Army for Research, Development and Acquisition (OASARDA); and the Total Army Personnel Command's (PERSCOM's) Acquisition Management Branch.

Support For The 21st Century

The keynote speaker was LTG Paul J. Kern, the Military Deputy to the Assistant Secretary of the Army for Research, Development and Acquisition, and the Director of the Army Acquisition Corps. He discussed CC support for the 21st century, and emphasized the Army's acquisition vision:

"A dynamic organization which provides the warfighter affordable world-class weapon systems and services years before any adversary can acquire comparable technological capability. Systems are continuously modernized and the cost of ownership drastically reduced each year. Quality people, teamwork and caring leadership are the heart of the Army acquisition organization."

Kern also talked about the changing geostrategic environment and how the Army Acquisition Workforce (AAW) will meet these changes. Military contracting needs, said Kern, are being tailored for an increase in deployments and to support operations other than war. He added that a continuous transformation is needed for contracting to remain relevant in the ever-changing strategic environment. For example, the power projection Army of today is moving to the flexible Army of the 21st century and the Army After Next (AAN). The AAN, he noted, will be more lethal, have greater mobility and agility, and will sustain fewer casualties than today's Army. This, he said, will be accomplished by investing today for tomorrow's capabilities, thereby creating an adaptable and logistically unencumbered support base for tomorrow's forces.

Kern emphasized that the initiative to include noncommissioned officers (NCOs), warrant officers, civilians, and supporting Reservists in the contracting pool will increase the number of available contingency contracting personnel.

Kern also discussed plans for developing a contracting Military Occupational Specialty for NCOs (E5-E9), and the assignment of either a Skill Qualification Identifier or Additional Skill Identifier (ASI) for both warrant officers and NCOs. In addition, he addressed the new doctrine for the contracting community, *Contracting on the Battlefield* (FM 100-10-XX). (At the time this article was written, this doctrine was scheduled for release in December 1998.) Kern concluded his remarks by stating that the AAW must understand the Army's vision of the future, focus on supporting the warfighter, understand acquisition, create major changes, and make a difference. The bottom line, he said, is "Soldiers are our customers."

FORSCOM's Perspective

LTC John L. Clemons, a member of the Principal Assistant Responsible for Contracting (PARC) staff, provided FORSCOM's perspective on contingency contracting and presented an overview of FORSCOM's mission, current concerns, operational procedures, organizations, and operational tempo (OPTEMPO). Major areas that drew the interest of the attendees were OPTEMPO, ASIs for NCOs, and the future of the Command Designated Position List (CDPL) command positions for FORSCOM contracting officers.

OPTEMPO, according to Clemons, continues to be high at FORSCOM. In fact, contingency contracting officers are deployed for nearly every operation involving troops. In many cases, said Clemons, CC personnel finish one deployment, and then turn around and deploy again. Thus, he noted, the need for warranted contracting personnel is high. Relative to the role of NCOs, Clemons noted that they can assist in decreasing the deployment frequency, adding that since May 1998, the new ASI G1 is available for NCOs who have completed the CON 101, CON 104 and CON 234 courses.

FORSCOM continues to lead the Army in contingency contracting, providing the commanders of today, and the future, with critical and vital contracting support.

Clemons also discussed the limited number of lieutenant colonel command positions within the Army. Contracting command positions have been approved for Fort Irwin, CA; Fort Hood, TX; and the Wiesbaden, Germany, Regional Contracting Center; and additional lieutenant colonel command positions are being sought for locations within and outside the continental United States.

COL Charles J. Guta, the FORSCOM PARC, conducted a round-table discussion on FORSCOM initiatives that will impact all contingency contracting officers. These initiatives include CDPL commands for Fort Hood and Fort Irwin, new doctrine release, and centralization of the CC authority with decentralized execution. Guta plans to keep CC on the front burner.

Current And Proposed Doctrine

A recurring topic of discussion during the workshop was the need for contracting doctrine. The lack of a usable doctrine hinders the supported commander's understanding of what contracting personnel can do to become the force multipliers for their operation. LTC Scott Risser, OASARDA, briefed the current concept for CC doctrine. The proposed doctrine, he said, addresses echelons above corps from two primary scenarios—the Army Service Component Command and the Theater Support Command. He also discussed the effort to physically move contracting officers to corps installations versus consolidating the CC control or authority at corps and decentralizing the execution at division levels and below. The draft doctrine currently has the CC function centralized at corps level, giving the corps responsibility for providing resources to accomplish the CC mission. Most workshop participants agreed that many of the current challenges facing CC would be eased or eliminated by establishing and publishing usable doctrine.

Other Workshop Briefings

MAJ Phil Yacovoni, Acquisition Career Management Office Functional Area 97 Proponency Officer, discussed the leadership development model that shows where officers enter the Acquisition Corps and their path to professional development. He also described the training and education required for the various levels of certification (levels I, II, and III), as well as educational opportunities. One additional topic Yacovoni addressed was the approval of NCO ASI G1 in May 1998. One of the main concerns NCOs expressed is their ability to permanently change stations (PCS) using the ASI. Most NCOs want to continue working in contracting at their next assignment but cannot currently do so because PERSCOM cannot cut PCS orders using the ASI. This is a major issue being addressed at the Department of the Army (DA) level. The ASI has been approved, however, and NCOs can now take the required Defense Acquisition University courses.

MAJ Steve Leisenring, from PERSCOM's Acquisition Management Branch, focused on the perception that contingency contracting officers are not favorably considered for lieutenant colonel command positions. Most contingency contracting officers have been told that CC positions are filled with the Army's best officers. However, according to Leisenring, many of the officers selected for command by the FY99 board had not served in a designated contingency contracting position. He also stated that the most important factor for any officer is "manner of performance." Officers, he said, should gain experience in all contracting areas, not just contingency contracting.

MAJ Jon Campbell, assigned to the U.S. Army, Pacific, provided an overview of USARPAC's mission and identified several major exercises or contingencies where USARPAC is involved. He also discussed the Standard Procurement System (SPS) for CC at USARPAC, adding that the Assistant Secretary of the Army for Research, Development and Acquisition has designated USARPAC as the proponent for testing the latest version of SPS. Campbell believes the SPS is a good, user-friendly system that enhances the contingency contracting officer's ability to do his or her job. The DA expects the release of a stand-alone version sometime in FY99.

Another workshop feature was the display of a deployment kit used by members of the XVIII Airborne Corps Contingency Contracting Section. The kit includes a wheeled carry-on size bag containing blank contracting forms, laptop computer, printer, cellular phone, scanner, hand-held radio, video camera, section manuals, and federal regulations. Contained in a bag, the kit allows an officer to set up a functioning contracting office upon arrival at his or her destination.

Conclusion

The workshop was termed a "huge success." In particular, participants were extremely encouraged by LTG Kern's efforts in continuing to provide support to the contingency contracting community. FORSCOM continues to lead the Army in contingency contracting, providing the commanders of today, and the future, with critical and vital contracting support.

LTC JOHN L. CLEMONS is Chief, Contract Operations Division for the PARC, Army Central Command (ARCENT), Atlanta, GA. He manages contingency contracting support for ARCENT's area of responsibility. He holds a B.A. degree from Albany State University and an M.S. degree from the University of Houston, TX.

CPT JEFFREY PETERS is a Contingency Contracting Officer and Team Leader with 1st Corps Support Command, XVIII Airborne Corps, Fort Bragg, NC. He has a B.S. degree from Iowa State University.

SPECIAL OPERATIONS FORCES AND THE ARMY'S TECHNOLOGY PROGRAM

Michael R. Miller

Introduction

In April 1987, the U.S. Special Operations Command (SOCOM) was established at MacDill Air Force Base, FL, and under U.S. Code, Title 10, was granted the authority to develop and acquire equipment, materiel, supplies, and services specific to Special Operations. In 1989, the Acting Secretary of Defense assigned Major Force Program 11 (MFP-11) Program Objective Memorandum and budget authority to SOCOM and, in 1992, the SOCOM appointed its first Special Operations Acquisition Executive (SOAE) to execute SOCOM's acquisition objectives and strategies. Today, SOCOM is one of nine unified commands reporting to the Secretary of Defense through the Chairman, Joint Chiefs of Staff. SOCOM's primary mission is to provide combat-ready Special Operations Forces (SOF) in peacetime and in war for theater combatant commanders, U.S. ambassadors and their country teams, and other government agencies.

SOCOM Strategy

Although the SOCOM Commander-in-Chief was given these unique responsibilities, congressional intent was to establish program authority with only limited funding and require the command to compete for non-MFP-11 resources from the Services' and other government agency technology programs. In 1992, congressional appropriations committees directed that SOCOM work with all research activities to ensure that Special Operations technology needs are considered in the development of their technology base programs. To this end, Congress reiterated that the unique missions of SOF require leading edge technology and, therefore, expected these research activities "to expend an appropriate amount of their technology base effort identifying and developing technologies that have Special Operations potential." While SOCOM has a Service-like responsibility for research, development, and acquisition, it is a user rather than a developer of technology, and does not have a dedicated laboratory structure as do the military departments. SOCOM's technology strategy is to monitor emerging technology relevant to SOF technology development objectives, and execute selected, high-priority projects to exploit emerging technology for near-term SOF application.

New Process

This article describes how the current U.S. Army Materiel Command—Field Assistance in Science and Technology (AMC-FAST) Science Advisor assigned to SOCOM, using congressional direction as general guidance and with the support of both the SOCOM Commander-in-Chief and the SOAE, initiated and executed a process that will assist SOCOM in fulfilling this congressional mandate. Through the efforts of the AMC-FAST Science Advisor assigned to SOCOM, a cooperative initiative has started, and is being institutionalized within both the Army research and development (R&D) community and SOCOM in pursuit of technologies of mutual value to both the Army and SOF. When fully institutionalized, this initiative should provide considerable benefit to both AMC and SOCOM as both organizations move into the 21st century faced with a declining R&D budget and an increase in soldier and materiel deployments throughout the world.

Implementation

In 1995 and 1996, the AMC-FAST Science Advisor worked on developing a process and a support structure for SOCOM to play a formal role in the Army's technology planning and development program. Efforts included the following:

- Establishing and coordinating operational criteria;
- Developing a methodology for SOF to use in their assessment of the value of the Army's technology projects or work packages for solving their materiel needs;
- Forming an assessment team comprised of representatives from the requirements, technology, and program executive office elements of the command, and operator representatives from each of SOCOM's four components;
- Establishing a point of contact at each Army organization to coordinate work package issues and scheduling; and
- Testing the process with two of the directorates in the Army Research Laboratory (ARL) to ensure that the key steps were executable and responsive.

For the criteria, a set of functional capabilities was established from capability needs contained in two SOCOM requirements reports, and then aligned with the command's 11 prioritized technology development objectives (TDOs). Some of the most relevant TDOs examined to date are individual survivability; sensors; mobility platforms; command, control, communications, computers, and

While SOCOM has a Service-like responsibility for research, development, and acquisition, it is a user rather than a developer of technology, and does not have a dedicated laboratory structure as do the military departments.

intelligence; and weapons and munitions. Each TDO contains 7 to 11 functional capabilities.

This concept was then briefed to the following senior leaders in the SOF and acquisition communities for their comments and concurrence: Commander-in-Chief, SOCOM; the SOAE; the Commanding General of the U.S. Army Special Operations Command; Office of the Deputy Assistant Secretary of the Army (Research and Technology); both the Principal Deputy for Technology and the Deputy Chief of Staff, Research, Development and Acquisition at AMC; and the Director of the ARL. All concurred with this effort and, in 1997, this process was successfully implemented within the Natick Research Development and Engineering (RD&E) Center and the four technology directorates of ARL: Human Research and Engineering (HR&E), Information Science and Technology (IS&T), Sensors and Electron Devices (S&ED), and Weapons and Materials Research (W&MR).

Project Assessment

The AMC-FAST Science Advisor then assessed the research projects of these organizations, identified those projects important for resolving SOF materiel shortcomings and, during March-June 1997, briefed the directors and staff of these organizations. The briefing covered the prioritized results of the assessment, a description of the methodology used in establishing the prioritization, the specific SOF capability that each of the identified projects will improve, and proposed new technology projects important to SOF that are currently not in the organizations' technology base program but are in their area of technical expertise. Some of the most important research projects SOF considered were S&ED's RF Imaging Technology, W&MR's Inertial Reticle Technology and Weapons Technology for Light Forces, IS&T's Protocol Specifications for Digital Communications on the Battlefield, HR&E's VR Research and Intelligent User Interfaces, and Natick RD&E Center's Airdrop Systems Technology. In addition, soldier improvement projects such as Countermeasures to Battlefield Sensors, Ballistic and Laser Eye Protection, Integrated Headgear, Warrior Performance and Endurance Enhancements, and future Warrior Technologies were highly rated. Of these 14 research projects, 5 are part of the Army's Science and Technology Objectives (STO) Program, and represent major technology advancements to the Army. In addition to these projects, the AMC-FAST Science Advisor identified to the senior staff of the above organizations approximately 35 additional Army projects that were of interest to SOF.

Future Actions

During meetings with these Army organizations, the AMC-FAST Science Advisor recommended numerous follow-on actions that will continue to strengthen this joint technology endeavor. These actions include formally identifying SOCOM as a proponent in the format of the highly rated research projects, describing this effort and its results in the Army Science and Technology Master Plan (ASTMP), developing potential transition strategies for these technologies, and working with the U.S. Army Training and Doctrine Command's Battle Labs and gaining their support for the projects most important to SOF and others.

Conclusion

While one of the principal goals of this initiative is to formally establish SOCOM's role in the Army's technology development planning, several other advantages will be gained through continued implementation of this process. For the Army, this effort provides the research community with a continual update of SOF missions and operational capability needs, as well as enhancing communications among the technology communities, increasing the customer base of select Army technologies, and increasing the potential for developing future partnership ventures. For SOCOM, the endeavor will help ensure that SOF forces will continue to operate with leading edge technology capabilities by keeping them informed of promising technology breakthroughs. Concurrently, this initiative is a key step in fulfilling the 1992 congressional mandate to leverage the Services' technology resources. A summary of this total effort is described in Annex F, Volume II, of the FY98 ASTMP.

MICHAEL R. MILLER was the AMC-FAST Science Advisor at the U.S. Special Operations Command when he wrote this article. He is now the Deputy Program Executive Officer for Special Programs at SOCOM. He holds a B.S. in mathematics, has completed graduate courses in operations research, and has authored approximately 35 technical reports.

IMPROVING VEHICLE SAFETY

Chuck Wullenjohn

Introduction

With a large number of personnel killed or injured in medium and heavy tactical vehicle accidents each year, truck safety is no laughing matter to the U.S. Army. In response, a concerted effort is being made to improve vehicle safety by installing or improving safety apparatus in truck cabs.

To address these concerns, personnel at U.S. Army Yuma Proving Ground have worked closely with engineers from Simula Technologies, Inc., of Phoenix, AZ, to characterize the conditions of typical vehicle accidents. Their intent is to generate scientific data that documents what occurs during an accident.

In August 1998, two tests involving the 22 1/2-ton Palletized Loading System (PLS) truck took place at Yuma Proving Ground's dynomometer course. The asphalt dyno course is one of 40-plus roadways designed for tracked and wheeled vehicles on the installation. The more than 200 miles of courses traverse nearly every type of terrain imaginable, from sandy valleys to craggy ridges.

Crash Testing

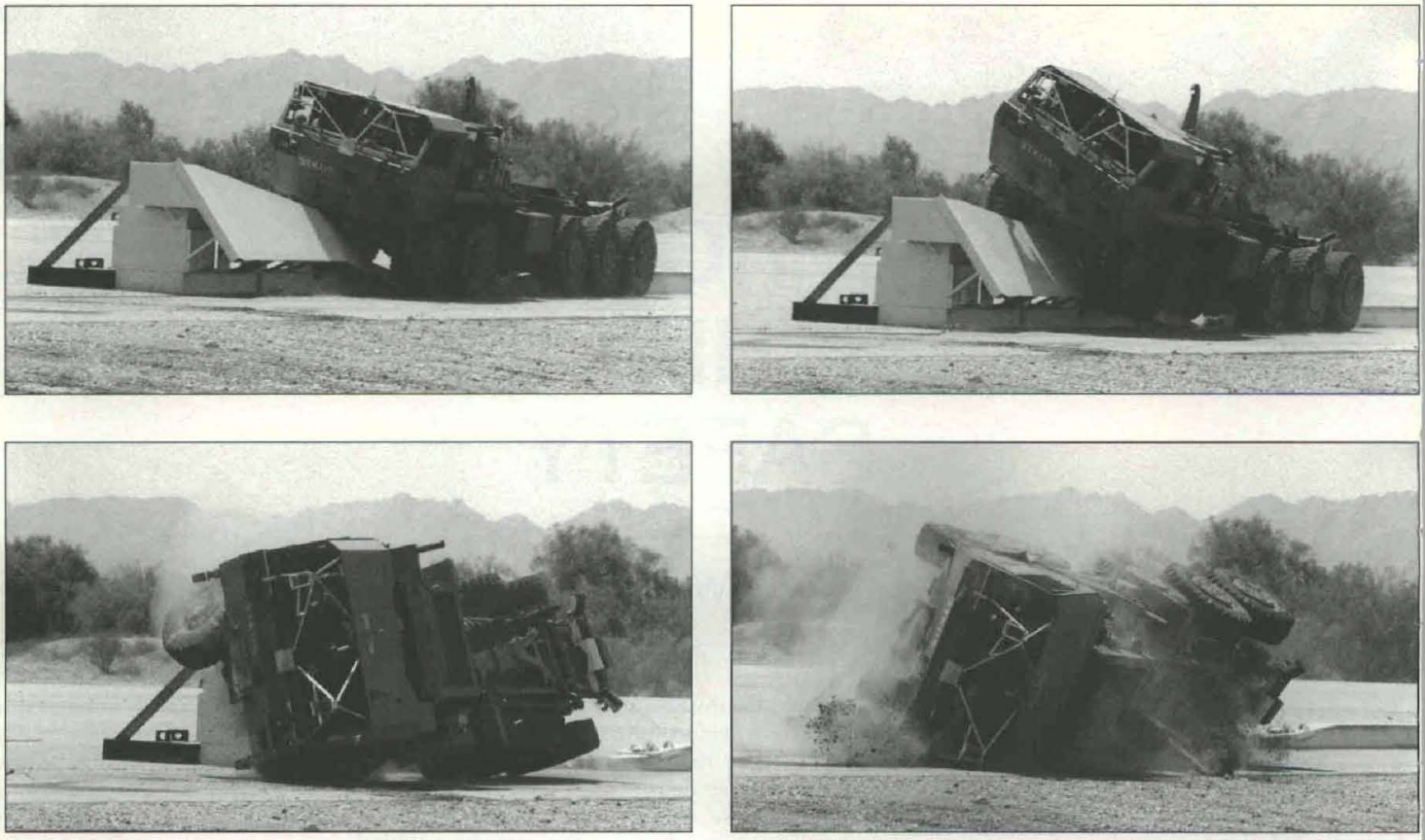
The first of the two tests required that a PLS truck be rolled over. This is not normally done intentionally, therefore, designing a ramp that would cause the system to roll over as it would in an actual accident was a particular challenge. Besides characterizing the accident, another purpose of the test was to validate the side-mounted air bag concept, which would dramatically enhance the safety of occupants.

"No one had ever done this before," said Al Kelley, a Team Leader in Yuma Proving Ground's Automotive Division. "The PLS is a very stable vehicle, so it was a real challenge to design a ramp that would roll the truck on its side realistically and consistently. We ended up devising a two-part 12,000-pound steel ramp with 10,000 additional pounds of ballast to hold it in place," he added.

A wide variety of sophisticated instruments were installed in the cab of the PLS prior to the test. These included accelerometers, position gyros, roll rate gyros, and displacement transducers. High-speed video and still cameras were positioned alongside the track and inside the vehicle to extract useful data as the test was taking place. Two internally instrumented crash test dummies, worth more than $60,000 each, occupied the driver and passenger sides of the truck's cab.

To conduct the test, the PLS truck was accelerated from a stop position along a 260-foot steel guide rail. When it reached 20 miles per hour (mph), it

With a large number of personnel killed or injured in medium and heavy tactical vehicle accidents each year, truck safety is no laughing matter to the U.S. Army.



Shown above is the PLS truck as it rolls over on a specially engineered ramp.

broke away from its towing apparatus and climbed the ramp, located on the right-hand side of the vehicle. After the PLS turned onto its side and ground to a halt, exuberant engineers and technicians descended upon it making notes and taking photographs. The hard data attained will be used to develop computer models for future rollover tests by simulation.

A second test on the PLS was conducted 2 days later. This time, the truck was accelerated to a speed of 24 mph and crashed into the back of a second, stationary PLS truck. The test was conducted strictly to characterize the effects of the crash—safety devices other than standard seatbelts were not involved. The same crash test dummies used in the earlier rollover were again strapped into their cab positions and a variety of data gathering devices and video cameras were mounted on the vehicle.

"We designed this to be a test that was survivable for the occupants, which is why the collision took place at 24 mph. The way it turned out, however, we may have been wrong," said Kelley.

Both dummies received major damage during the accident. The bed of the trailer of the stationary PLS lifted during the collision, crashing through the windshield of the oncoming truck. The cab was seriously damaged and the dashboard was crushed. If it had been real people, one person likely would have been killed and the other would have had major, life-threatening injuries.

Conclusion

"The value of these tests is that they ultimately will save lives. With safety modifications and enhancements to the PLS cab—elimination of angled corners, remounting of equipment in different areas, the installation of front and side air bags, that sort of thing—people could be able to walk away from accidents like this. It's a very worthwhile goal to shoot for," Kelley states.

Future crash tests involving other military systems are scheduled at U.S. Army Yuma Proving Ground. Within a few months, Kelley will begin working with Simula Technologies on crash tests of UH-1 Huey helicopters into bodies of water.

Kelley concludes, "I love to do this work. It's exciting, challenging and very interesting. I'm glad to be doing it, for it could very well save lives in the future."

CHUCK WULLENJOHN is the Public Affairs Officer at U.S. Army Yuma Proving Ground, AZ. He is a graduate of Humbolt State University, and has completed postgraduate courses at San Jose State University and Hayward State University. He is a frequent contributor to this magazine and other military publications. He is also an Active Reservist in the U.S. Coast Guard.

SENTINEL SYSTEM SOFTWARE CONVERSION

Figure 1.
Sentinel AN/MPQ-64 air defense radar.

LTC Tim R. McKaig,
Jerry Cox, and
Wes Wells

Introduction

The AN/MPQ-64 Sentinel, the Army's newest air defense radar (Figure 1), provides air track data to the forward-area air defense command and control network and cues short-range air defense weapons. The system's mission functions, maintenance functions, and external interfaces are controlled by software situated in the system's signal/data processor (SDP). The SDP consists of eight circuit card assemblies in a Versa Modular European chassis (Figure 2). The system's data processor is contained in a standard Navy UYK-44 circuit card assembly that executes most of the Sentinel system software. The UYK-44 and its executable software build onto early versions of the Army's AN/TPQ-36 Firefinder mortar-locating radar from which the Sentinel radar was derived. A program was initiated in 1997 to convert the Sentinel system software to C language, host the software on another circuit card assembly, and delete the UYK-44 from the system's configuration.

Objectives

The Sentinel System Software Conversion Program has two objectives: reduce Sentinel life-cycle costs, and achieve Joint Technical Architecture (JTA)–Army compliance. The Sentinel Product Office reviewed the program office estimate for the Sentinel system's life-cycle costs and identified the top 10 cost drivers. The biggest cost drivers were replenishment spares and repair parts, which constitute 19.5 percent of the Sentinel's life-cycle cost estimate. Another cost driver was contractor manufacturing, which constitutes 15.5 percent of life-cycle costs. By deleting the UYK-44, contractor manufacturing and replenishment spares and repair part costs will be reduced. Although not overall program cost drivers, costs associated with initial spares fielded with systems and software maintenance will also be reduced. Additionally, the system software conversion program affords Sentinel, which was initiated as a Non-Developmental Item Program in 1991, the opportunity to become JTA-Army compliant with respect to the system's data processor programming language, operating system, and interface protocols.

Approach

Currently, three Sentinel computer system configuration items (CSCIs) are executed by an application-specific integrated circuit processor residing on the UYK-44 circuit card assembly (CCA). These CSCIs, coded in the ULTRA-16 assembly language, include the Radar Operational Program (ROP), maintenance aids (MAIDS), and antenna transceiver group fault isolation test (ATGFIT). ROP is the heart of the Sentinel radar. It executes system control, beam scheduling, and target tracking and reporting functions. MAIDS and ATGFIT are off-line diagnostic CSCIs that support troubleshooting and maintenance. Under the Sentinel System Software Conversion Program, these CSCIs will be converted to C language and rehosted on a Motorola 68040 processor residing on another CCA in the SDP. Currently, this processor executes a fourth CSCI, the radar control terminal interface (RCTI). It is loaded at 14-percent memory usage and 5-percent computational throughput. When the other three CSCIs are cohosted with RCTI, it is projected to be loaded at 28-percent memory usage and 31-percent computational throughput.

Cost Reduction

Deleting the UYK-44 CCA will reduce the Sentinel contractor manufacturing unit cost $21,856 (FY98 constant). Of 208 systems planned for procurement, 62 have been procured with the UYK-44 in the system configuration. The remaining 146 systems not requiring the UYK-44 will provide a cost reduction of $3.6 million in contractor manufacturing. The UYK-44 deletion will also reduce Sentinel sustainment costs by eliminating the requirement for replenishment spares and repair parts associated with the CCA.

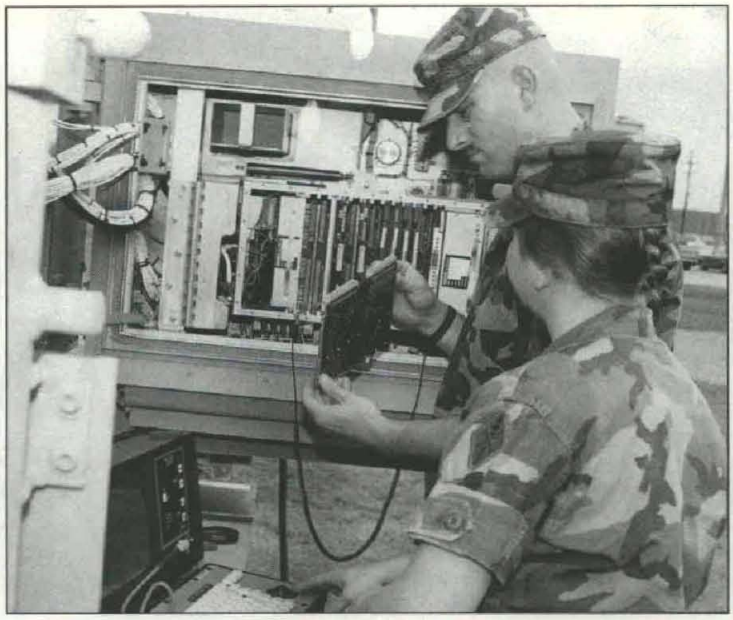


Figure 2. *Soldiers testing Sentinel signal/data processor circuit card assembly.*

The Sentinel cost estimate for replenishment spares and repair parts is calculated based on Department of the Army guidance for estimating consumable and depot reparable parts. Factors provided by the U.S. Army Aviation and Missile Command were used to construct a cost-estimating model. Based on a 20-year life cycle, the model projects a total reduction of $4.9 million in replenishment spares and repair parts attributable to the UYK-44 deletion.

Once all 208 systems are fielded, the annual cost reduction is projected to be approximately $250,000. An additional cost reduction will be realized from the deletion of the UYK-44 from the initial spares packages fielded with systems. Of 45 planned Sentinel fieldings, 11 will include UYK-44s in the initial spares packages. The remaining 34 fieldings will not require UYK-44s, which will yield an expected cost reduction of $855,900. The most significant cost reduction will be in software maintenance.

The conversion of the ULTRA-16 assembly language to C third generation language will result in a substantial reduction in the source lines of code (SLOC) currently being maintained. The reduction of SLOC is expected to decrease the software maintenance by 33 percent, which will provide an estimated $6.4 million cost reduction over the 20-year life cycle. The investment required to convert the Sentinel system software is $6.4 million; therefore, the net cost reduction for the program is projected to be $9.3 million.

JTA-Army Compliance

Sentinel's System Software Conversion Program moves the Sentinel system data processor into compliance with the JTA-Army standards related to programming languages, operating systems, and use of standardized interface protocols. The converted code will adhere to the ISO/IEC 9899 standard that defines C language. Compliance with ISO/IEC 9945, Portable Operating System Interface for Computer Environments (POSIX) standards, will be achieved by eliminating the contractor's proprietary operating system and replacing it with the commercial off-the-shelf (COTS) Vx Works operating system.

The Vx Works operating system, with its restricted POSIX-compliant library, will ensure that future rehosting of the Sentinel system software to new hardware can be made without software changes. JTA-Army compliance for interface protocols is being addressed by implementing standard COTS software drivers for Ethernet, asynchronous and synchronous links, and internal processor-to-processor communications interfaces.

Current Status

Sentinel's System Software Conversion Program is being executed in three tasks. Task 1, the conversion of central processor unit (CPU) independent code, is complete. Task 2, a trade study to determine which POSIX-compliant operating system should be used, examined two operating systems: Vx Works and LYNX. Based on contractor familiarity with Vx Works, the existence of a board support package for the 68040 CCA, and the operating system services required by Sentinel, Vx Works was selected. Task 3, the conversion of CPU-dependent code and integration and testing of the converted Sentinel system software, began in early 1998. Testing is almost exclusively simulation-based using a radio frequency target injection unit to simulate multiple targets flying several baseline scenarios. Task 3 is planned to be complete by mid-1999.

Conclusion

The Sentinel System Software Conversion Program supports two important Army acquisition initiatives: reduction of life-cycle costs and JTA-Army compliance. The program will delete 146 UYK-44 CCAs from systems to be procured and 34 from spares packages to be fielded with the systems. Additional cost reductions will be achieved by eliminating UYK-44 replenishment spares and repair parts and decreasing software maintenance. The program is expected to reduce Sentinel's 20-year life-cycle costs by $9.3 million. In addition, the program ensures that the Sentinel system data processor becomes JTA-Army compliant in several areas.

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WES WELLS was the Technical Director within the Sentinel Product Office when he wrote this article. He has a B.S. degree in electrical engineering from Auburn University.

MODERNIZATION FUNDING TRENDS: THE PAST AND THE FUTURE

LTG Ronald E. Adams,
Keith Charles,
and COL Houng Y. Soo

Editor's Note: At the end of the Program Budget Decision Cycle in December 1998, the Department of Defense provided Total Obligation Authority plus-ups to all the Services. The Army received more than $17 billion distributed across the Future Years Defense Program. More than $2.4 billion was allocated to modernization efforts, with the bulk of funds ($2.2 billion) distributed in FYs 04 and 05.

Introduction

The Department of the Army recently submitted to the Office of the Secretary of Defense (OSD) its FY00-05 Future Years Defense Program (FYDP). Difficult decisions were made by the Army to meet both near- and long-term readiness requirements in a constrained fiscal environment. The Army funded readiness, the Department of Defense's (DOD's) first priority, by distributing risk across all programs. More than $7 billion of projected modernization program content was reshaped. This will have a tremendous impact on all Army modernization programs. This article summarizes how the Army developed its FY00-05 FYDP, describes the Army Modernization Plan and how it will guide Army modernization into the 21st century, and reviews what current

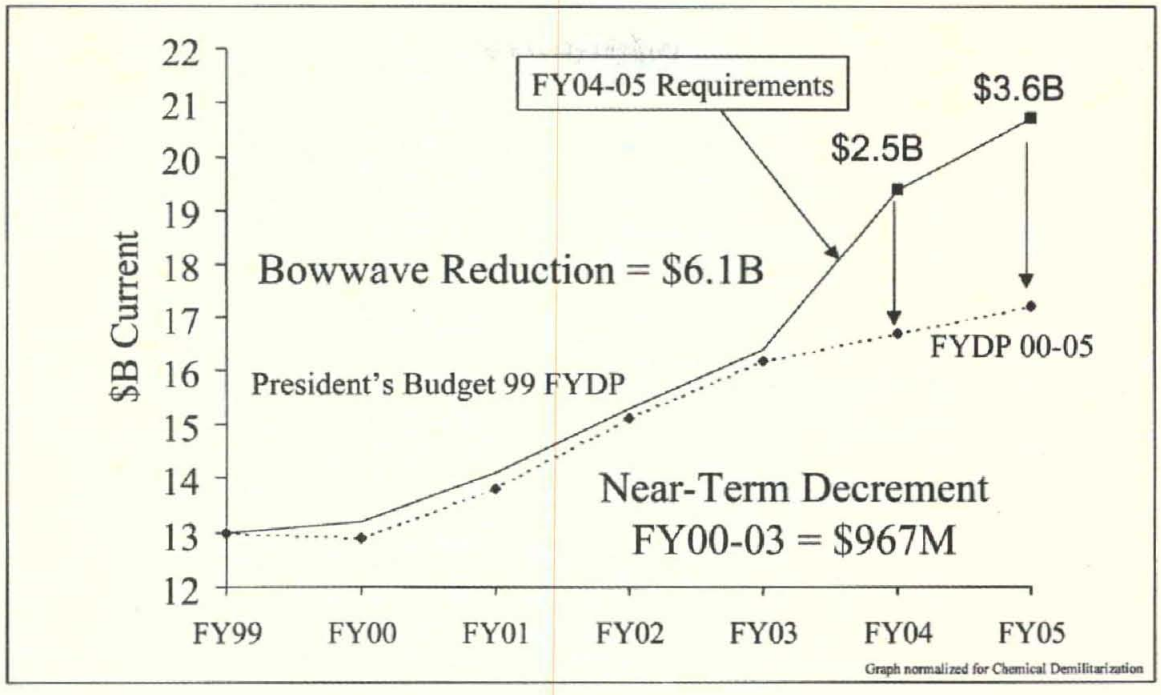

Figure 1.
Final FY00-05 FYDP.

The greatest challenge facing the total Army as it moves into the future is balancing today's readiness and tomorrow's modernization requirements with declining resources.

funding trends mean to future Army modernization.

FY00-05 FYDP

Throughout the past decade, the Army FYDP decreased steadily—nearly 32 percent. During the same period, Army research, development and acquisition (RDA) funding declined approximately 35 percent. These reductions have accumulated into long-term projections that create a "bowwave" of demand for procurement. In addition, these projections are conservative. They do not allow for real program growth nor do they account for procurement of additional systems. Without additional investment resources, reducing the bowwave will disrupt planned modernization programs.

In November 1997, we began to develop the modernization portion of the upcoming FY00-05 FYDP. We used the following as a conceptual framework:

- Address the Quadrennial Defense Review and National Defense Panel recommendations.
- Balance the six imperatives of quality people, doctrine, force mix, training, modern equipment, and leader development.
- Maintain the schedules for First Digitized Division by FY00 and First Digitized Corps by FY04.
- Maintain the schedule to modernize the light forces.
- Maintain stability in Reserve component modernization.
- Focus science and technology (S&T) on leap-ahead technologies.
- Posture ourselves to accelerate the Army After Next (AAN).

We were faced with a demand bowwave of more than $6 billion in FYs 04 and 05. The question was: How do we reduce a bowwave of that magnitude without seriously impacting Army modernization? To answer this question, we performed a comprehensive front-end analysis to establish an initial solution list of trade-offs.

Formal FY00-05 FYDP guidance was issued in March 1998. The following highlights were included:

- Preserve combat capabilities.
- Establish a logical timeline for transition from current maneuver force platforms to next generation technology.
- Program command and control "backbone" to total force as rapidly as possible.

A PPBES Primer

The Future Years Defense Program (FYDP) officially summarizes the programs developed within the Planning, Programming and Budgeting System and approved by the Secretary of Defense. The FYDP exists in a machine-readable form that lists resources by program element, resource identification code, fiscal year, and value. The FYDP identifies and accounts for all resources programmed by the Department of Defense (DOD). It shows the current budget year and the following 5 years.

Within the Department of the Army, Program Evaluation Groups (PEGs) for manning, equipping, sustaining, training and organizing the force, as well as for installation management, perform the Planning, Programming, Budgeting and Execution System (PPBES) functions. The equipping PEG is responsible for modernizing the Army. This PEG is co-chaired by the Assistant Deputy Chief of Staff for Operations and Plans – Force Development (ADCSOPS-FD) and the Deputy Assistant Secretary of the Army for Plans, Programs and Policy. Within this PEG, there are 16 Budget Operating Systems (BOSs) representing the functional areas of aviation; fire support; maneuver; command and control; combat service support; nuclear, biological or chemical; horizontal technology integration; science and technology; ammunition; and air defense. Each BOS has representation from both ADCSOPS-FD and ASARDA to ensure linkage of operational requirements and business practices.

The Army Program and Budget Committee (PBC), the Prioritization Steering Group (PSG), the Army Resources Board Support Group (ARBSG), and the Army Resources Board (ARB) are the principal PPBES committees. The PBC is co-chaired by the Director, Program Analysis and Evaluation (DPAE) and the Director of the Army Budget (DAB). It serves in both a coordinating and executive advisory role, oversees the programming and budgeting phases, and provides a continuing forum in which program and budget managers review, adjust and decide issues.

Chaired by the DCSOPS, the PSG consists of the primary Army staff principal with representation from the Army Secretariat as well as other key special staff. The PSG resolves issues on which the PBC fails to reach agreement, and reviews the Program Objective Memorandum (POM) resource allocation, makes recommendations on unresourced programs, and proposes offsetting decrements.

The ARBSG is chaired by the Assistant Secretary of the Army for Financial Management and Comptroller (ASAFM&C). It consists of the Assistant Secretaries, General Counsel, DCSOPS, Special Assistant FM&C, DAB, and DPAE. The ARBSG is the central council for coordinating issues for ARB consideration. It reviews and provides recommendations to ARB on Army guidance, resource allocation, and priorities for all phases of the PPBES.

The ARB is the Army "board of directors," and is chaired by the Secretary of the Army and vice-chaired by the Chief of Staff of the Army. Members include the Undersecretary of the Army, the Vice Chief of Staff of the Army, Assistant Secretaries, DCSOPS, and other Army staff principals as required. The ARB provides top-down guidance in framing and assessing alternatives during all phases of PPBES, and formulates final decisions.

- Maintained First Digitized Division/First Digitized Corps Schedule
- Maintained Light Force Modernization Schedule
- Maintained Army Division Redesign Study Funding
- Maintained Ammunition to achieve C1 for Training (T1) FYs 00 and 01
- Maintained Science & Technology at FY99 Level in accordance with Defense Planning Guidance
- Supported Logistics Enablers

Figure 2.
FY00-05 accomplishments.

- Modernize the rest of the total Army on a first-to-fight basis.
- Maintain S&T funding at the level of the president's FY99 budget.
- Reinvest funding of procurement where overmatch exists to higher Army priorities.

Army fiscal guidance reflected the need to balance near-term readiness, quality of life, and modernization. The modernization account was reduced nearly $1 billion between FY00-03 to meet near-term readiness requirements. This was in addition to the bowwave reduction of more than $6 billion for FYs 04 and 05.

Based on our extensive front-end analysis, we presented programming recommendations and trade-offs to the Army Program and Budget Committee, the Army Resources Board Support Group, and the Army Resources Board

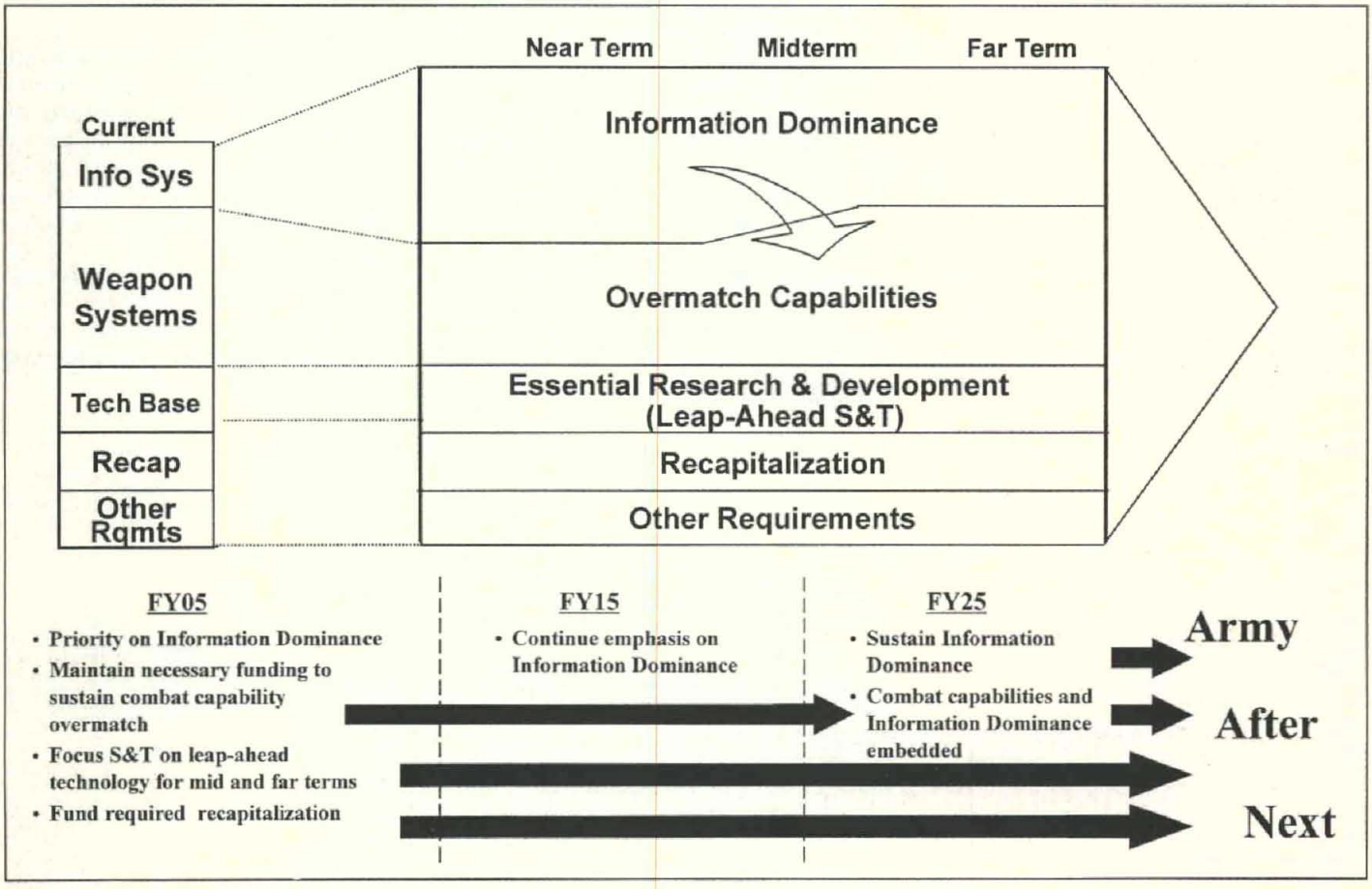

Figure 3.
Army investment strategy.

for approval. The Army leadership made difficult decisions to maintain balance, taking risks where prudent. Figure 1 illustrates the final FY00-05 FYDP and shows the difference as compared to the president's FY99 budget FYDP and FYs 04 and 05 requirements. Program content of more than $7 billion was affected. More important, approximately $1 billion of program decrements were taken in FY00-03. Figure 2 lists what we accomplished in the FY00-05 FYDP. The bottom line is that we met OSD and Army guidance, reduced the bowwave, and maintained momentum on a number of high-priority Army initiatives. However, we had to make some tough choices to meet fiscal constraints. We terminated 4 programs and decreased program funding for 32 major systems.

Army Modernization Plan

The greatest challenge facing the total Army as it moves into the future is balancing today's readiness and tomorrow's modernization requirements with declining resources. Army modernization is critical to meet the requirements of an uncertain future. To maximize our ability to modernize, we must have a modernization vision, optimize congressional support, embrace acquisition reform initiatives, and continue to make tough choices.

We have adopted a modernization vision to guide us into the 21st century and beyond: *Enable Army Vision 2010 by equipping a capabilities-based Army to achieve full-spectrum dominance in conducting prompt, sustained joint operations while protecting the essential elements of the S&T and industrial bases.* Embedded in that vision is a strategy with five major goals:

- Have a networked and digitized Army by 2010.
- Maintain our present combat overmatch capabilities.
- Sustain essential research and development and focus S&T on leap-ahead technologies for the AAN.
- Recapitalize the Army.
- Better integrate the Active and Reserve components.

To achieve this vision, the Army strategy prioritizes investments throughout a period of time. Figure 3 depicts how the investment priorities subtly shift in the near, mid, and far terms to synchronize modernization activities.

In the near term (FY00-05), the goal is to gain information dominance. Near-term priorities are to equip a digitized division by FY00 and a digitized corps by FY04, provide the minimum funding necessary to maintain the current degree of capability overmatch, provide funding for S&T efforts to develop technologies that guard against an uncertain future, and recapitalize essential aging systems to extend their life and increase their capabilities.

The midterm (FY05-10) goal is to achieve information dominance and begin to attain the physical agility needed to achieve full-spectrum dominance. Midterm priorities are to continue emphasis on systems that provide information dominance capabilities, continue funding of required overmatch capabilities, focus basic and early applied research to enable AAN forces to achieve full-spectrum dominance, and recapitalize aging systems.

The far-term (FY11-20) goal is full-spectrum dominance. The Army will have synchronized and executed the modernization of planned and required capabilities to ensure a force that embodies Joint Vision 2010 and Army Vision 2010 operational capabilities. Far-term priorities are to field overmatch systems with information dominance embedded, sustain an information dominance capability, provide stable funding of S&T that focuses applied research and advanced technology development on AAN-required capabilities, and continue to recapitalize the force.

Future Army Modernization

The Army RDA budget has consistently been the smallest in DOD. Today, Army modernization investments account for approximately 16 percent of all DOD RDA. During the past 14 years, Army procurement has declined nearly 76 percent (from $25.5 billion in FY85 to $6.2 billion in FY00). This decline in funding has caused the Army to maintain procurement programs at minimum sustaining rates rather than more efficient economic rates.

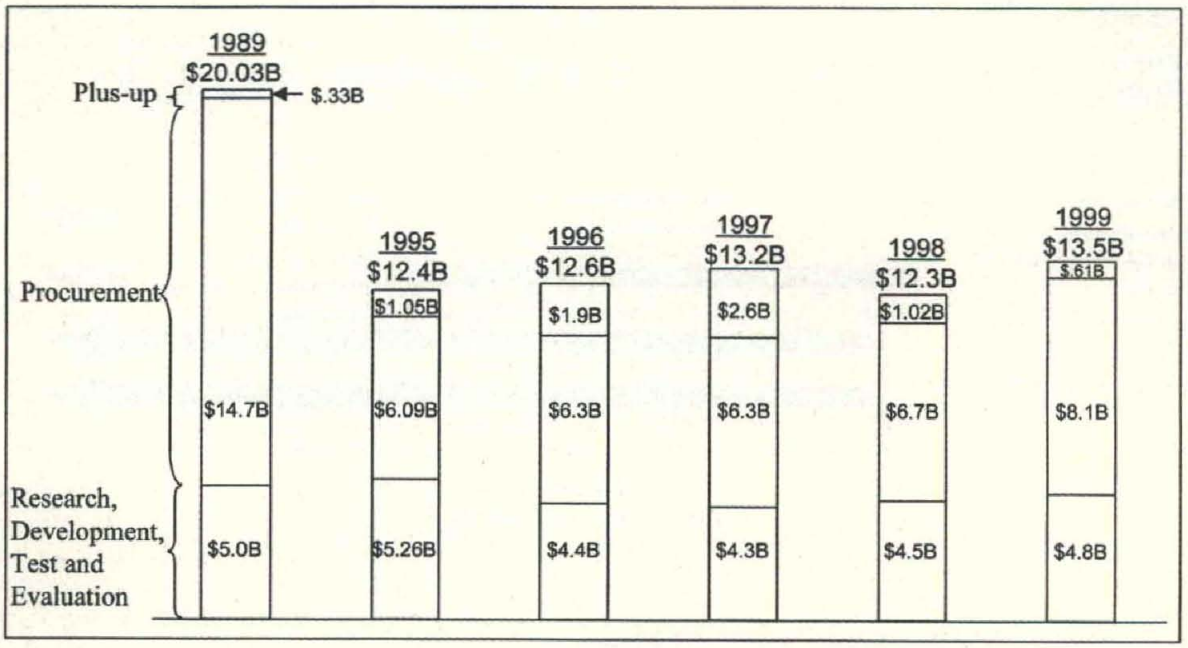

Figure 4.
Army RDA funding.

Each year, the Army leadership has testified to Congress that a modernization backlog of $3-5 billion exists and needs to "get fixed" for the Army to continue to modernize. Congress has responded generously, providing increases to the Army RDA account to sustain the modernization rate. Figure 4 reflects the impact of congressional additions to the Army RDA Program in recent years. However, the extent that Congress can continue to help is severely limited by the 1998 balanced budget agreement. In the FY99 budget, Congress was bound by the balanced budget resolution to cap Defense spending. As a result, they were only able to add $612.5 million to the Army's RDA account, significantly less than the $1-2 billion of previous years. Unfortunately, we can no longer rely on congressional plus-ups to supplement our modernization accounts.

To mitigate the impact of decreasing RDA resources, the Army is committed to becoming the most efficient organization possible through efficiencies and reforms. The Army leads DOD in implementing acquisition reform initiatives. We are aggressively pursuing a number of innovative initiatives to become more efficient and reduce the cost of doing business. An example is the initiative to reduce a system's total ownership cost (TOC).

TOC is associated with acquiring, operating, modifying, maintaining, supplying, and disposing of weapon systems. Reducing TOC not only decreases fiscal demands on the operational commander, but also generates savings for reinvestment in support of Force XXI modernization objectives. For example, our second generation Forward Looking Infrared (FLIR) Horizontal Technology Integration Program has allowed the Army to have one development program for multiple-system use. This has given us economy of scale and a single repair-parts support system. (We estimate a cost savings of more than $565 million.) We're currently investigating potential operations and support (O&S) savings for Apache FLIR upgrade.

Other examples of ongoing TOC initiatives are as follows:

- Top 10 Cost Drivers Plan. The program executive officer or program manager identifies cost drivers and develops plans to reduce and track O&S savings, reduce nonessential costs and inefficient practices, and develop life-cycle cost management templates.
- Program Objective Memorandum (POM) investment initiative. This is a disciplined process to identify and fund investment initiatives in the POM. (For example, more than 60 initiatives have been processed; 4 have been funded and 17 have been shifted to other Army cost-reduction programs.)
- Modernization Through Spares. This strategy applies technology insertion; and the use of commercial products, processes, and practices to extend a system's useful life.

The Army must maintain the momentum to continuously evaluate the way we conduct business and to implement necessary reforms and initiatives to achieve our goal: ***the warfighter receiving state-of-the-art equipment at minimum cost to dominate the battlefield under all operational and environmental conditions.*** Although we have made great progress toward improving the way we conduct business, these initiatives will not go far enough to meet essential Army requirements.

What the future portends is more hard choices because there has been no substantial increase in Army Total Obligation Authority (TOA). The Army must continue to balance quality of life (base operations and pay), readiness (training), and modernization. Clearly, Army modernization will benefit from the DOD objective to increase procurement to $60 billion by FY01. However, there are many competing demands that continue to challenge our ability to modernize at a steady pace. We have to recapitalize those weapon systems that we successfully used in Desert Shield/Desert Storm—the M1 Abrams tank, the M2 Bradley infantry fighting vehicle, the AH64 Apache attack helicopter, the UH60 Blackhawk utility helicopter, and the Multiple Launch Rocket System M270 Launcher, which were all procured in the 1980s.

We have two major weapon systems approaching production decisions, Comanche and Crusader, and a number of others in various stages that will compete for resourcing. We have requirements to modernize the Army tactical wheel vehicle fleet. We need to procure training ammunition that will allow the Army to train to standard. Additionally, we need to restock our war reserve ammunition with modernized munitions. We are working to achieve information dominance by equipping a digitized division in FY00 and a digitized corps in FY04. We are trying to accelerate the AAN to define the future force through a series of Army Warfighting Experiments. All of these compete for scarce resources. Without an increase in Army TOA, we will continue to be forced to make hard choices in the future.

Conclusion

Today's modernization is tomorrow's readiness. Our goal is to maintain balance among the Army's competencies, achieve the objectives of Joint Vision 2010 and Army Vision 2010, and follow the Army modernization investment strategy. Without adequate modernization funding, we risk sending our soldiers into an uncertain future without the technological edge necessary for them to accomplish their mission and return home safely.

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COL HOUNG Y. SOO is the Chief, Program and Priorities Division, Office of the Deputy Chief of Staff for Operations and Plans – Force Development. He holds an M.S. degree in nuclear engineering from the University of Washington, an M.B.A. from the Florida Institute of Technology, and an M.A. in national security and stategic studies from the U.S. Naval War College.

Acquisition Reform . . .

A-MART: ARMY SHOPPING ONLINE

Jodi Santamaria

I call upon all Internet users—both in government and in the private sector—to join me in seeking global consensus ..., so that we may enter the new millennium ready to reap the benefits of the emerging electronic age of commerce.

—William J. Clinton
President
United States of America

Introduction

This excerpt was taken from the president's message to Internet users on July 7, 1997, and underscores the ongoing acquisition reform movement in the Department of Defense (DOD).

On May 21, 1997, Dr. John J. Hamre, Deputy Secretary of Defense, issued Management Reform Memorandum #2 directing DOD to "undertake a revolution in business practices in conjunction with the Quadrennial Defense Review." The mandate stipulates that DOD adopt a paperless contracting process by Jan. 1, 2000. It was followed by an addendum directing a completely paperless *acquisition* process by 2002, and requesting support from the logistics community.

To achieve these goals, the Services have initiated paperless projects to address the different contracting processes. One such initiative is the establishment of a DOD Electronic Mall (E-Mall) to empower our buyers to make decisions and facilitate online ordering and purchasing with a government purchase card. Buyers can focus their resources on their priorities, such as modernization, while the expertise of contracting personnel can be focused on providing value-added support to our ultimate customer, the soldier.

A-Mart is the Army's door to the DOD E-Mall and is a critical part of the Army's vision for acquiring supplies and services that are necessary to support Army Vision 2010 and Force XXI.

DOD E-Mall

To aid in the implementation of the paperfree contracting Defense reform initiative, the Army is participating with its sister Services, agencies, and the Joint Electronic Commerce Program Office in constructing the DOD E-Mall. E-Mall shoppers will be able to browse through the Commodities Corridor sponsored by the Defense Logistics Agency (DLA) to find DLA inventory items, products available through the Army Tank-automotive and Armaments Command's Direct Vendor Delivery System, items made under Federal Prison Industries Corporate Contracts with the Army Communications-Electronics Command (CECOM), or clothing from the Defense Supply Center Philadelphia's Automated System of Catalogs and Orders for Textiles. In addition, shoppers can search for information technology products in the Information Technology (IT) Corridor run by the Navy, including the Joint Technical Architecture-Army-compliant IT products offered by the Army Small Computer Program (**http://pmscp.monmouth.army.mil/**. Shoppers seeking services or construction information can review lists of services and construction contracts in the Services and Construction Corridors built by the Army in partnership with the Air Force.

A-Mart

Electronic malls and catalogs are an excellent way for us to take full advantage of the efficiency offered by electronic commerce technologies, while providing better and faster acquisition support for the warfighter.

—COL Bill Phillips
Director, Information Management and Assessment, Office of the Deputy Assistant Secretary of the Army for Procurement

A-Mart is the Army's door to the DOD E-Mall and is a critical part of the Army's vision for acquiring supplies and services that are necessary to support Army Vision 2010 and Force XXI. Technically, it is the front page for Army users of the E-Mall. It contains the search engine for the Services and Construction Corridors, as well as links to the corridors for commodities, IT products, health products, and office products.

A-Mart makes use of cutting-edge commercial web technology by providing access to government-awarded indefinite delivery contracts, blanket purchase agreements, and vendor catalogs in an online, paperless medium. Army users worldwide can conduct market research quickly and easily by browsing among products and comparing features and prices. Buyers can initiate electronic order processing and payment with their government purchase card throughout the E-Mall, or via a traditional DOD Military Standard Requisitioning and Issue Procedure requisition in the Commodities Corridor. Real-time status of the order can then be tracked online.

Although the initial operating capability for the DOD E-Mall is targeted for the end of the second quarter FY99, A-Mart became fully operational during the first quarter of FY99.

Benefits

The Army is committed to building a more versatile, deployable, and powerful 21st century force. ... Only by enhancing current equipment with advanced technology and providing high-quality soldiers with state-of-the-art weapons systems can the Army build a full spectrum force capable of fulfilling America's security needs well into the next century.

—Army Posture Statement (FY98)

Access to A-Mart is access to competition and real-time pricing. It provides users with multiple choices of suppliers and a source of information on available products and services.

In addition to its commitment "to building a more versatile, deployable, and powerful 21st century force," the Army is committed to providing the tools necessary to sustain that force. We must use technology to be effective and efficient. Soldiers need access to the latest technology, as well as a means by which to acquire it rapidly.

A-Mart increases visibility into what contract vehicles currently exist and gives decisionmaking authority to the buyer. With this tool, users can leverage the purchasing power of the Army and that of DOD to ensure that they are getting the best prices for the items and services they need. Access to A-Mart is access to competition and real-time pricing. It provides users with multiple choices of suppliers and a source of information on available products and services.

The Army is also improving its information infrastructure at installations with advanced communications, which increases total asset visibility and logistical efficiency and allows the Army to manage distribution from factory to foxhole.

—Army Posture Statement (FY98)

A-Mart helps produce better decisionmakers who can then place orders from existing contracts and under existing agreements, thereby drastically reducing the administrative costs of issuing new contracts. Decisionmakers can refer to the real-time, online order status to update their readiness posture. To ensure responsiveness to users, the DOD E-Mall will incorporate links to Army supply systems.

Most important, however, is a reduction in cycle time. By shortening acquisition lead time and ordering items from government stock, soldiers will receive products and services faster than ever before.

Conclusion

Soldiers are our Army. A-Mart is a way to empower our Army with the tools necessary to sustain our forces and meet the challenges of the future. Register today at **http://armysarda.elpress.com**.

JODI SANTAMARIA is a Contract Specialist with the CECOM Acquisition Center and is currently on a yearlong developmental assignment at HQDA in the Paperless Contracting Program Management Office, Office of the Deputy Assistant Secretary of the Army (Procurement). She is also the Project Leader for A-Mart and the Army's Single Face to Industry for new business opportunities. For more information on A-Mart, contact her by e-mail at ***santa@sarda.army.mil***.

THE BATTLEFIELD INTEROPERABILITY PROGRAM: A UNIQUE INITIATIVE TO RESOLVE MULTINATIONAL INTEROPERABILITY PROBLEMS

Dr. Dirk R. Klose, Gunther Kainz, and Hobbie Negaran

Introduction

With the growing involvement of U.S. forces in multinational coalition operations, interoperability among the participating nations' command and control (C2) systems is crucial to mission success. Both technical and operational incompatibilities have hindered interoperability among national C2 systems. Incompatibilities include different C2 system hardware and software, message sets and formats, communication protocols, operational procedures, and military concepts and principles. Additionally, different languages and cultural attitudes further complicate interoperability among multinational forces. Even when the information in a message from one nation is transmitted, converted and translated into an equivalent message set used by another nation, significant concerns still remain. For example, has the receiving nation "fully understood" the tactical intent of the sending nation's message and will the receiving nation's response be in accordance with the expectations of the sending nation's operational doctrine? This is a critical point because the operational doctrine implemented by nations is different and, thus, could potentially produce different results for the same set of orders. For that reason, it is extremely important that in multinational operations, the tactical intent of the information exchange among nations is correctly conveyed and understood.

To resolve these interoperability problems, the U.S. Army Communications-Electronics Command (CECOM) Research, Development and Engineering Center's Command and Control Directorate (C2D), together with the Army Digitization Office and the Mounted Maneuver Battlespace Lab (MMBL) at Fort Knox, initiated the Battlefield Interoperability Program (BIP) in 1994 with the Federal Republic of Germany. France joined the BIP initiative later that year, and the United Kingdom was admitted in 1996. The goal of the BIP was to develop and demonstrate a capability that permitted the participating nations' C2 systems to interoperate seamlessly. A fundamental tenet of the BIP was to demonstrate this interoperability using the national C2 systems, radios, protocols, message sets, languages, etc., of the participants. The BIP focused on evolving digitized battalion- and regiment-level C2 systems: for France, the Systeme d'Information Regimentaire; for Germany, the Gefechtsfeld Fuehrungs System; for the United Kingdom, the BOWMAN C2 System; and for the United States, the Force Battle Command Battalion and Below/Applique/Maneuver Control System.

The Technical Solution

The CECOM C2D technical team, under the leadership of Dr. Dirk Klose, the U.S. BIP Program Manager, was responsible for all technical aspects of the BIP, including the design, implementation and testing of the required technical solution. Together with MMBL personnel at Fort Knox, the CECOM technical team selected and defined the message text formats used by the United States and also supported all technical aspects of the final field experiment.

The MMBL, representing the user, was responsible for the operational, tactical and procedural aspects of the BIP. Working with the C2D technical team, MMBL researchers defined the common BIP messages and determined the information exchange requirements. They designed and implemented the operational scenarios and vignettes and conducted all operational aspects of the field experiment, including all data collection and analysis. Additionally, they provided the military personnel required for the field experiment.

The basic concept for the technical solution for the BIP was to agree on a Local Area Network (LAN) with commercial standards as the common communication interface, and to execute the radio portion of the BIP using each nations' own radios with their respective protocols. Each nation mapped its respective radio protocols to the common LAN protocol. Each nation was responsible for implementing and testing its own technical interface for its

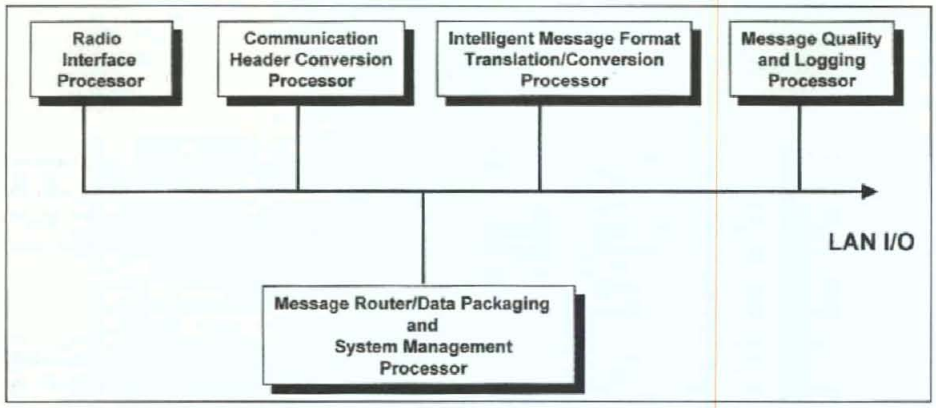


Figure 1.
U.S. MEI architecture.

respective national radio. This was accomplished through a series of joint technical tests designed to incrementally build, test, and validate the necessary hardware and software. Using this common test methodology, the four nations implemented and tested the required technical solution among their respective C2 systems. The initial series of tests took place in a simulated operational environment using the Internet to link the four national C2 systems.

The implemented technical solution, called a Message Exchange Interface (MEI) (see Figure 1), automatically converted and translated information representations between several message and data formats. The MEI software parsed incoming BIP message headers received, for example, by the United States, via the Single Channel Ground and Airborne Radio System (SINCGARS). The MEI then translated the message content of the sending nation into the appropriate United States Message Text Format or Variable Message Format, which could be understood and displayed by the U.S. MCS. Thus the MEI, together with the respective radio (see Figure 2), served as an intelligent gateway translating data formats, message formats and languages among the four national C2 systems.

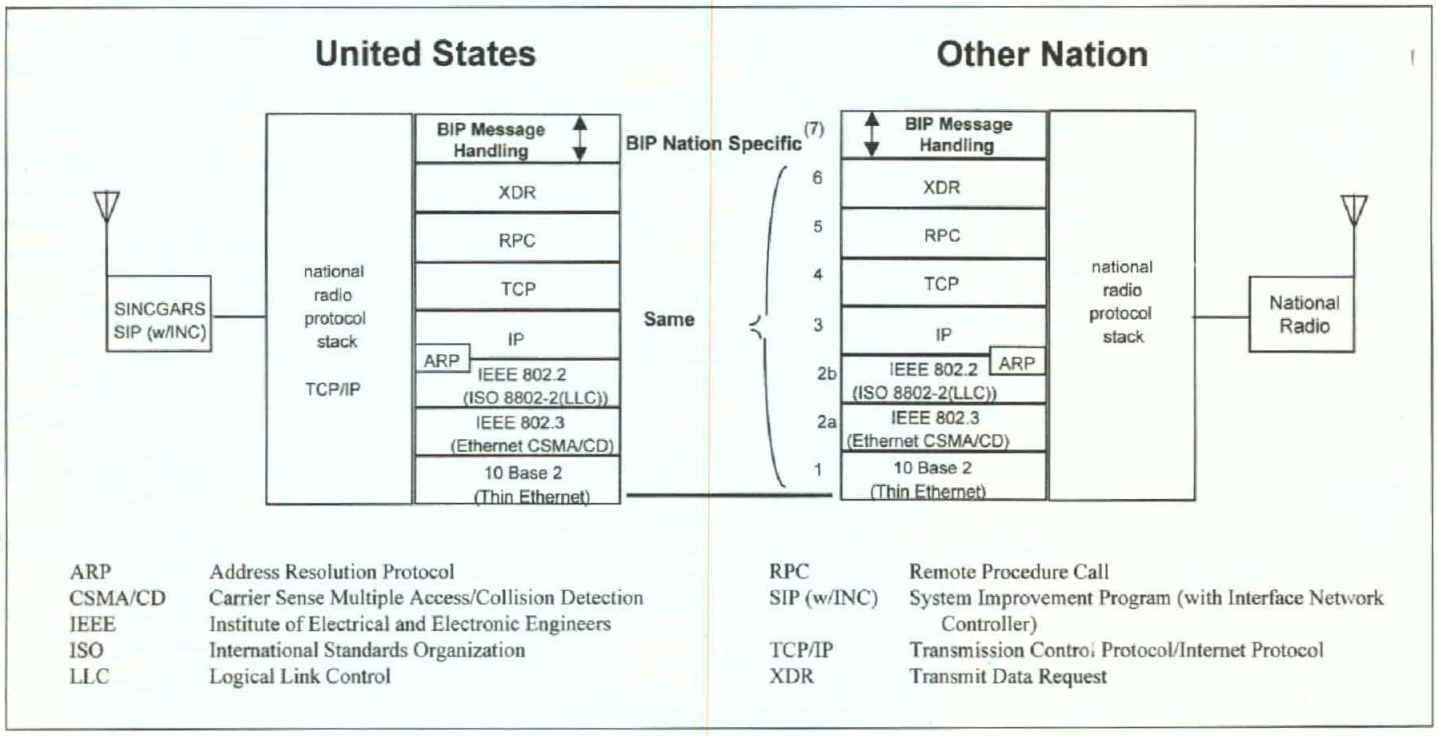
BIP Configurations And Implementation

Three basic configurations were used during the BIP technical tests and the field experiment: centralized, decentralized, and hybrid. Each configuration tested the technical stability of the hardware and software associated with message-exchange capabilities for each of the four national participants. Each configuration contributed certain operational and technical merits.

Each nation was responsible for implementing its own MEI. Additionally, each nation integrated its MEI into its respective tactical operations center (TOC) vehicle and also into a second vehicle as determined by the BIP configurations. This two-vehicle implementation led to the distinction of a "TOC MEI" and a "remote MEI."

The TOC MEI interfaced to its corresponding national C2 system. The remote MEI was responsible for routing messages to or from its TOC MEI. The permutations of the different communication paths (LAN or radio) between the national remote MEIs and between a remote MEI and its TOC MEI generally defined the BIP configurations.

The centralized configuration is characterized by the clustered position of the nations' MEI vehicles housing the MEI and national radios. These MEI



ARP	Address Resolution Protocol
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
IEEE	Institute of Electrical and Electronic Engineers
ISO	International Standards Organization
LLC	Logical Link Control
RPC	Remote Procedure Call
SIP (w/INC)	System Improvement Program (with Interface Network Controller)
TCP/IP	Transmission Control Protocol/Internet Protocol
XDR	Transmit Data Request

Figure 2.
MEI radio interface.

The BIP demonstrated close and constructive teamwork among government and military personnel and civilian contractors residing in different nations to successfully execute a major effort.

vehicles are connected with the common MEI LAN and are communicating with their national TOCs via their own national radios.

In the decentralized configuration, one nation provides the MEI and national radio installed in a vehicle for use by the other participating nations. The provided vehicles are connected to the participating nations via the common MEI LAN and use the provided radios to communicate among themselves and with the TOC of the providing nation.

In the hybrid configuration, the centralized configuration is modified such that one nation's MEI and radio communicate not only with its TOC, but also with an additional MEI and radio, which then communicate with another nation's MEI via the common MEI LAN.

These configurations assume that each nation's TOC is equipped with the common MEI LAN interface and must attach at least one MEI vehicle to serve as a gateway. To be fully mobile, the decentralized configuration should be used with the other nations' TOCs capable of integrating the providing nations' communication equipment.

The BIP Field Experiment

The field experiment, code named Concordia 97, was hosted by Germany and held at the General Fellgiebel Kaserne, Poecking, Germany, a German army signal school, from Oct. 27-Nov. 21, 1997.

The purpose of the field experiment was to validate the BIP technical solution in a realistic operational deployment. By mutual agreement, only the maneuver battalion/regimental C2 systems of each nation participated. In the field experiment, BIP nations evaluated and demonstrated BIP message exchange in a series of realistic scenarios and vignettes, alternately using the three different BIP MEI configurations to exchange messages among the four participating nations.

To evaluate the success and quality of BIP information exchange, data collection teams were established by each nation and centrally coordinated. Following an established data collection plan and procedure, message data were collected and analyzed during and after the experiment. Several different measures of effectiveness and measures of performance were used to assess and evaluate the message exchange.

The analysis of the experiment data demonstrated extremely positive results. Of the 1,070 messages sent, 960 were successfully received by the addressee. Of those received, the receipt and understanding rate varied from 88 percent to 100 percent, with a norm above 90 percent. Of the messages not received, 7.4 percent were attributed to sending system errors and the other 4.2 percent were attributed to receiving system errors. Additional analysis indicated that the error rate in transmission and reception declined with time, indicating a user learning curve during the course of the field experiment.

As a result of the success of the BIP and the field demonstration, the interoperability capabilities developed are being transitioned to the Program Manager, Army Tactical Command and Control System. Fielding is scheduled for the 1999-2000 timeframe. Additionally, a proposal has been made for a follow-on Command and Control Systems Interoperability Program Advanced Concept Technology Demonstration, building on the foundations established by the BIP. The demonstration would be initiated and managed by the Program Executive Office, Command, Control, and Communications Systems.

Summary

The BIP was successful in demonstrating that messages in different formats can be transmitted to other nations in a common format and in language understood by every participating nation. Additionally, the BIP nations used their own national C2 systems and radios without any restrictions or limitations. The BIP was executed in an exceptionally short timespan from conception to implementation to functional verification. The BIP used the Internet for initial technical tests and to coordinate and manage the overall program. The BIP demonstrated close and constructive teamwork among government and military personnel and civilian contractors residing in different nations to successfully execute a major effort. Lastly, the BIP provided an impetus for the NATO Armament Group - Land Group 1 to expand its scope and focus its efforts on incorporating the results of the BIP in NATO.

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HOBBIE NEGARAN is a Senior Technical Manager in the C2 Systems Architecture Branch, CECOM C2 Directorate. He has an M.S.E.E., a B.S.E.E., and a B.S.A.E.

ACTIVE NOISE REDUCTION AND NONLINEAR EARPLUGS IMPROVE COMBAT EFFECTIVENESS

Georges R. Garinther,
Alan Dorney, and
B. Wayne Anderson

On modern day battlefields, soldiers and their equipment are confronted with many obstacles, but one of the most potentially dangerous is simple noise.

Combined with the vast array of battlefield sounds, the deep roar of high-powered armored vehicles and aircraft can significantly interfere with verbal communications between crewmembers and contribute to hearing loss. Without the ability to hear communications clearly, commanders and their crews are put in great danger. Studies have shown that poor communications increase fatigue, reduce alertness, decrease combat performance and, most importantly, contribute to the loss of life and equipment.

Attempting to improve communications in battlefield vehicles, Georges Garinther and Wayne Anderson, researchers in the Human Research and Engineering Directorate (HRED) at Aberdeen Proving Ground, along with the Bose Corp., have been evaluating a technology known as active noise reduction (ANR). As part of the new Vehicular Intercommunication System (VIS), ANR adds an important new dimension that improves hearing protection and provides greater speech intelligibility in combat vehicles. The ANR electronics, installed in the tanker helmet, generate out-of-phase "antinoise" at low frequencies that reduce noise at the ear by up to 13 decibels (dB) more than the passive attenuation of the helmet.

The VIS tanker helmet reduces noise of the Bradley Fighting Vehicle from 115 dB in the crew area to 83 dB at the ear. The DH132 helmet only reduces noise at the ear to 100 dB. The Army Surgeon General's limit is 85 dB at the ear. This is a dramatic improvement over conventional "passive" hearing protectors that primarily block out high-frequency noise.

Conventional hearing protectors provide passive attenuation of only 10 to 15 dB at low frequencies. This attenuation is not sufficient to reduce the characteristic low-frequency sounds of aircraft, armored vehicles and other background rumble to acceptable levels. By using ANR to electronically cancel some of the noise in the low-frequency range, soldiers can greatly improve their hearing protection and speech intelligibility.

Studies of the VIS using ANR have shown an overall noise reduction of 30 dB compared to only 15 dB for conventional passive helmets. This 15-dB improvement increases the allowable exposure time in the Bradley Fighting Vehicle from 20 minutes per day to 12 hours per day. In addition, speech intelligibility scores of 89 percent can now be achieved in the 115-dB Bradley noise environment compared to 68 percent using the conventional helmet. ANR also reduces voice levels at the ear and helps prevent auditory damage caused by high voice levels. In addition to ANR, the VIS helmet includes digital circuitry, improved electrical shielding, and a voice-activated lip microphone.

The Army began fielding VIS in 1996, selecting the M1A1 as the first armored vehicle to receive it. Since that time, VIS has been added to the Bradley Fighting Vehicle, the M109 self-propelled Howitzer, and to other vehicles. The VIS was the first large fielding of any military communications system in the world that included headsets with ANR.

Recently, the authors demonstrated this technology to aviation commanders to solicit their feedback regarding potential retrofits in existing aircraft and inclusion in new systems such as the Comanche and Virtual Cockpit Optimization Program. The combination of ANR and three-dimensional auditory virtual reality has the potential to significantly increase pilot performance and effectiveness.

Garinther has also been working with French researchers at the Institute of Saint Louis on the development of a nonlinear earplug. This new device would dramatically reduce hearing loss and

improve speech intelligibility among soldiers shooting rifles, mortars, artillery, and other impulse-producing weapons. Since these personnel do not use electronic headsets equipped with ANR, they need a simple mechanical device to improve their hearing.

Although the concept of a nonlinear earplug is not new, this technology has been vastly improved so that voice commands can now be heard while the earplug provides excellent protection against high-level impulse noise ranging from 140 to 190 dB. This new earplug has been constructed with a small plastic filter inserted in the middle of the plug. The filter is a drum-like device, shaped like a small tube, with a small hole of precise length and diameter in each end. This allows the particle motion of low-level sounds (speech, infiltration sounds, etc.) to enter the ear through the small hole, while creating turbulence that blocks the passage of high-level impulse noise.

During the past 2 years, Garinther has been involved in testing this device with French soldiers firing the FAMAS (equivalent to the M-16) at a French Army post at Nimes and firing mortars at Canjuers, France. In both tests, fewer errors and misunderstandings of commands were made when wearing the nonlinear earplug in comparison to the standard earplug. Communication errors decreased approximately 75 percent while hearing protection nearly equaled the standard earplug.

Testing in HRED's Hostile Environment Simulator showed that the nonlinear earplug lacked effectiveness in the high-level steady-state noise range (115 dB), such as that produced by armored vehicles. Therefore, it would be necessary to also provide soldiers with standard earplugs for operations in these environments. Since two types of earplugs could create a burden on the individual, two configurations of a nonlinear plug are being considered. A valve capable of closing the drum-like tube inside the nonlinear earplug is being studied. A reversible earplug with a nonlinear plug on one end and a standard earplug on the other end is also being evaluated.

During the development of this new device, HRED has kept the Army medical community aware of its testing and progress. Garinther suggests that the U.S. Army consider using this nonlinear earplug. Just like ANR, this earplug provides a dramatic reduction in hearing loss among soldiers, while allowing them to hear voice commands and combat-related sounds on the battlefield.

An armored vehicle crewmember wearing a VIS helmet with active noise reduction.

GEORGES R. GARINTHER is a guest researcher at the Human Research and Engineering Directorate of the U.S. Army Research Laboratory. He recently retired as a Human Factors Engineer, holds a B.S. degree in electrical engineering from Gannon University, and is a fellow of the Acoustical Society of America and the Army Research Laboratory.

ALAN DORNEY is a Human Factors Engineer at the Human Research and Engineering Directorate of the U.S. Army Research Laboratory. He holds a B.S. degree in mechanical engineering from The Johns Hopkins University and is a senior member of the American Society of Mechanical Engineers.

B. WAYNE ANDERSON is an Engineering Psychologist at the CECOM Element of the Human Research and Engineering Directorate, U.S. Army Research Laboratory. He holds an M.S. degree in experimental psychology from Texas A&M University.

From The Director Acquisition Career Management Office

The 1999 Army Acquisition Workforce (AAW)/Army Acquisition Corps (AAC) Roadshow is well underway. I encourage you to consult the schedule in this section of the magazine to find out when it will be in your region. One of the major areas of focus for this year's roadshow is the importance of updating personnel files. The critical components of your file are the Acquisition Civilian Record Brief (ACRB) for civilians, or the Officer Record Brief (ORB) for military, and the Individual Development Plan (IDP). These components should be constantly updated. They are tools created for use by the AAW to certify their eligibility to compete for career-enhancing opportunities. The ACRB, like the ORB, is an automated record that consolidates personnel data, education, experience, certification level, assignments, and training data. The IDP is an automated document designed to reflect current and future training requirements for a 5-year period. If the information on your ACRB is not current, your ability to compete for opportunities is restricted. If your IDP is not current, and is not certified and approved by your supervisor, your training will not be authorized! The Mobile Acquisition Career Management Office is in place specifically to give you the information needed to understand these important records.

I also want to remind military Acquisition Workforce members that under the Officer Personnel Management System for the 21st Century (OPMS XXI), all acquisition functional areas (FAs) will be managed under FA51. One result of this change is that officers will be able to compete for all acquisition leadership opportunities (program management and acquisition command).

I want to take this opportunity to congratulate Materiel Acquisition Management Course graduates and the newly accessed AAC members listed in this section of the magazine. I also refer you to the article that outlines statistics of the Command and General Staff College selectees.

I hope to see you soon at a roadshow near you, but don't wait until then to contact the Acquisition Career Management Office if you have a question about acquisition career management. My office is always available to provide information to assist you in advancing your acquisition career goals. Our phone numbers can be found on the AAC home page at **http://dacm.sarda.army.mil/contacts**.

COL Edward Cerutti
Director
Acquisition Career
Management Office

1999 AAW/AAC Roadshows Begin

Are career opportunities passing you by? Have you ever applied for acquisition courses or other training opportunities to keep you competitive but were not selected? Do you know how the Army fills current and future product and project manager (PM) positions?

Are you aware of the following:

- By FY01, acquisition officers will hold the designator 51Z, and Functional Areas 97 and 53 will be discontinued.
- What the Single Functional Initiative means to your career.
- The Acquisition Civilian Record Brief (ACRB) is used by Army selection boards to fill PM positions and to select personnel for long-term training opportunities such as Senior Service College and other career enhancement opportunities.
- All your current and future training requirements must now be listed in your Individual Development Plan (IDP) and be approved by your supervisor before your training will be processed.
- If your official personnel file is not current, your career in the Army Acquisition Workforce (AAW)/Army Acquisition Corps (AAC) could be impacted.

Would you like to know more? If you are a member of the AAW, you are invited to attend the roadshow briefings scheduled throughout the country this year.

Keith Charles, Deputy Director for Acquisition Career Management, kicked off this year's roadshow Jan. 21, 1999, at Fort Belvoir, VA. Charles discussed the progress that the Army acquisition community has made in the past, and described new initiatives for 1999.

The roadshows will again be followed by a visit from the Mobile Acquisition Career Management Office, a team of experts from the Acquisition Career Management Office. The team is prepared to provide assistance to AAW members, including help with updating your ACRBs and IDPs.

Following the January kickoff in the National Capitol Region, the Roadshow visited the U.S. Army Simulation Training and Instrumentation Command, Orlando, FL, Feb. 9-11. The remaining schedule is as follows:

Army Forces Command, Atlanta, GA	April 15-16
Fort Monroe/Fort Lee/Fort Eustis	April 28-29
Fort Monmouth, NJ	May 3-5
Picatinny Arsenal, NJ	May 4-6
Fort Bragg, NC	May 19-20
Rock Island, IL	June 8-9
Warren, MI	June 15-16
Europe (Germany)	July 10-14
England	July 12-13
Natick, MA	Aug. 10-12
Huntsville, AL	Aug. 24-25
Edgewood/Aberdeen Proving Ground	Sept. 14-17
Yuma, AZ	Oct. 5-6
Fort Huachuca, AZ	Oct. 6-8
Hawaii	Oct. 25-27

Don't miss the opportunity to hear first hand what the AAC is doing to enhance your career opportunities!

ACMO Hosts Third Annual Acquisition Career Management Workshop

The Acquisition Career Management Office (ACMO) hosted the third annual Army Acquisition Career Management Workshop Nov. 30, 1998, through Dec. 3, 1998. The theme of the workshop, "Soldiers are our Customers," was addressed in the three major components of the workshop: an Army Acquisition Corps (AAC) update, leadership experience workgroups, and discussions of operational experience opportunities.

Preceding the formal opening of the workshop, Keith Charles, the Army's Deputy Director for Acquisition Career Management, gave individual briefings to Acquisition Career Management Advocates, Acquisition Workforce Support Specialists, Competitive Development Group members, and program management interns and their sponsors. Charles discussed program management as a career field, results of the regional training initiative, and workloads of those supporting the Army Acquisition Workforce (AAW).

Charles also provided introductory remarks for the workshop, and introduced COL Ed Cerutti, ACMO Director, and Mary Thomas, ACMO Deputy Director. Thomas provided an AAC update by reviewing the evolving AAC focus during the last several years. She stated that the AAC vision has remained constant, while the view of the vision has been expanded by progressive developments. The AAC focus began with devising a vision, and is now centered on establishing strategic goals to maximize each AAW member's potential, staying connected and relevant to the soldier, and helping the AAW take "early ownership" of their career progression. Cerutti was called on to relate his experience with the leadership competencies (executive core qualifications (ECQs)) prescribed by the Office of Personnel Management. He emphasized that the ability to lead change has been crucial to success in three of his key assignments: the AAC Reengineering Team; Commander, Defense Contract Management Command, Raytheon; and ACMO Director. Charles followed Cerutti with closing comments, assuring the attendees that what they do early in their career counts, and encouraging them to take the opportunity to lead.

Charles then introduced Stephen French, Director of Personnel, United Kingdom Ministry of Defence. French is the team leader for the Smart Procurement Implementation Sub Team of Personnel and Training. He noted the similar challenges faced by the United Kingdom and the U.S. Army to improve their acquisition processes. French stated that acquisition career management work must support the goals of the armed forces if it is to be of value. Similar to the Army acquisition career management changes implemented as a result of the Defense Acquisition Workforce Improvement Act, the United Kingdom is responding to recommendations from a Strategic Defence Review. French identified initiatives such as the Integrated Product Team (IPT) concept, clear identification and knowledge of the customer, streamlining the acquisition approval process, and encouraging commonality. He also emphasized the need for cultural change and improving the range of staff quality across career fields. Like Charles, French stressed that acquisition professionals cannot be afraid to lead change, stating that "a sensible idea always finds its time." He closed by providing a list of accomplishments to date and goals for 1999 that include development of a clear personnel model; increased awareness training for acquisition personnel; IPT training; and establishment of mentors and coaches, and other developmental experiences.

Following French, Barry Berglund from the Center for Creative Leadership offered a presentation entitled, "Learning From Your Own Lessons of Experience." Berglund noted that effective leaders enable others to reach their potential, and stressed the importance of managing one's own career. As such, he recommended that individuals choose their career path, prevent "derailment," and use their strengths to overcome failures. Berglund provided several criteria on the qualities of leaders, key reasons for a leader's derailment, and a discussion of other research on leadership success and failure. Berglund's presentation preceded the workshops, which were designed to identify key experiences contributing to the development of ECQs.

All attendees were assigned to workgroups led by facilitators. The goal of each workgroup was to make a list of general experiences that would contribute to a given ECQ (leading change, leading people, results driven, business acumen, and building coalitions/communication). The following day, workgroups were organized by career field and tasked with generating a list of specific experiences within their fields that would contribute to each ECQ. The results of each group were reported on the final day of the workshop.

The third component of the workshop, operational experience opportunities, was conducted in a panel format. Various speakers presented information on current operational experience opportunities and answered questions from the audience. These opportunities can be found in the updated training catalog online at **http://dacm.sarda.army.mil/careerdevelopment**.

The workshop was deemed a success because of the unique opportunity for acquisition professionals from a variety of career fields and organizations and with varying levels of experience to share their thoughts. The topics presented in the workshop were highly informative, and attendees left with information they can share with co-workers, subordinates or supervisors.

Attention All Army Acquisition Corps Members

The Acquisition Career Management Office requests that all AAC members contact their Functional Acquisition Specialist (FAS) as soon as possible to update or provide their e-mail addresses. To identify your FAS, consult the contact section of the Army Acquisition Corps home page at **http://dacm.sarda.army.mil**. E-mail is becoming the primary means for communicating with the Acquisition Workforce, and we want to be sure you get the information you need!

MAM Course Now Includes Modeling And Simulation Instruction

Private industry is increasing its use of modeling and simulation (M&S) in product design and manufacturing. Simultaneously, Defense and Army policymakers have embraced M&S as a valuable tool for new acquisition programs. To reflect such widespread adoption of this tool, the Army Logistics Management College has added M&S instruction to its Materiel Acquisition Management (MAM) Course curriculum.

Today, the Army encourages the widest use of M&S in new acquisition programs. Any office may incorporate M&S in determining program requirements, developing threat scenarios, designing software and hardware, conducting component and system testing, and in production.

The potential benefits of M&S include ensuring realistic threat scenarios, saving time and money throughout the program, and gaining more confidence from test results. During this era of funding and personnel shortages, along with rapidly changing technology, potential benefits of M&S should be considered in every program.

Members of the Army Model and Simulation Office are providing instructional assistance. Their website is **www.amso.army.mil**.

30 Graduate From MAM Course

Thirty students graduated in December 1998 from the Materiel Acquisition Management (MAM) Course, Class 99-001, held at the U.S. Army Logistics Management College, Fort Lee, VA. The graduates included one allied officer from Greece. The Distinguished Graduate Award was presented to MAJ Joseph M. Taylor, assigned to the Florida Institute of Technology, Fort Lee, VA.

The 7-week MAM Course provides a broad knowledge of the materiel acquisition process. Course areas include acquisition concepts and policies; research, development, test and evaluation; financial and cost management; integrated logistic support; force modernization; production management; and contract management. Emphasis is on developing midlevel managers who can effectively participate in the management of the acquisition process.

Research and development, testing, contracting, requirements generation, logistics, and production management are examples of the materiel acquisition work assignments offered to these graduates.

MAM Graduates

Allen, Steven L.
Bodrick, Morris L.
Brandenburg, John
Buhl, Harold A. Jr.
Burnet, Patrick A.
Card, Rose K.
Chinowsky, Lary E.
Dailey, Jamie J.
Delaney, James P.
Dupont, Joseph P.
Eggert, John M.
Faieta, Phillip J.
Field, William E.
Franks, Gregory C.
Haines, Allen L.
Hossack, Timothy C.
Jackson, Alfred E.
Kim, Yu Shik
Kolllhoff, Joy N.
Kranjc, Jozef
Orange, Terry M.
Pace, Ronald R.
Peterson, Samuel L.
Redfield, Daniel W. Jr.
Riley, Donald D.
Smith, Mark A.
Soefer, Harvey G.
Swisher, Eugene F.
Taylor, Joseph M.
Tisdale, Steven R.

PERSCOM Notes . . .

Results Of The PERSCOM Acquisition Candidate Accession Board

The annual U.S. Total Army Personnel Command (PERSCOM) Acquisition Candidate Accession Board (PACAB) was held Dec. 1-4, 1998, to review the personnel records of officers from Year Group (YG) 92 and earlier for accession into the Army Acquisition Corps (AAC). The board reviewed 116 records from YG92 and 59 records from YG91 and earlier. The PACAB recommended 94 officers from YG92 and 56 officers from YG91 and earlier for accession into the AAC.

The Director of the Officer Personnel Management Directorate approved the recommendation of the PACAB, and the following officers were accessed into the AAC from the YGs indicated. All officers are captains unless marked with an asterisk (*), which indicates the officer is a major.

Name	Basic Branch	Year Group
Anderson, Lisa L.	AG	92
Bailey, Michelle M.	AV	91
Baker, Sherwood P. II	MI	92
Barker, Wayne E.	MI	92
*Barraclough, Brett A.	IN	86
Bassett, Thomas C.	TC	92
Bentzel, Thomas F.	AR	92
Blomquist, Michael D.	AV	92
Bristol, David P.	AV	91
Britt, Arthur L.	MI	91
Buonamia, Victor L.	OD	91
Burdette, Brian L.	OD	92
Cahill, Michael S.	MI	92
Carter, Don C.	CM	92
Clady, John E. II	AV	89
Clark, Steven B.	AV	92
Cleveland, Gregory J.	FA	92
Clomera, Arthur B.	OD	92
Coile, Gregory H.	MI	92
Collins, Robert M.	SC	92
Conaway, Stephen J.	AD	92
Coombs, John L.	CM	92

CAREER DEVELOPMENT UPDATE

Cooper, Willie J. Jr.	IN	92
Creech, Gregory S.	MI	88
Davidson, Paul G.	SC	92
*Dennis, Michael L.	AV	85
Dilullo, Jeffrey J.	IN	91
Dimant, Gai	AR	92
Duchemin, Edgar R.	SC	92
Evans, Mark M.	AR	92
Fischer, William D.	TC	89
Foster, Michael E. Sr.	FA	92
Furber, Daniel L.	FA	92
Gardunia, Craig R.	QM	92
Geisbert, Kevin L.	AR	92
Gray, Michael G.	AV	92
Greig, Scot William	IN	92
*Grigsby, Robert E.	AV	88
Grosenheider, Susan M.	AD	92
Grzybowski, Gregory H.	MI	92
Hackett, Christine A.	OD	92
Hagenston, Marty G.	MI	92
Harmon, Ernest J. Jr.	MI	92
Harp, Daryl M.	SC	92
Harris, Terrece B.	MI	92
Hawkins, Jon	MI	91
Heck, Joseph D. Jr.	FA	92
Hilton, William M.	AV	92
*Hirniak, Justin A.	IN	87
Hollis, Fredrick C.	AG	92
Homan, Larry L.	AV	90
*Howell, John P.	OD	87
Hudson, Christopher S.	MI	92
Huff, Michael A.	AD	88
Hughes, Frederick J. IV	QM	92
Hunter, Michael D.	CM	91
Iglesiascruz, Gregorio	QM	92
Jennings, Marvin R.	MI	91
Jeter, William G.	AV	91
Johnson, Mark A.	AR	92
King, Federica L.	AG	92
Knight, Jeffrey T.	AR	88
Kreun, David R.	MI	91
Landry, Paul D.	OD	92
Larkin, Kevin L.	FA	92
Lauro, Paul M.	EN	92
Lee, William E. III	FA	92
Limberg, David G.	AV	92
Lind, Susan M.	AV	90
MacCready, Howard V.	MI	90
MacFarlane, Bruce A.	AV	92
Mallory, David S. Jr.	EN	92
Martinez, Robert A.	AV	92
Matlock, John W. Jr.	IN	89
Matthews, John C.	AV	89
May, Charles H.	EN	91
McCaa, Ramona M.	MI	91
McGurk, Michael K.	MI	92
McNair, Lonnie J. Jr.	AD	92
McNair, Robert L. Jr.	FA	89
McRae, Timothy R.	MI	92
Mentzer, Rodney A.	FA	88
Miceli, Robert J.	AG	92
Micklewright, Scott D.	OD	92
Miller, Laney D.	IN	90
Milner, Michael W.	AR	91
Morris, Stephen S.	CM	90
Moses, Kathaleen D.	AD	91
Muhammad, Hakeem A.	TC	92
Myers, Vernon L.	IN	92
Myles, Robert W. Jr.	IN	88
Nathan, Lloyd M. Sr.	MI	89
Neuwirth, Joseph P.	IN	89
Nieto, Edward D.	AD	92
Noe, Steven M.	OD	88
Odum, Marcus J.	MI	92
Okeefe, Dewander L.	AG	90
Oneill, John B.	AV	91
Overbey, Gerard J.	OD	92
Padilla, George	MP	92
Pearson, William E. Jr.	AV	92
Perry, Christopher D.	AV	89
Powell, Shawn B.	AV	91
Raines, Jane M.	QM	92
Rannow, Eric C.	FA	92
Ravenell, Craig M.	FA	92
Reddick, Jeffrey E.	MI	90
Rickey, Jon K.	IN	89
Rivera, Erwin	OD	91
Roberson, Aaron D.	FA	92
Robinson, Kelvin L.	QM	89
Rodriguez, Michael L.	MI	91
Ross, Pete A.	AV	92
Ryder, Ronald L.	AV	92
Satterfield, Anthony J.	AV	92
Seay, Arnold	AD	90
Shadrick, Keith D.	QM	92
Sherrill, Tommie L.	MI	92
Shuler, Paul D.	QM	92
Sieber, Anthony J.	AV	92
Skinner, James T.	SC	92
Smalls, Douglas E.	MP	92
Smallwood, Phillip E.	AV	92
*Smith, James H.	IN	86
Smith, Jesse W.	MI	92
Smith, Robert S.	MI	92
Stewart, Joyce B.	MI	92
Stone, Daniel L.	OD	92
*Sweat, Kenneth F.	IN	86
Tasca, Adam R.	FA	92
Taylor, Michael W.	IN	90
Theall, Debora L.	QM	89
Thorne, James M.	OD	92
Thorpe, Scott N.	AV	92
Thorsrud, Derek R.	AV	92
Topinka Tom T.	SC	92
Tracy, Larry A. Jr.	AD	92
Traxler, Michael E.	OD	92
Vanriper, Steven G.	AV	92
Vinson, Timothy J.	AV	90
Volkin, Ronald S.	AV	92
Warren, Thomas Edward Jr.	AV	92
Wilhide, Donald B.	TC	92
Williams, Rodney V.	QM	89
Wolons, David S.	AV	89
Woodman, Richard F.	SC	92
Worshim, Charles III	AD	92
Yates, Emmett M.	IN	89
Zachary, Bernard Jr.	CM	92
Zbaeren, Willard G.	SF	88

Army Acquisition Corps FY98 Resident Command And General Staff College Selection Results

The FY98 Command and General Staff College Selection Board results for Academic Year 99/00 were released on Dec. 17, 1998. Fifty-five Army Acquisition Corps (AAC) officers were selected for resident attendance, and 39 AAC officers were revalidated for resident attendance. Shown below is statistical information on the 55 officers selected for the first time by year group and functional area.

STATISTICS FOR SELECTED OFFICERS

Year Group	No. Selected	Functional Area	No. Selected
85	3	51	30
86	8	53	12
87	21	97	13
88	22		
89	1		

Year Group Command and General Staff College Selection Status

									*Projected**		
Year Group	Popula-tion	Total to Select	% Total to Select	Previous Selected	**FY98 Selection**	Current Total	To Select	Current % Selected	FY99 Selection	FY00 Selection	FY01 Selection
Functional Area 51											
1985	83	42	50.6	41	1	42	0	100	0	0	0
1986	64	32	50.0	26	5	31	1	96.9	1	0	0
1987	66	33	50.0	16	12	28	5	84.8	4	1	0
1988	55	28	50.9	1	11	12	16	42.9	11	4	1
1989**					1						
Functional Area 53											
1985	27	14	51.9	13	1	14	0	100	0	0	0
1986	18	9	50.0	7	1	8	1	88.9	1	0	0
1987	21	11	52.4	5	4	9	2	81.8	2	0	0
1988	33	17	51.5	1	6	7	10	41.2	6	3	1
Functional Area 97											
1985	32	16	50.0	15	1	16	0	100	0	0	0
1986	20	10	50.0	7	2	9	1	90	1	0	0
1987	29	15	51.7	7	5	12	3	80	2	1	0
1988	27	14	51.9	2	5	7	7	50	5	1	1

* The projected number of selections for FY99, FY00, and FY01 are subject to change within the Total to Select ceilings.
** Below Zone selects.

White Sands Hosts Army's Largest Y2K Demonstration

Late last year at White Sands Missile Range, NM, the Army conducted what is believed to be its largest Y2K sensor-to-shooter demonstration. The exhibition proved that in the new millennium, the AH-64A Apache, the AH-64D Longbow Apache, and the OH-58D Kiowa Warrior will be able to designate, identify and attack targets with their missile systems and communicate with the Advanced Field Artillery Tactical Data System (AFATDS) to direct a Multiple Launch Rocket System (MLRS) attack.

"This clearly shows that we are ready to be deployed rapidly and that we will be able to do our job," said Miriam F. Browning, the Director for Information Management, Office of the Director of Information Systems for Command, Control, Communications and Computers, and the Y2K Coordinator for the Department of the Army.

To begin the demonstration, technicians and soldiers moved all system clocks ahead to Dec. 31, 1999, just before the new year. Next, the Apache, Longbow Apache and Kiowa Warrior each fired a Hellfire missile at an armored target. The Kiowa Warrior, still in 1999, then fired an air-to-air Stinger missile at an aerial target. All system clocks rolled over naturally to Jan. 1, 2000, and each aircraft repeated the firing sequence. Finally, each aircraft crew transmitted digital or voice commands for fire support to an AFATDS, which passed the fire order to an MLRS battery. The MLRS crew then fired six rockets at the target area identified by the aircraft.

"The real purpose of this demonstration," said COL Craig Madden, Commander, 4th Brigade, 4th Infantry Division, Fort Hood, TX, "was to prove to our soldiers that their equipment will be ready after the year 2000 arrives."

Many Army organizations worked behind the scenes to ensure the demonstration was a success. The 4th Infantry Division provided the soldiers and most of the systems used in the demonstration. Other organizations that participated were the Army Aviation and Missile Command (Kiowa Warrior and Stinger missile); the Program Executive Office (PEO), Aviation (Apache and Longbow Apache); and the PEO, Tactical Missiles (MLRS and the Hellfire missile) (all from Redstone Arsenal, AL); as well as the PEO, Command, Control and Communications Systems (AFATDS and Single Channel Ground and Airborne Radio System), Fort Monmouth, NJ.

CASCOM Acquisition Liaison Office Established

A new Acquisition Liaison Office (ALO) has been established at the Combined Arms Support Command (CASCOM), Fort Lee, VA, as a result of a memorandum of agreement between the Deputy Director for Acquisition Career Management in the Office of the Assistant Secretary of the Army for Research, Development and Acquisition (OASARDA) and the Commanding General, CASCOM. This small, hybrid office is staffed by both CASCOM and the Army Acquisition Executive Support Agency, including a civilian chief, two lieutenant colonels (Functional Areas 51 and 97) and a civilian secretary.

Gordon L. Campbell, Chief of the ALO, serves in a dual-hatted position. He represents the ASARDA, who is also the Army Acquisition Executive. His principle responsibilities in this position include the formulation and publication of doctrine regarding the Army Acquisition Workforce. The purpose of the acquisition doctrine is to explain the missions, roles and functions of the Army Acquisition Corps during both wartime and contingency-type operations.

Additionally, Campbell is the Principal Deputy to the CASCOM Commanding General (CG) for Acquisition. In this capacity, he serves as the CG's senior acquisition advisor with overall responsibility for supervising the coordinated development of acquisition and logistics doctrine, as well as acquisition and logistics concepts, plans, policies, programs, systems, procedures, and standards.

In summary, the new ALO is responsive to requirements of both Army Acquisition Reform and the Revolution of Military Logistics. The ultimate concern of the office is tracking the impact each area has on the other so that acquisition and logistics doctrine is clearly and coherently melded to best support the warfighter. Current examples of proposed acquisition and logistics doctrine include the final draft of FM-100-10-2, *Contracting Support on the Battlefield*; the pending initial draft release of FM-100-XX, *Contractors on the Battlefield*; as well as the implications of the recent white paper, *An Acquisition Concept for "Cradle to Grave" Partnerships With Industry*; and the work of the Project 912 study groups.

Acquisition Liaison Office staff members and their e-mail addresses are as follows:

Gordon L. Campbell, Principal Deputy to the CASCOM CG for Acquisition, **campbellg@lee-dns1.army.mil**

LTC William R. Sarvay, Acquisition Liaison Officer, **sarvayw@lee-dns1.army.mil**

LTC Thurston Van Horn, Acquisition Liaison Officer, **vanhornt@lee-dns1.army.mil**

Faye Hudson, Secretary, **hudsonf@lee-dns1.army.mil**.

Supportability Engineering Exchange Symposium Call For Papers

A call for papers has been issued for proposed briefings at the 12th Annual Department of Defense Government/Industry Supportability Engineering Exchange Symposium, June 16-18, 1999, in the Sparkman Auditorium, Redstone Arsenal, AL. All industry and government personnel are invited to submit an abstract and a summary of a proposed briefing by April 16, 1999, to Commander, USAMC Logistics Support Activity, ATTN: AMXLS-AL, (Emerson McAfee), Sparkman Circle, Bldg. 5307, Redstone Arsenal, AL 35898-7466; e-mail: **emcafee@logsa.army.mil**; fax: DSN 645-9865 or (256) 955-9865.

Abstracts should be 50-75 words and describe a best practice or lesson learned by your organization in process improvement of implementing logistics engineering. If selected for presentation, the abstract will be placed online for prospective attendees to review. Summaries should be 300-400 words long and describe the proposed presentation.

The symposium will be hosted by the U.S. Army Materiel Command (USAMC) Logistics Support Activity, and co-hosted by the International Society of Logistics, Tennessee Valley Chapter. An open forum format will allow participants from each of the Services, the Department of Defense (DOD) and other federal agencies, industry, and allied nations to share ideas relating to best practices, lessons learned, process improvements, and new techniques in the logistics acquisition arena. In addition, speakers will provide insight regarding new and changing, high-level DOD/Service policies.

To obtain any additional information about the symposium, contact Emerson McAfee at DSN 645-9830 or (256) 955-9830.

NEWS BRIEFS

ATC Honors Ward For Mechanical Hand Grenade Launcher

John P. Ward, a Mechanical Engineering Technician at Aberdeen Test Center (ATC) was recently recognized for inventing a mechanical hand grenade launcher, for which he earned a patent. Ward, a 10-year Test Director assigned to ATC's Firepower Core, was praised by ATC Commander COL Andrew G. Ellis during a safety meeting. Ward said he was simply trying to figure out how to remotely throw a stun hand grenade into an enclosed room. Although the patent is in Ward's name, he assigned it to the Army.

Ward also received a congratulatory letter on his accomplishments from MG Edward L. Andrews, Commander of the Test and Evaluation Command. "This patent is a significant milestone in your career and is recognition of your technical competence and innovation," Andrews said. "Your prestigious achievement reflects great credit on you, ATC, and the Test and Evaluation Command."

Ward said his objective was to provide a low-cost, safe, easy-to-operate, remote mechanical launching device that reduces the chances of injuries or the effects of an exploding grenade. "Stun hand grenades are usually thrown by hand into the target area, which is not ideal for test purposes. If the person throwing the grenade is close to the grenade explosion, the individual may be injured or suffer the same effects as the intended target," Ward said.

"Before the invention, ATC used a fixture in the form of a bombproof," Ward said, describing the "bombproof" as a three-sided metal shield used to protect testers. "It obviously was too large to use for the test that I needed to conduct."

The mechanical hand grenade launcher consists of a metal canister, plunger, plunger handle, internal spring and two lanyards. The device also fits into a briefcase.

The preceding article was written by Lena Goodman, Public Affairs Specialist at the U.S. Army Aberdeen Test Center, Aberdeen Proving Ground, MD.

LETTERS

Dear Sir,

Reference is made to the article "Army Researchers Develop Fibrin Bandage" by COL John R. Hess (Page 49, November-December 1998, *Army RD&A*). This is a very interesting development, but the length of the item did not provide much depth into a subject that concerns all soldiers and, in reality, all injured persons worldwide. If the research group has not considered other forms of packaging, perhaps they should. Several interesting methods are probably worth investigating:

- Fibrin powder in a unit dose "shaker" that could be sprinkled on a wound or existing bandage (similar to the use of Sulfa powder during the Korean War).
- Fibrin paste (non-water based) in a unit dose plastic tube that can be issued as a supplement to the existing field pressure dressing and applied to the bandage immediately prior to use.
- Fibrin paste (non-water based) in a metal collapsible tube (non-unit dose) for use at aid stations and by unit medical personnel. Its use is similar to the fibrin paste, however, since the tube must be squeezed and then recapped, no air (and no water) would be introduced into the tube. The product should keep and a quantity for 10 doses could be issued this way.
- Fibrin foam (non-water based) in a spray can (sort of like shaving creme). Its use is obvious.
- Any of the above with other additives (antibiotics, antiseptics, vitamin K, etc.).

When the fibrin bandage is approved by the FDA, it will become the new standard of care in this country. The demand for this product will be tremendous because of the liability issue. If an emergency medical service fails to use this product once it is available and a patient dies, then a lawsuit for negligence could easily be filed and won. Accordingly, all emergency services in the U.S. and the military will need this product. The same could be said for industrial first aid kits in factories. This new product will be the standard of care for the future. Hopefully, a large manufacturing partner will be found and the product (in one or more delivery methods) will be available in less than three years.

MAJ Niels J. Zuzzblatt
U.S. Army

From The Acquisition Reform Office...

Top Dollar Contracting Award

The U.S. Air Force Europe (USAFE) conducted its annual Top Dollar field contracting and finance competition at Ramstein Air Base, Germany, July 12-16, 1998. USAFE invited the U.S. Army Contracting Command Europe (USACCE) to enter an Army contracting officer as a member of the Air Force contracting team from Rhein Ordnance Barracks. The competition simulates an early-stage deployment into Africa, and includes weapons firing, reaction to a chemical attack, and either an obstacle course or team run (weather dependent). USACCE selected Kennith Robinson, a civilian contracting officer, to compete because of his physical conditioning and contingency contracting skills. Robinson works at the Wiesbaden Regional Contracting Center and was deployed as a contingency contracting officer to Croatia in support of Operation Joint Endeavor from December 1995 through June 1996.

During the competition, Robinson served as the Contracting Team Chief, and although his team did not win the overall competition, they won the key element, contracting. The team took everyone by surprise, particularly because Robinson is a civilian, and military contracting personnel led all the other teams. This was the first time a contracting officer from outside the Air Force has won a Top Dollar Best Contracting Crew Award. Together, USACCE and USAFE are striving to put "teeth" into working jointly. This is a good example of that effort.

Point of contact for this article is COL Yates, Commander, USACCE, 011 49 621 487-3201.

AN/PRD-12 Modernization Through Spares

The AN/PRD-12 is a lightweight, man-transportable radio direction finding system used in tactical signals intelligence. The AN/PRD-12 is an indispensable source of information on the battlefield because it pinpoints the enemy's location through his/her transmissions and communications. One of its major components, the Control Display Unit (CDU), has experienced high failure rates because its liquid crystal display is vulnerable to cold weather solidification and front panel breakage under field conditions. In addition, the liquid crystal displays for this product are technologically obsolete, and no manufacturer could be found to produce them.

In June 1997, an Integrated Product Team (IPT) based at the U.S. Army Communications-Electronics Command (CECOM) developed a performance specification for a new, more durable CDU. Through the use of Operations and Maintenance Army funds from our Operations and Support Cost Reduction Program, a prototype CDU was developed. The redesigned CDU incorporated the newest, lightest, most durable liquid crystal display from similar components used in today's commercial products such as cell phones. An impressive aspect of this project is that the upgraded component prototype was developed and system tested in just 5 months. This exemplifies the good working relationship among members of the IPT, including the contractor, Value Systems Engineering. By January 1998, a production contract was awarded. The first new CDUs were delivered in August 1998 to Army military intelligence battalions and the U.S. Marine Corps. What's even more exciting is that these replacement CDUs are acquired through the Army's supply system using Army working capital funds. Soldiers want this product, and the marketplace has provided the resources to ensure success.

The new CDU costs about $13,000, less than half the original unit cost of nearly $28,000, and is much lighter, 18 ounces versus 40 ounces. It consumes one-sixth the battery power of the old units, thereby contributing to efficient power management and lower operating costs. This new CDU can also be repaired in the field with modular parts. The old one required depot-level maintenance and repair. In addition, it is guaranteed to operate at minus 30 degrees Celsius, has much stronger cover glass, and an easier to read screen. The bottom line is that the Army reduced operating and sustainment costs, improved reliability, and provided our soldiers an information advantage, all at the same time.

This IPT's success represents the teamwork needed among researchers, users, materiel developers, logisticians, and industry partners to provide our soldiers with the best equipment available. It is also an excellent example of applying our Modernization Through Spares strategy as an effective tool in the management of Army programs.

Point of contract for this article is Beth Sparandera, CECOM, (732) 532-9935, e-mail: **leshick@doim6.monmouth.army.mil**.

Contracting Training At The National Training Center

Forces Command (FORSCOM) requires units rotating through the National Training Center (NTC) to deploy with contingency contracting personnel from their divisional contracting section. In the past, these personnel were limited to executing delivery orders against existing Fort Irwin, CA, basic ordering agreements. LTC Mike Henry, Director of Contracting at Fort Irwin, revamped his operations during the past year to afford contingency contracting personnel at the NTC better training by allowing them to solicit and award purchase orders and contracts for goods and services their units require.

At FORSCOM's recent Contingency Contracting Workshop, COL Charles Guta, FORSCOM's Principal Assistant Responsible for Contracting, proposed additional training for contingency contracting personnel while their units conduct maneuvers at the NTC. Contingency contracting personnel support their units before and after this maneuver period, with a 2-week period available for additional training. The Deputy Assistant Secretary of the Army for Procurement (DASAP) collected contracting scenarios from the U.S. Air Force's Top Dollar competitions and the U.S. Army Contracting Command Korea's external evaluation and forwarded them to FORSCOM. Using these scenarios, Henry is developing a 2-week, scenario-based contracting training program as part of NTC rotations. With the cooperation of the DASAP, the Air Force, and the Army's Contracting Command Korea, FORSCOM will provide another superb training opportunity for our young contingency contracting officers and noncommissioned officers during the 2nd quarter of FY99.

Point of contact for this article is LTC Ken Cobb, DSN: 367-5510 or (404) 464-5510, e-mail: **cobbk@forscom.army.mil**.

For additional information on acquisition reform, contact LTC Daniel J. Gallagher in the Acquisition Reform Office at DSN 761-9479 or (703) 681-9479, e-mail: ***gallaghd@sarda.army.mil***.

Generals In Khaki

By Henry Blaine Davis Jr., Pentland Press Inc. 1998

Reviewed by Cynthia Hermes, Managing Editor, Army RD&A Magazine.

Henry Blaine Davis' 411-page book, *Generals in Khaki*, is a catalogue of the 473 active U.S. generals who served during World War I, as well as three other generals whose names were mentioned elsewhere in the book and whose stories he felt were too interesting to pass up.

In the Preface, Davis explains that he chose this title because khaki was the color of the service uniform of the U.S. Army during World War I. The Preface also includes historical background, military terminology, and interesting facts regarding the Army during that period.

The names of the generals in this book are arranged alphabetically. Their biographies are accompanied by photographs and include details of their military career and summaries of their civilian life.

An essay by Elbert Hubbard entitled "A Message to Garcia" follows the biographical section. This is included because Davis feels that it helps illuminate the character and guiding beliefs of the generals in the book: stiff spines that caused them to be loyal to the trust placed in them and to act promptly, concentrating their energies on accomplishing their missions.

The book has two appendices. Appendix A provides interesting data on the generals, such as who among them were siblings or were commissioned directly from civilian life. Appendix B is a listing of where each general attended college. The final section of the book is a biography of published sources.

Davis spent 12 years researching U.S. Army generals of World War I for *Generals in Khaki*. A former officer himself, he spent many years as a curator of military museums across the country. A similar book on generals of the Civil War inspired Davis to write this book. *Generals in Khaki* will appeal to librarians, military historians, genealogists, and anyone with an interest in the leaders of World War I.

Army Acquisition Corps Reading List

LTG Paul J. Kern, Military Deputy to the Assistant Secretary of the Army for Research, Development and Acquisition, and Director of the Army Acquisition Corps (AAC), recommends the reading list shown below for AAC members. The *Army RD&A* editorial office welcomes book reviews on these publications. Please note that we have already received a review of *Hope Is Not a Method: What Business Leaders Can Learn From America's Army*, by Gordon Sullivan and Michael V. Harper. To preclude duplicate submissions, contact the *Army RD&A* editorial office prior to sending your book review. The phone number is (703) 805-1035 or DSN 655-1035. The e-mail address is **bleicheh@aaesa.belvoir.army.mil**.

- *Being Digital*, Nicholas Negroponte and Marty Asher, Random House, January 1995
- *Built To Last: Successful Habits of Visionary Companies*, James C. Collins and Jerry I. Porras, HarperCollins, January 1994
- *Hope Is Not a Method: What Business Leaders Can Learn From America's Army*, Gordon Sullivan and Michael V. Harper, Broadway Books, October 1997
- *Leading Change*, John P. Kotter, Boston: Harvard Business School Press, August 1996
- *Sacred Cows Make The Best Hamburger*, JoAnn Roberts, Warner Books, January 1993
- *Unleashing The Killer App: Digital Strategies For Market Dominance*, Larry Downes and Chunka Mui, Boston: Harvard Business School Press, April 1998

ARMY RD&A WRITER'S GUIDELINES

About *Army RD&A*

Army RD&A is a bimonthly professional development magazine published by the Office of the Assistant Secretary of the Army (Research, Development and Acquisition). The address for the Editorial Office is: DEPARTMENT OF THE ARMY, ARMY RD&A, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. Phone numbers and e-mail addresses for the editorial staff are as follows:

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Purpose

To instruct members of the RD&A community relative to RD&A processes, procedures, techniques and management philosophy and to disseminate other information pertinent to the professional development of the Army Acquisition Workforce.

Subject Matter

Subjects may include, but are not restricted to, professional development of the Army's Acquisition Workforce, RD&A program accomplishments, technology developments, policy guidance, information technology, and acquisition reform initiatives. Articles containing footnotes are not acceptable. Acronyms used in manuscripts and with photos must be kept to a minimum and must be defined on first reference.

Length of Articles

Articles should be approximately 1,500 to 1,600 words in length. This equates to approximately 8 double-spaced typed pages, using a 20-line page. Do not submit articles in a layout format.

Photos and Illustrations

A maximum of 3 photos or illustrations, or a combination of both, may accompany each article. Photos may be black and white or color. **Illustrations must be black and white, in PowerPoint, and must not contain any shading, screens or tints.** Not all photos and/or illustrations may be used and they will not be returned unless requested.

Biographical Sketch

Include a short biographical sketch of the author/s. This should include the author's educational background and current position.

Clearance

All articles must be cleared by the author's security/OPSEC office and public affairs office prior to submission. The cover letter accompanying the article must state that these clearances have been obtained and that the article has command approval for open publication.

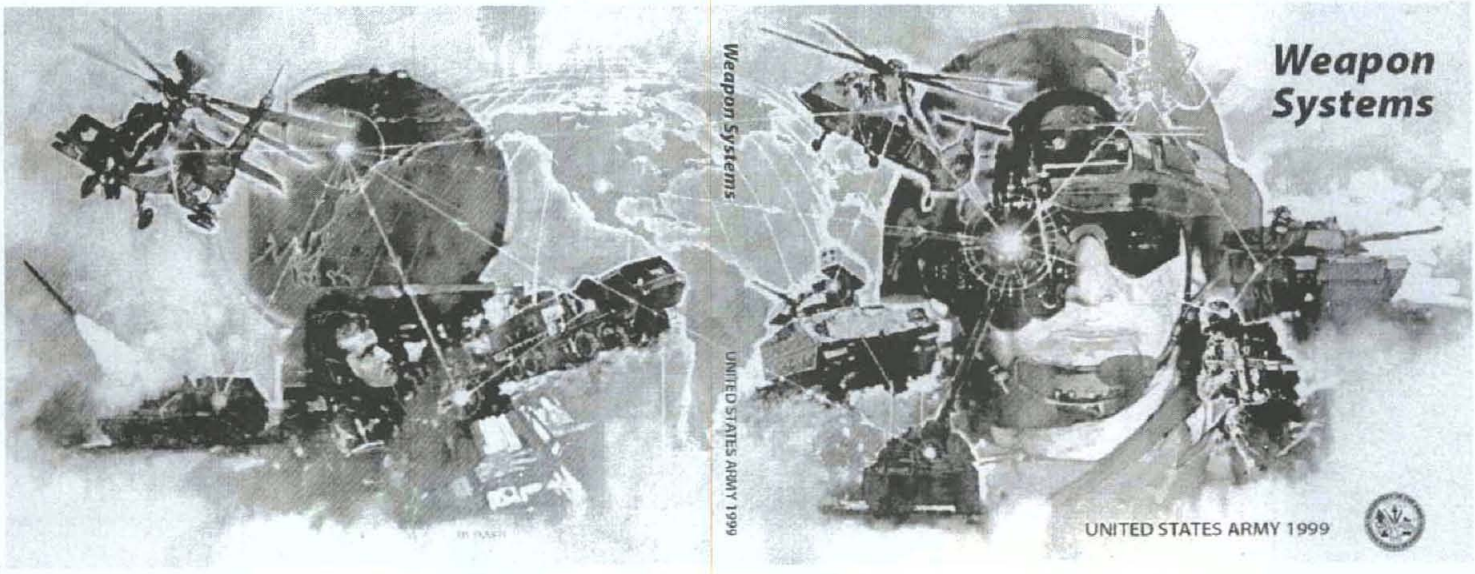
Offices and individuals submitting articles that report Army cost savings must be prepared to quickly provide detailed documentation upon request that (1) verifies the cost savings; and (2) shows where the savings were reinvested. Organizations should be prepared to defend these monies in the event higher headquarters have a higher priority use for these savings. All Army RD&A *articles are cleared through SARD-ZAC. SARD-ZAC will clear all articles reporting cost savings through SARD-RI. Questions regarding this guideline can be directed to SARD-ZAC, Acquisition Career Management Office, (703)604-7103, DSN 664-7103.*

Submission Dates

Issue	*Author's Deadline*
January-February	15 October
March-April	15 December
May-June	15 February
July-August	15 April
September-October	15 June
November-December	15 August

Submission Procedures

Article manuscripts (in MS Word) and illustrations (in PowerPoint) may be submitted via e-mail to **bleicheh@aaesa.belvoir.army.mil**, or on a 3 1/2-inch floppy disk via U.S. mail to DEPARTMENT OF THE ARMY, ARMY RD&A, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. Photos may be e-mailed *for review purposes only*, but glossy prints must be sent via the U.S. mail. All submissions must include the author's mailing address, office phone number (DSN and commercial), and a typed, self-adhesive return address label.



Hoeper Receives Painting

During a ceremony in his office, Assistant Secretary of the Army (Research, Development and Acquisition) Paul J. Hoeper (right) was recently presented with the original painting that is reproduced on the cover of the 1999 *Weapon Systems Handbook*. Shown (left) are Don Vogus and Kristin Wilson, employees of Science Applications International Corporation (SAIC). The painting, which is the work of C. Michael Dudash, a nationally renowned artist, offers a vision of the power of mental agility and information dominance in the force. The soldier in the painting is the focal point of the network links represented by the rays of light. This depiction highlights the vitality and success of the individual soldier. The situational information flows across the network, directing the firepower of the combat platforms, and directing the delivery of support assets and materiel. Every system and every information link supports the individual soldier.

A printed version of the 1999 *Weapon Systems Handbook* may be obtained by calling LTC Charles Coutteau at (703) 614-4363 or DSN 225-4363. The handbook is also on the SARDA home page at **http://www.sarda.army.mil**.

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