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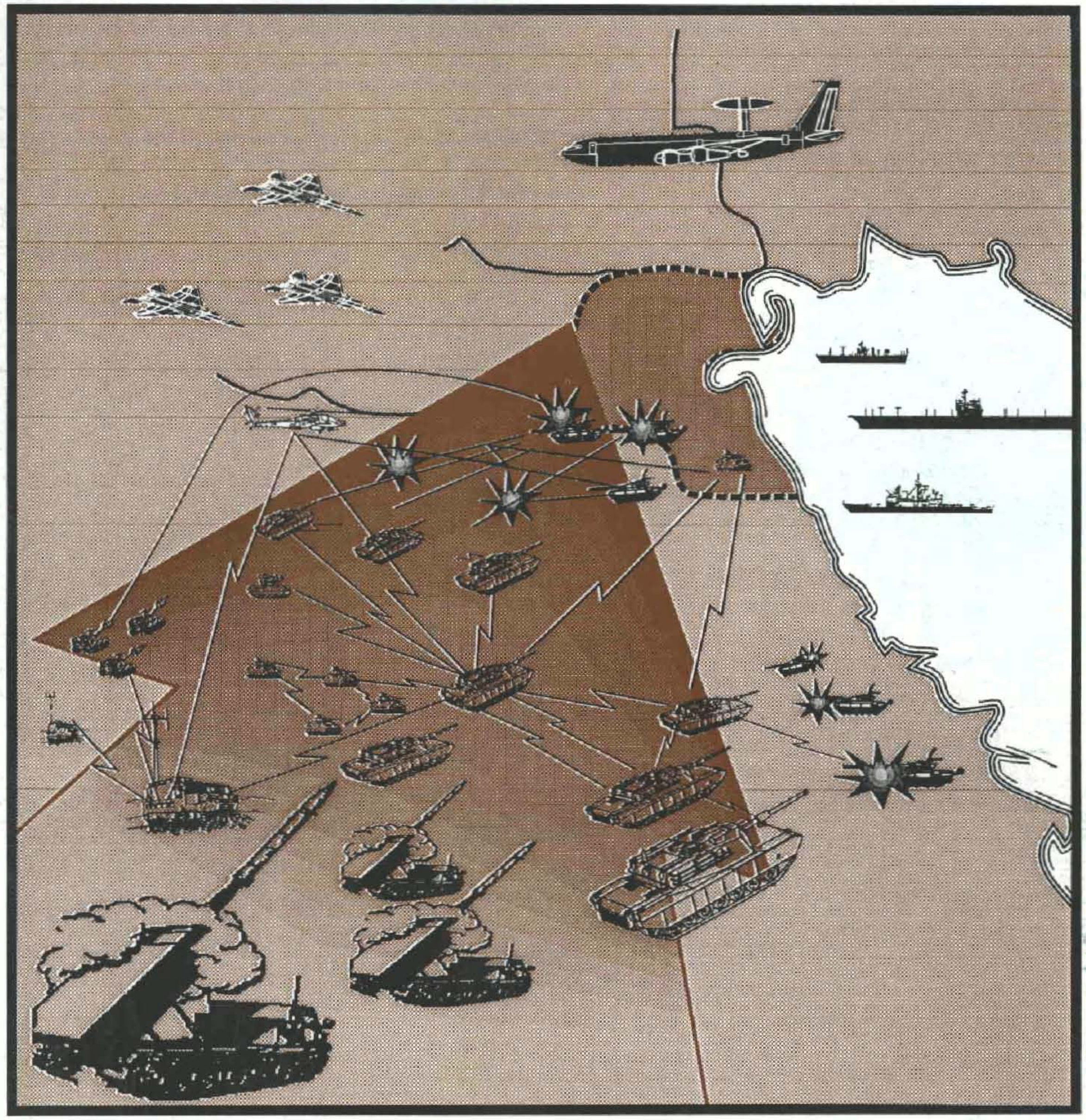

TRI-SERVICE SCIENCE & TECHNOLOGY RELIANCE

NOVEMBER–DECEMBER 1992
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By order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
02809

ARMY
Research Development Acquisition
RD&A
BULLETIN

Professional Bulletin of the RD&A Community

FEATURES

DEPARTMENTS

COVER

As Desert Storm showed, future conflicts will be fought jointly with the other services, planned by the warfighting CINCs and possibly alongside coalition forces. This cooperation and teamwork is also taking place throughout the Defense science and technology enterprise. This issue summarizes the progress made by the three military departments under the bold initiative, Project Reliance.

PROJECT RELIANCE

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

NOV 25 1991

SARD-ZT

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY FOR RESEARCH AND TECHNOLOGY

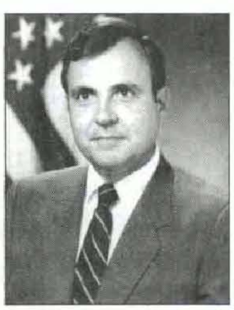
SUBJECT: Tri-Service Science & Technology (S&T) Reliance Implementation

I have reviewed the Tri-Service Science and Technology Reliance Strategy Report dated April 1991, and, using it as a baseline, you are directed to implement the Reliance process.

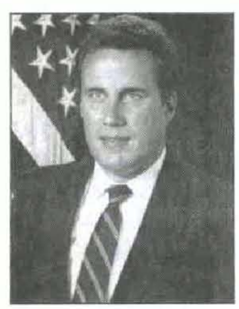
As the Army's S&T Executive, you will be our representative to the Defense Science and Technology Steering Group. The implementation process will be executed through the S&T Reliance Oversight organizational structure outlined in the Reliance Strategy report. The specific details of the implementation process and continued Reliance planning and development will be accomplished through coordinating bodies including the Joint Directors of Laboratories, the Armed Services Biomedical Research Evaluation and Management, the Training and Personnel Systems S&T Evaluation and Management, and the Joint Engineers. Reporting of their progress will be provided to you on a periodic basis via the Joint Directors of Laboratories. You are to staff and submit for my approval Tri-Service plans which result from the Reliance process and that affect the Army S&T program.

Tri-Service Reliance in Science and Technology represents an outstanding example of the progress achieved under the Defense Management Review. We will continue to improve these processes in concert with the DDR&E and aggressively solicit Congressional support for Tri-Service Reliance processes and programs.

Stephen K. Conver
Assistant Secretary of the Army
(Research, Development and Acquisition)



GEORGE T. SINGLEY III
Deputy Assistant Secretary of the Army for Research and Technology and Chief Scientist



STEPHEN K. CONVER
Assistant Secretary of the Army (Research, Development and Acquisition) and Army Acquisition Executive

TRI-SERVICE RELIANCE IN SCIENCE AND TECHNOLOGY

By George T. Singley III
Deputy Assistant Secretary of the Army (Research and Technology) and Chief Scientist
and
Douglas E. Ellsworth
Chief, Laboratory Coordination Office
Office of the ASA (RDA)

Introduction

The national security strategy of the United States has long depended upon technological superiority to counter the military numerical superiority of its potential adversaries. But carrying out this strategy has its price: the United States must stay technologically ahead of its potential adversaries. And it must do so during a time of unprecedented technology advances around the globe.

Since World War II, the science and technology (S&T) community of the Department of Defense has carried much of the burden of maintaining our vital technology advantage. In doing so, it has carried an awesome level of responsibility for maintaining our long term security.

The Cold War placed enormous demands upon the individual missions and military responsibilities of each service. Fulfilling these individual service missions, in turn, demanded support through science and technology efforts that are uniquely responsive to each service's needs. Not surprisingly, the Department of Defense and the three military departments each created and maintained, over the years, sophisticated S&T development organizations that were tailored to support their individual challenges.

For almost half a century, through the depths of the Cold War—from the Korean War to the War in the Gulf—the Defense science and technology base of the United States has met the challenge. Today, our military systems remain the envy of the world and are a persuasive deterrent to aggressors, both large and small.

But the world that shaped the services' individual missions (and their science and technology activities) has changed radically: the rapid decline in tensions between the U.S. and the Soviets and the subsequent dissolution of the Soviet Union; the shift from a bipolar to a multipolar world; the reduction of overseas bases; the proliferation of high-technology weaponry throughout the world; the increased recognition of the importance of economic security to overall national security; and the force and budget reductions of the U.S. military. As the winds of change were growing more and more powerful, important questions were being formulated within the Department of Defense: Was the existing science and technology infrastructure, used so successfully during the Cold War, still appropriate for the new strategic environment emerging during the 1990s? And if it was not, what new organizational structure should replace it? Answering these questions was soon to have a profound influence on the future of science and technology development within the Department of Defense.

OSD Concerns and the Creation of Tri-service S&T Reliance

By 1989, senior officials at the Department of Defense had become increasingly concerned about the viability of maintaining a "business-as-usual" approach to science and technology development in the defense technology base. In October 1989, Deputy Secretary of Defense Donald Atwood issued a draft Defense Management Report (DMR) Decision initiative which challenged the services to create a new approach to S&T management that would increase efficiency and reduce unwarranted overlap in the research, development, test and evaluation (RDT&E) activities of the military departments.

The services moved quickly to respond to the challenges of the draft DMR initiative. In October 1989, just after issuance of the draft DMR, the services began formal discussions on ways to further strengthen inter-service cooperation in their RDT&E programs and increase utilization of each other's facilities. One of these studies was called "Tri-service S&T Reliance," a study undertaken by the Army, Air Force and Navy to examine opportunities to consolidate and collocate their R&D efforts at single site locations in selected technology areas. Project Reliance is one of the most comprehensive restructuring efforts involving the science and technology base in over 40 years.

By the summer of 1990, the three services had jointly developed a coordinated proposal for Deputy Secretary of Defense Atwood that further outlined approaches for inter-service Reliance in Science and Technology and Test and Evaluation (T&E), as well as RDT&E laboratory consolidations. Mr. Atwood

TECHNOLOGY AREA RESPONSIBILITIES OF THE OVERSIGHT BODIES

JOINT DIRECTORS OF LABORATORIES

AEROPROPULSION
AIR VEHICLES (FIXED WING)
AIR VEHICLES (ROTARY)
ASTROMETRY
CHEMICAL/BIOLOGICAL DEFENSE
CLOTHING, TEXTILES, AND FOOD
COMMUNICATIONS, COMMAND, AND CONTROL
CONVENTIONAL AIR / SURFACE WEAPONRY
ELECTRO-OPTICS
ELECTRONIC DEVICES
ELECTRONIC WARFARE
ENVIRONMENTAL SCIENCE
EXPLOSIVE ORDNANCE DISPOSAL
FUELS AND LUBES
GROUND VEHICLES
INTEGRATED AVIONICS
NUCLEAR WEAPONS EFFECTS
RADAR
SHIPS / WATERCRAFT
SMALL ARMS
SOFTWARE
SPACE
UNMANNED GROUND VEHICLES
ADVANCED MATERIALS*
DIRECTED ENERGY WEAPONRY*

ASBREM	TAPSTEM	JOINT ENGINEERS
MEDICAL	MANPOWER AND PERSONNEL TRAINING SYSTEM	CIVIL ENGINEERING ENVIRONMENTAL QUALITY

* ADDED DURING RELIANCE IMPLEMENTATION PHASE

Figure 1.

S&T RELIANCE OBJECTIVE

MOVE FROM CATEGORY 1
(COORDINATION) DOMINANT MODE BEFORE RELIANCE . . .

. . . TO A HIGHER MODE
(CATEGORY 2, 3, OR 4) AND IDENTIFY SERVICE UNIQUE (CATEGORY 6) AREAS WITH COMPETITION RETAINED AS A FUTURE OPTION IF A HIGHER MODE OF RELIANCE IS NOT ACHIEVED

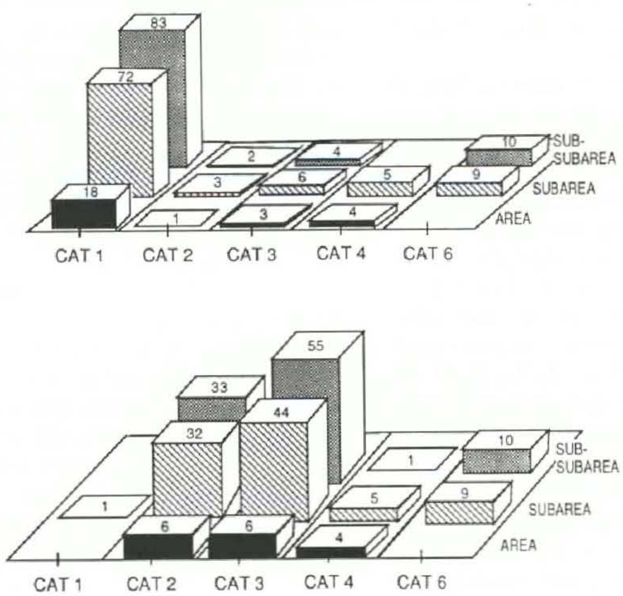


Figure 2.

approved the tri-service coordinated proposal in concept and the services began tasking individual groups to identify ways to achieve greater inter-service reliance for S&T and T&E. On Oct. 12, 1990, the formal Tri-service S&T Reliance study began, addressing the full range of the services' S&T activities; namely, their 6.1 (basic research), 6.2 (exploratory development), and 6.3A (advanced development) programs.

In November 1990, Mr. Atwood signed the final version of the DMR initiative (DMRD 922) which formally adopted the inter-service Reliance initiative, acknowledged the savings already achieved by the individual service consolidation initiatives, and tasked the services to proceed with plans for restructuring and streamlining their RDT&E activities.

Tri-Service S&T Reliance

Tri-service S&T Reliance was effected in two major phases: the Study Phase and the Implementation Phase. The Study Phase spanned from September 1990 to March 1991 and involved dozens of tri-service working groups. It was during this time that the goals of S&T Reliance were formally stated to be:

- Enhance science and technology;
- Ensure critical mass of resources to develop "world-class" products;
- Reduce redundant capabilities and eliminate unwarranted duplication;
- Gain efficiency through collocation and consolidation of in-house work where appropriate; and
- Preserve services' mission-essential capabilities.

These goals had to be accomplished in a new strategic environment, an environment that would demand closer coordination of science and technology resources and plans than had ever before been attempted by the services. To help accomplish these goals, a new conceptual framework was developed to help manage the transition from the current state of extensive, but informal cooperation to an increasing level of mutual reliance among the services. Understanding this conceptual framework is the key to understanding the progress achieved by Tri-service S&T Reliance.

The new framework consisted of defining a spectrum of six different categories of inter-service Reliance for use in analyzing the services' S&T programs:

Category 1: Coordination. This category represents the type of interaction most frequently used among the services prior to Reliance. For example, it would literally describe hundreds of DOD-sponsored S&T coordination bodies that had successfully supported S&T coordination for the past several decades.

The objective of the Tri-service S&T Reliance process was to move the S&T efforts of the three services from the preponderance of Category 1 type of activities to Categories 2, 3, or 4, wherever it made good sense to do so.

Category 2: Joint Efforts. This category includes programs that will be planned and conducted jointly, but task execution can be at separate service locations and all services retain separate funding control.

Category 3: Collocation. This category includes programs for which in-house task execution will be collocated at a single services' activities, with all services retaining separate funding control. Each service, at its option, may retain its own in-house effort of up to two work-years per year, in order to ensure service awareness of the major activity on-going at the collocated site. Collocated programs may also be "joint," but there is no requirement for this.

Category 4: Consolidation. This category includes programs that will be consolidated under a lead service for management. For programs so designated, all related S&T funds will be transferred to the designated lead service, and work will be carried out at that service's activities.

Category 5: Competition. This category includes programs for which in-house task execution will be competed among the service performers, with all services retaining separate funding and performer-decision control.

Category 6: Service Unique. This category recognizes that certain S&T programs will be unique to a given service, for which the other two services have no need to rely on that service.

The objective of the Tri-service S&T Reliance process was to move the S&T efforts of the three services from the preponderance of Category 1 type of activities to Categories 2, 3, or 4, wherever it made good sense to do so. The services agreed at the outset to adopt Category 5 in those instances where they were unable to agree on one of the other modes of Reliance.

A total of 28 technology areas were addressed during the study phase of Reliance. (See Figure 1.) The 28 technology areas, all of which were of interest to two or more services, were selected for examination based on findings of previous OSD-sponsored studies, which had indicated that there was potential for better coordination of effort among the services in those areas.

Tri-service working groups were established during the Study Phase to examine these different technology areas and develop recommendations for enhanced Reliance in each. Thus the first order of business facing each group was to agree upon a technology "taxonomy" which described the content of their technology area. These taxonomies were structured hierarchically into "areas" (the top level of aggregation), "subareas" (the next level of aggregation) within which it was possible to relate the individual S&T activities of each service. In addition to the original 28 technology areas, the working groups ultimately identified 195 subareas and sub-subareas—223 technology topics in all—of importance to Tri-service S&T Reliance.

The working groups next had to assess which of the 223 technology topics were in need of higher levels of inter-service Reliance, propose an appropriate Reliance category (2, 3, 4 or 6 initially) for each topic, and develop specific plans for achieving the proposed level of Reliance. After review and iteration by the Reliance integration team, the Reliance Executive Steering Group, and the individual service chains of command, the proposals solidified into firm agreements. The Study Phase of Reliance resulted in formal service agreements for joint planning, collocated research, or consolidation under a lead service for each of the technologies that were not service unique.

Reaching these agreements was a major milestone of the Study Phase. Just how much of a change the agreements represent can be seen in Figure 2, which graphically portrays the difference between the state of coordination among the service S&T programs that existed pre-Reliance, and the new levels of in-

IMPLEMENTING LETTERS

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON DC 20310-0103

NOV 25 1991

SARD-ZT

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY FOR RESEARCH AND TECHNOLOGY

SUBJECT: Tri-Service Science & Technology (S&T) Reliance Implementation

I have reviewed the Tri-Service Science and Technology Reliance Strategy Report dated April 1991, and, using it as a baseline, you are directed to implement the Reliance process.

As the Army's S&T Executive, you will be our representative to the Defense Science and Technology Steering Group. The implementation process will be executed through the S&T Reliance Oversight organizational structure outlined in the Reliance Strategy report. The specific details of the implementation process and continued Reliance planning and development will be accomplished through coordinating bodies including the Joint Directors of Laboratories, the Armed Services Biomedical Research Evaluation and Management, the Training and Personnel Systems S&T Evaluation and Management, and the Joint Engineers. Reporting of their progress will be provided to you on a periodic basis via the Joint Directors of Laboratories. You are to staff and submit for my approval Tri-Service plans which result from the Reliance process and that affect the Army S&T program.

Tri-Service Reliance in Science and Technology represents an outstanding example of the progress achieved under the Defense Management Review. We will continue to improve these processes in concert with the DDR&E and aggressively solicit Congressional support for Tri-Service Reliance processes and programs.

Stephen K. Conver
Assistant Secretary of the Army
(Research, Development and Acquisition)

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC 20330-1000

OFFICE OF THE ASSISTANT SECRETARY

OCT 06 1991

MEMORANDUM FOR AFSC/XT (MAJOR GENERAL RANKINE)

SUBJECT: Tri-Service Science and Technology Reliance Implementation - ACTION MEMORANDUM

I have reviewed the Tri-Service Science and Technology (S&T) Reliance report, and using the agreements for S&T it contains as a baseline, you are directed to implement the Reliance process. The implementation process will continue to be managed by the Joint Directors of Laboratories (JDL), with specific Tri-Service Reliance program planning to be accomplished by the JDL and other Tri-Service coordinating groups (e.g., ASBREM). Tri-Service plans which result from the Reliance process that affect the Air Force S&T program will be staffed by the TEO to the AFAE for approval.

Tri-Service Reliance represents a benchmark for DoD S&T program streamlining under the Defense Management Review (DMR). We will aggressively work with DDR&E and Congress to gain support for the Tri-Service Reliance process and the S&T program.

J. J. WELCH, JR
Assistant Secretary of the Air Force
(Acquisition)

THE ASSISTANT SECRETARY OF THE NAVY
(Research, Development and Acquisition)
WASHINGTON D.C. 20350-1000

SEP 06 1991

MEMORANDUM FOR THE CHIEF OF NAVAL RESEARCH

Subj: TRI-SERVICE SCIENCE AND TECHNOLOGY (S&T) RELIANCE IMPLEMENTATION

I have reviewed the Tri-Service S&T Reliance report and concur with its contents. Using the agreements for S&T it contains as a baseline, you are directed to implement the Inter-Service Reliance process within the Navy. The implementation process will continue to be managed by the Joint Directors of Laboratories (JDL), with specific Tri-Service Reliance program planning to be accomplished by the JDL and other Tri-Service coordinating groups (e.g., ASBREM). The resultant Tri-Service S&T plans will serve as a foundation for interaction with DDR&E regarding Service S&T investments.

Tri-Service Reliance in Science and Technology represents an outstanding example of the progress achieved under the Defense Management Review. We will continue to improve these processes in concert with the DDR&E and aggressively solicit Congressional support for Tri-Service Reliance processes and programs.

Gerald A. Cann

Figure 3.

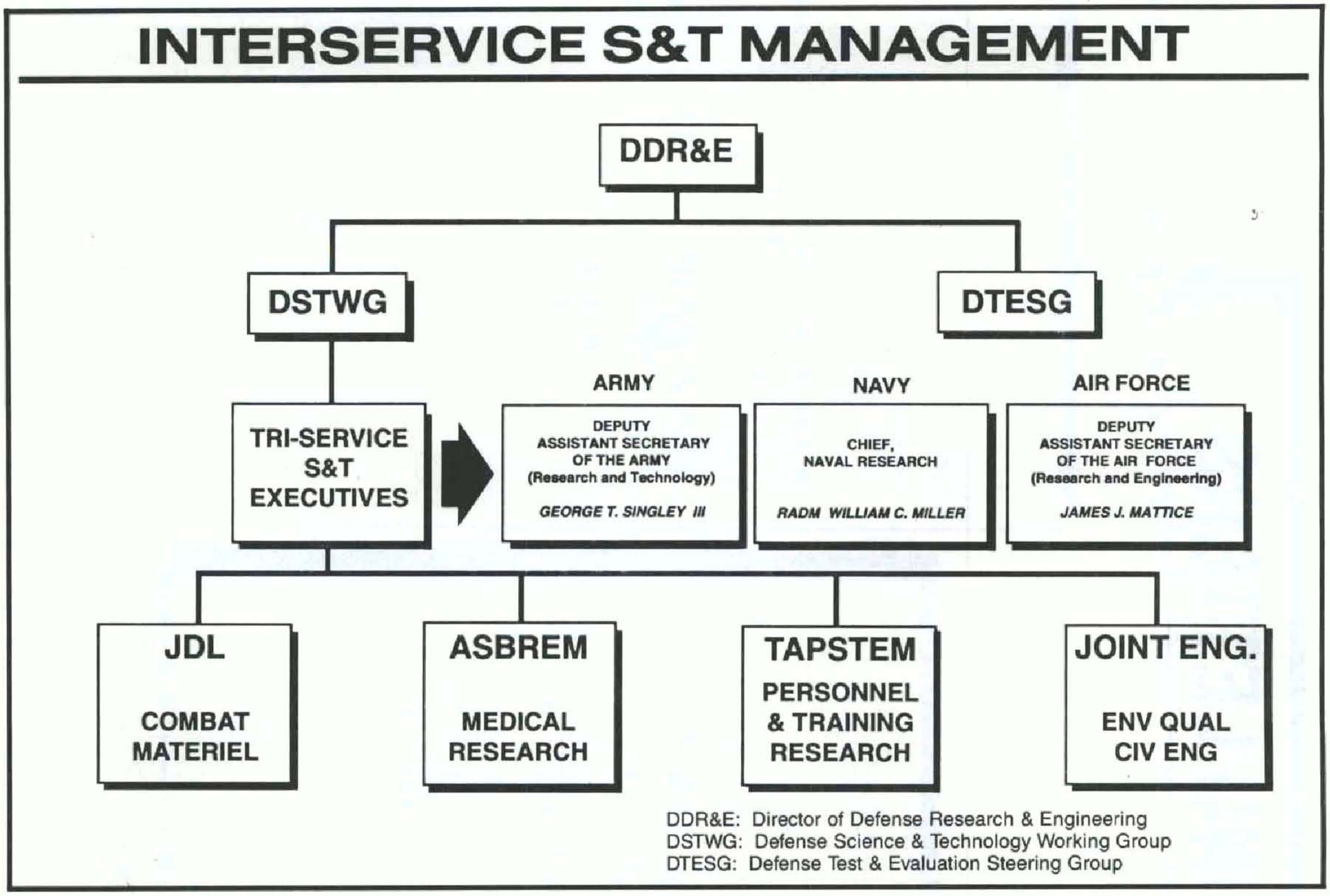


Figure 4.

teraction achieved as a result of Reliance. The top of the figure shows that the pre-Reliance relationships were dominated by Category 1 type coordination activities, with joint programs, collocations, and consolidations being the exceptions to the rule. The bottom of the figure shows the dramatic movement to higher modes of Tri-service Reliance, particularly Category 2 (Joint) and Category 3 (Collocation).

As a result of these agreements there is a new management and planning structure to implement and verify compliance with Reliance agreements through the Joint Directors of Laboratories (JDL), the Armed Services Biomedical Research, Evaluation and Management (ASBREM) Committee, the Training and Personnel Systems Science and Technology Evaluation and Management (TAPSTEM) Committee, and the Joint Engineers.

The Study Phase provided the blueprint for implementing greater Tri-service Reliance. Its findings and agreements were accepted by the Executive Steering Committee and presented to the Service Acquisition Executives (SAEs) in March 1991. It was subsequently agreed that the Implementation Phase of the initiative would be performed under the Defense Science and Technology Working Group (DSTWG) of the Defense Technology Board (DTB) through the Tri-service S&T Executives.

Implementation of Reliance

By Nov. 25, 1991, all three service assistant secretaries for research, development and acquisition had reviewed the Reliance process and had directed its implementation in their respective services. Figure 3 displays the three memoranda directing the implementation of the Reliance process.

As indicated above, responsibility for carrying out the implementation and verification of compliance with Reliance has been assigned to the JDL, ASBREM, TAPSTEM, and Joint Engineers. Figure 4 displays how responsibility for the individual Reliance technologies has been partitioned among these four bodies. The JDL existed prior to Reliance but its charter needed to be expanded by its parent body, the Joint Logistics Commanders, to enable the JDL to carry out its new role. ASBREM also existed before the beginning of Tri-service S&T Reliance and was deemed still to be a viable management and coordination vehicle for the medical area. TAPSTEM was in the process of being formed during the Reliance initiative and was therefore easily incorporated into it. The Joint Engineers did not exist, but has now been established.

THE ROLE OF THE JOINT DIRECTORS OF LABORATORIES IN PROJECT RELIANCE

By Richard Vitali
Acting Director
U.S. Army Research Laboratory

The Joint Directors of Laboratories (JDL) is chartered as a Joint Technical Coordinating Group by the Joint Logistics Commanders (JLC). The commander, U.S. Army Materiel Command; deputy chief of Naval operations (logistics); and the commander, Air Force Materiel Command are the JLC. The JDL was established in December 1974, and rechartered in March 1982. The JDL principals are: BG Richard R. Paul, deputy chief of staff/science and technology, U.S. Air Force Materiel Command; MG Patrick J. Kelly, commander, U.S. Army Research Laboratory (formerly U.S. Army Laboratory Command); and RADM William C. Miller, chief of Naval research. ***(Editor's Note: MG Kelly retired from the Army as this issue of Army RD&A Bulletin was going to press. MG Thomas L. Prather Jr., deputy chief of staff for research, development and engineering, Headquarters, U.S. Army Materiel Command, has replaced Kelly as the Army JDL principal.)*** As such, the JDL reports directly to the JLC on the science and technology (S&T) research programs (research, exploratory development, and advanced technology development) in the services. The JDL charter/process provides a structure to oversee the services' S&T resources, lab expertise and facilities.

Using the JDL process as the medium, the services had already achieved considerable success in identifying, establishing and coordinating joint service programs in key technology areas such as electronic warfare and command, control and communications. These achievements demonstrated that the JDL process worked and provided a viable structure for accomplishing joint service initiatives. To enable the JDL to carry out its new role and responsibilities under Tri-service S&T Reliance, its charter needed to be expanded by its parent body, the JLC. The JLC issued guidance on Dec. 5, 1990, that expanded the charter of the JDL to include oversight and support of the Reliance initiatives. In addition, the JDL supporting infrastructure had to be substantially enlarged and reorganized in order to better manage the 25 Reliance technology areas assigned to it—which collectively can be described as combat materiel. Figure 1 shows the current JDL organization. The technology panels focus on 6.2 (exploratory development) and 6.3A (advanced development) programs but include 6.1 (basic research) work where it is closely tied to the higher category programs. The other two panels are the Basic Research Panel (which addresses all service-supported 6.1 work) and the Management Panel. The Management Panel members are the services' senior JDL executives responsible for the administration and management of S&T resources. In particular, Tri-service S&T Reliance delegated the Management Panel with oversight responsibility for seven technology areas—specifically, ships and watercraft; fuels and lubes; clothing, textiles and foods; ground vehicles; nuclear weapons effects; astrometry; and chemical/biological defense—that were not called out as Reliance joint efforts, and were not included within the current JDL technology panel structure. The Management Panel is charged with monitoring compliance of the Reliance agreements in these technology areas.

The JDL Panels provide the necessary supporting infrastructure for implementing Tri-service S&T Reliance by assuming the following important functions:

- Develop Joint Service Program Plans (JSPP) for and oversee execution of integrated S&T programs in those areas designated as "Joint" (Category 2) and, where appropriate, for "Collocated" (Category 3) and "Consolidation" (Category 4);
- Monitor implementation of other Reliance agreements and ensure appropriate coordination;
- Conduct inter-service competitions for S&T task execution as directed by the JDL;
- Recommend additional areas of advanced technology warranting multi-service attention;
- Develop and maintain a data base of on-going work and make it available to the Defense Technology Information Center (DTIC);
- Assess the state of independent industrial research and development (IR&D) and international R&D in pertinent areas;
- Interface with cognizant service and director of Defense research and engineering (DDR&E) staff on a continuing basis and other organizations as appropriate;
- Promote transition of advanced technologies;
- Maintain cognizance of operational/

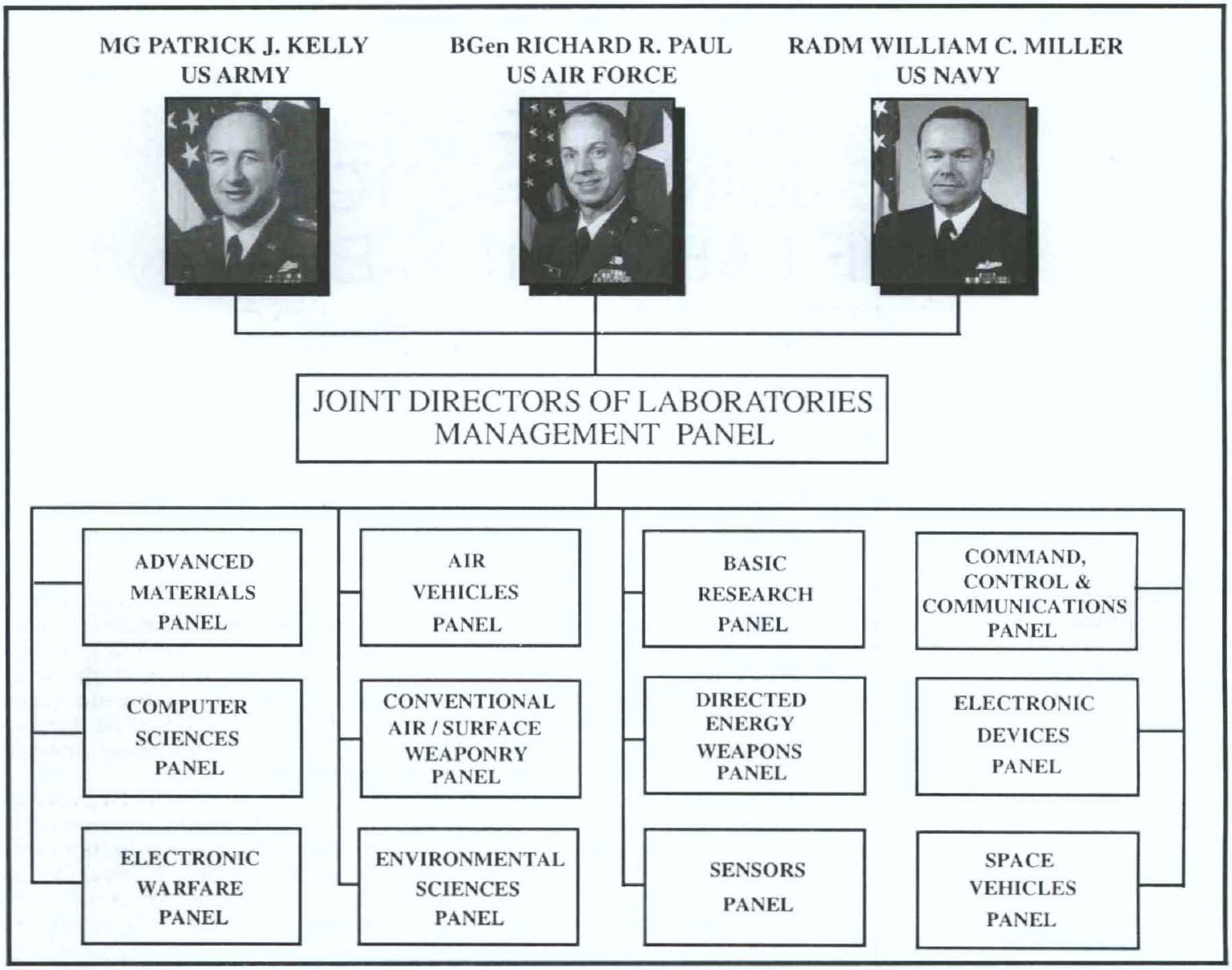


Figure 1.

technical multi-service issues; and

- Issue an annual report of panel activities.

Each JDL technology panel has tri-service representation, with the panel chairman rotating among the services at two-year intervals.

The JDL issued a formal JDL instruction to the implementing panels in September 1991. This instruction provided the schedule and the format for producing the JSPP, the general areas of responsibility, and other important guidance. Because the implementation process provides substantial integration of service S&T activities, it is now possible for Tri-service S&T Reliance to provide the foundation for OSD review of these activities, thereby streamlining for OSD a formerly cumbersome S&T review process.

In November 1991, all three service assistant secretaries for research, development and acquisition had reviewed the Reliance process and had directed its full implementation in their respective services. Implementation of Tri-service S&T Reliance also responds to (and provides inputs for) a number of important management functions and planning processes. The budget planning process, the development and update of technology investment plans, the updates of the Defense science and technology strategy and the Defense critical technologies plan, and other important management thrusts are effectively accounted for by the Reliance implementation process. Figure 2 shows the recurring Reliance planning process and schedule. The figure shows how important annual events under the JDL auspices relate to other important events occurring in the individual military departments, the budget system, the Defense Technology Board, Defense Technology Working Group (DTWG), and the DDR&E.

As seen in the schedule, the various joint plans of the JDL technology panels are developed each year during the November to January time frame, with appropriate JDL review and approval scheduled for March. The panels issue their annual reports in June and brief Reliance progress to OSD during the DDR&E-sponsored S&T reviews in July and August.

To achieve close coordination with Basic Research (6.1) iniatives and the work of the JDL Technology Panels and the other DOD management committees, the JDL Basic Research Panel has created 12 Tri-service Scientific Planning Groups (SPGs). Figure 3 illustrates how the tri-service SPGs relate to the JDL Technology Panels, ASBREM, TAPSTEM and the Joint Engineers.

Early JDL Accomplishments of Tri-service S&T Reliance

The JDL Reliance process is operational with the JDL technology panels completing the first JSPP. In addition, the panels have presented their annual reports of panel activities covering progress on implementation of Reliance, in general, as well as specific progress in all areas of the JSPP, and candidate technical areas for new joint program plans.

Tri-service S&T Reliance is beginning to provide substantive examples of major improvements in the services' S&T programs; here are but a few examples:

• All tri-service aircrew training devices and simulator technology will be consolidated in Orlando, FL, resulting in movement of approximately 50 Air Force Armstrong Laboratory positions from Williams AFB to Orlando.

• All service efforts are being combined to develop an advanced tactical radio for mobile forces. Called "Speakeasy," this tri-service effort for a modular multiband, programmable radio will be led by Rome Laboratory and jointly funded by the services.

• Army Armament Research, Development and Engineering Center (ARDEC) has been selected as the lead agency representing the tri- services for all conventional guns S&T. The Air Force and Navy will terminate in-house efforts at the end of their current programs, with the Air Force collocating researchers for future gun work at ARDEC beginning in FY93.

• The Air Force will initiate in-house chemical/biological research at the Army facility at Edgewood Arsenal to satisfy operational requirements stemming from Desert Storm. Note that this work, which was previously done at Air Force facilities, was terminated under Reliance as part of the DMRD 922 reductions.

• The Air Force will lead a tri-service effort to replace hydraulic systems on aircraft with "power by wire" flight controls. Anticipated savings of more than $12 million as a result of joint flight tests (compared to individual service programs) are expected.

• With regard to civil engineering technology for nuclear hardened and protective structures, the Air Force has cut approximately 60 positions and will collocate three Air Force researchers at the Army Waterways Experiment Station for this work in the future.

Even though these accomplishments are substantive, future accomplishments hold even greater potential.

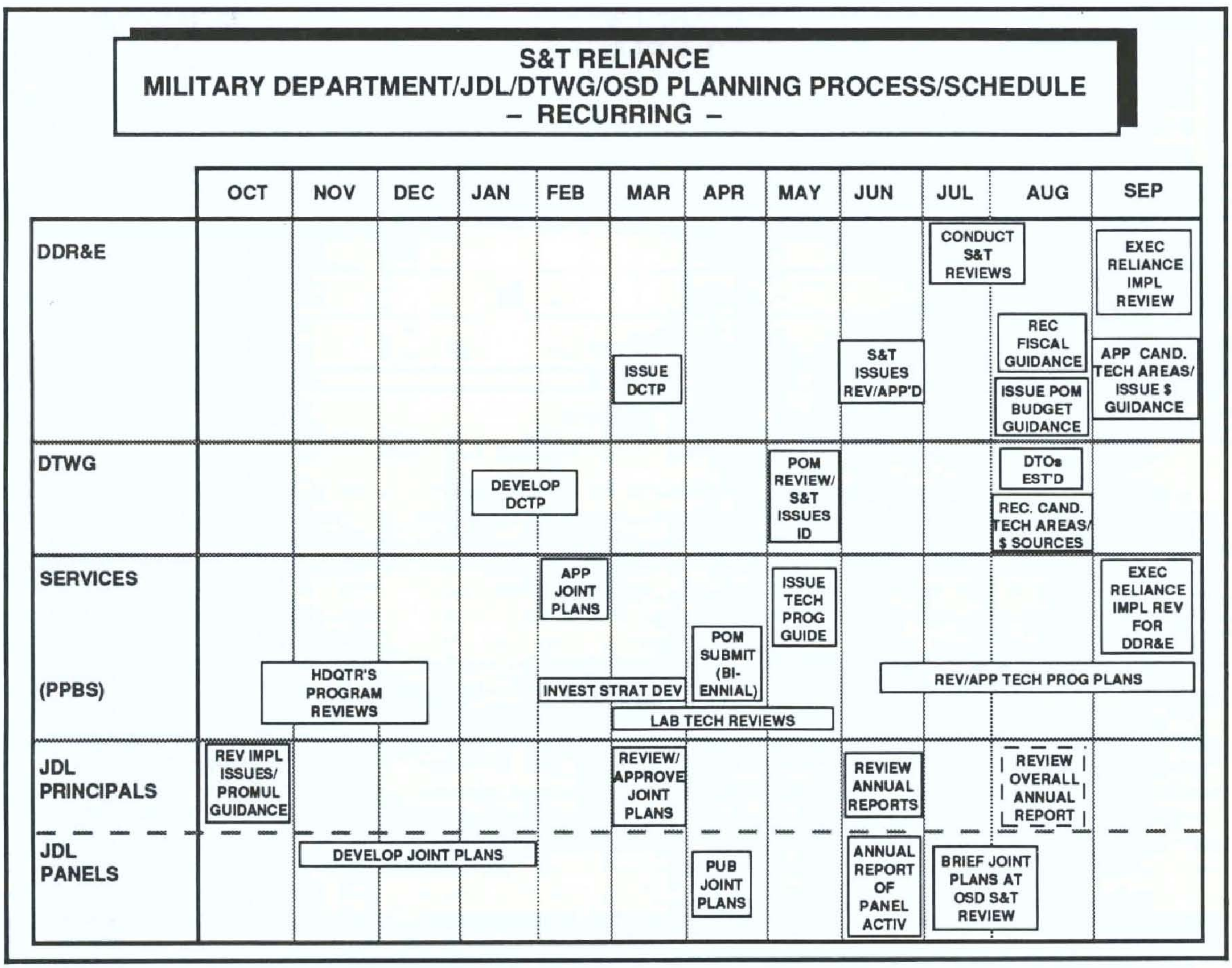


Figure 2.

TRI-SERVICE PLANNING GROUPS AND ASSOCIATED JDL TECHNOLOGY PANEL AND DOD MANAGEMENT COMMITTEES

JDL TECHNOLOGY PANELS/DOD MANAGEMENT COMMITTEES

SCIENTIFIC PLANNING GROUPS	Advanced Materials	Air Vehicles	Communications, Command & Control	Computer Sciences	Conventional Air/ Surface Weaponry	Directed Energy Weapons	Electronic Devices	Electronic Warfare	Environmental Science	Sensors	Space Vehicles	ASBREM	Joint Engineers	TAPSTEM
Atmospheric & Space Sciences		○	◒	●	○	◒		○	●	◒	◒			
Biological & Medical Sciences	○	○			○	○			○	○		●		○
Chemistry	●	◒			○	◒	◒		○	◒				
Cognitive & Neural Sciences		○	●	◒			○			●	○			●
Computer Sciences	○	○	●	●			◒	○	○					
Electronics	○	○	●	◒	○		●	◒		○	○			
Environmental Quality	○	○			○				●	◒			●	
Materials Science	●	◒					○			○	◒			
Mathematics			●	◒					○					
Mechanics	○	◒			●						◒		○	
Ocean Geophysics/ Terrestrial Science			○		○			○	●	○			○	
Physics	○					●	◒	○		◒	○			

KEY:
● = Major
◒ = Moderate
○ = Marginal
Blank = None

Figure 3.

Additional JDL accomplishments in implementing Tri-service S&T Reliance have included:

- Expanding the original 28 technology areas into 30 (by adding advanced materials and directed energy weapons);
- Establishing JDL Centers of Excellence in Artificial Intelligence;
- Conducting inter-service competition for Defense Advanced Research Projects Agency (DARPA) supercomputer hardware;
- Providing an effective service focal point for developing the DOD Software Technology Plan;
- Conducting the 1991 OSD S&T Reviews using the Reliance infrastructure; and
- Consolidating the 6.1 (Basic Research) SPGs.

JDL Reliance in the Future

Managing technology development is a dynamic process and the S&T activities of the three services are not islands unto themselves. The notion of "leveraging" is based on a simple fact: The services' individual technology base accounts cannot fund all the R&D activities that any one service needs. The JDL is expanding the concept of cost-sharing in technology base activities, using the Reliance process, to other government agencies including DARPA, the Strategic Defense Initiative Organization (SDIO), the National Aeronautics and Space Administration (NASA), the U.S. Special Operations Command (SOCOM), the National Security Agency (NSA), and the Federal Aviation Administration (FAA). Senior representatives from DARPA and SDIO are invited members to the JDL and provide substantial means for the services to leverage their S&T investments. The JDL has strengthened tri-service S&T coordination through the exchange of technical presentations and information at joint meetings with the FAA, NSA, and SOCOM. The JDL principals and NASA's Space Technology Interdependency Group (STIG) signed a memorandum of understanding that incorporates JDL membership within the STIG.

The JDL will continue to reach out and tap those sources of technology it needs to fulfill its mission, whether those technology sources are within the services, Defense agencies, or other government organizations.

ASBREM'S ROLE IN MEDICAL PROJECT RELIANCE AND BRAC 91

By COL Harry G. Dangerfield
Executive Assistant to the Commander
U.S. Army Medical R&D Command

Editor's Note: COL Dangerfield retired from the Army as this issue of Army RD&A Bulletin was going to press.

ASBREM Organization

The Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee, established in FY 82 by Congressional direction, provides management oversight, direction and coordination of Defense medical research, development, test and evaluation (RDTE) programs. The goals of the ASBREM Committee are to sustain and improve the responsiveness of Defense medical RDTE programs to priority warfighting capability issues, reduce costs, strengthen Defense medical RDTE plans and programs, and improve effective information exchange.

The assistant secretary of Defense (health affairs) and the director, Defense research and engineering, cochair the ASBREM Committee. The ASBREM Committee consists of the senior, uniformed medical materiel developer of each military department: MG Richard T. Travis, commanding general, U.S. Army Medical Research and Development Command; RADM Hugh P. Scott, assistant chief, operational medicine and fleet support, Bureau of Medicine and Surgery, Department of the Navy; and BG George K. Anderson, commander, Human Systems Division, Department of the Air Force. The uniformed members of the ASBREM Committee serve, under the direction and oversight of the cochairs, as the ASBREM Steering Committee. The Steering Committee is responsible for ASBREM Committee operations including: development, revision and review of the medical science and technology and medical materiel development and acquisition plans; review, analysis and integration of DOD medical RDTE POM and budget requests; annual review of medical science and technology and medical materiel development and acquisition accomplishments and plans; oversight of initiatives to improve cost effectiveness and obviate unwarranted duplication while strengthening program capability and responsiveness—which includes review and oversight for implementing and building upon Tri-service Medical Project Reliance initiatives.

ASBREM, in existence prior to the inception of Tri-service S&T Reliance, proved to be an effective management and coordination mechanism for assessing the medical technology area of Project Reliance.

ARMED SERVICES BIOMEDICAL RESEARCH EVALUATION AND MANAGEMENT COMMITTEE

MG Richard T. Travis
Army

BG George K. Anderson
Air Force

RADM Hugh P. Scott
Navy

ASBREM COMMITTEE SERVICE MEMBERS

ASBREM SECRETARIAT

JOINT TECHNOLOGY COORDINATING GROUPS

- **INFECTIOUS DISEASES OF MILITARY RELEVANCE***
- **MEDICAL BIOLOGICAL DEFENSE****
- **MEDICAL CHEMICAL DEFENSE****
- **COMBAT DENTISTRY***
- **HUMAN SYSTEMS TECHNOLOGY**
- **COMBAT CASUALTY CARE**
- **IONIZING RADIATION BIOEFFECTS**

*Army is Congressionally appointed Lead Agency
**Army is DOD designated Executive Agent

An ASBREM Secretariat, composed of the personal representatives of each member of the ASBREM Committee, provide day-to-day assistance to the ASBREM Steering Group in execution of the Steering Group's functions and responsibilities. Joint Technology Coordinating Groups (JTCGs), established for each of the major DOD biomedical research and development areas, perform the following duties: coordinate and review planning, programming and budgeting formulation; develop and submit annual recommendations to the ASBREM Committee on inter-service distribution of responsibility for program execution, resources, direction or emphasis, and new initiatives; promote effective scientific and developmental coordination. (See accompanying figure.)

Project Reliance Linkage

ASBREM, in existence prior to the inception of Tri-service S&T Reliance, proved to be an effective management and coordination mechanism for assessing the medical technology area of Project Reliance. The ASBREM Committee, in response to OSD direction to downsize yet maintain world-class S&T programs, recommended reducing the number of Army medical RDTE laboratories from nine to six. The Army medical laboratories to be disestablished are: Letterman Army Institute of Research (LAIR), the Biomedical Research and Development Laboratory (BRDL) and the Institute of Dental Research (IDR). In addition, the ASBREM Committee recommended closing the Naval Biodynamics Laboratory and collocating or consolidating numerous tri-service medical research programs including: consolidating Army's trauma research and medical materiel development facilities with existing Army medical RDTE facilities; collocating Army blood research with the Navy; collocating Army combat dentistry research with the Navy; collocating Army directed energy (laser and microwave) bioeffects with the Air Force; collocating Army biodynamics (vibration) and Navy biodynamics research with the Air Force; collocating Navy and Army toxicology (environmental quality and occupational health) research with the Air Force; and collocating Navy infectious disease research and Air Force environmental medicine (heat physiology) with the Army.

Looking toward the future, DOD medical RDTE must effectively evolve with the next generation of technological advances.

These ASBREM initiatives were given careful consideration in the Tri-service S&T Reliance approval process. The ASBREM Committee recommendations were translated into a formal plan after many months of effort and were recommended to Deputy Secretary of Defense Atwood on Aug. 22, 1990. Atwood subsequently approved them in DMRD 922 (Consolidation of R&D Laboratories and T&E Facilities) in November 1990. Effective implementation began when the ASBREM Committee appointed the Tri-service Medical Integration Steering Committee to support actions required by the Defense Base Closure and Realignment Act of 1990. As part of the Base Realignment and Closure 1991 (BRAC 91), the secretary of Defense recommended the execution of Tri-service Medical Project Reliance initiatives. The Defense Base Closure and Realignment Commission accepted this recommendation in its report to the president and ASBREM recommendations within Reliance were incorporated into public law (with the exception of Navy directed energy and biodynamics research). The ASBREM Committee approved memoranda of agreement, on each functional realignment, to expedite implementation at reduced costs, and the services took immediate action to begin implementing the various medical RDTE realignment activities as directed by BRAC 91. Disestablishment of LAIR and BRDL began March 27, 1992, and June 12, 1992, respectively. The recommended mission realignments are slated to be completed by the third quarter of FY 97. While execution milestones have been established and the Services are working to implement BRAC 91, exact timing of each move is dependent upon establishing necessary infrastructure (completing facilities renovation, for example) at each of the proposed collocation sites.

Future Thrusts

Looking toward the future, DOD medical RDTE must effectively evolve with the next generation of technological advances. To that end the military departments must:

- Strengthen the medical RDTE infrastructure with recruitment and retention of quality biomedical scientific personnel;
- Maintain sufficient infrastructure to ensure program responsiveness;
- Sustain S&T objectives responsive to warfighting capability issues and priorities; and
- Nurture a technology base of inhouse and extramural capabilities and capacity sufficient to anticipate technological surprises and to be exploited for fielding effective medical materiel and information.

The BRAC Commission recognized the ASBREM Committee recommendations as the benchmark objectives of Tri-service S&T Reliance. Cooperation among working groups has been highly responsive to the needs of the DOD. The approved realignment initiatives strengthen inter-service dependence while preserving mission capabilities and responsiveness to service-unique requirements. Finally, consistent with the president's objective to the technology base capability and reduce costs, the end result of Tri-service Medical RDTE Reliance will be responsive yet flexible, requirements-driven, research and development programs which support the continuum of DOD's warfighting needs.

THE TAPSTEM ROLE IN PROJECT RELIANCE

By Dr. James A. Bynum
Chief of Plans, Programs and Operations
U.S. Army Research Institute
for the Behavioral and Social Sciences

The Armed Services Training and Personnel Systems Science and Technology Evaluation Management (TAPSTEM) Committee is the recognized integrating mechanism responsible for implementation and verification of compliance with Reliance objectives in the manpower, personnel, and training systems technology areas.

Background

The foundations for TAPSTEM were actually laid in February, 1979 when the commanders of the Army Research Institute (ARI), the Navy Personnel Research and Development Center (NPRDC) and the Air Force Human Resources Laboratory (AFHRL) (now the Human Resources Directorate, Armstrong Laboratory (AL/HR))—the services' three major laboratories for training and personnel systems research and development—signed a memorandum of agreement for cooperation and coordination in the area of people-related research and development.

The commanders and technical directors of these organizations met several times each year. They voluntarily shared both program and scientific information of mutual benefit and took definite actions to facilitate the advancement throughout the services of manpower and personnel and training research and development. These actions ranged from temporary duty assignments of personnel across laboratories to the adaptation by one service of R&D products developed by another service.

One noteworthy example of joint cooperation was an effort to standardize the software and delivery of computer-based training. To this end, ARI, NPRDC, the Naval Training Equipment Center, the Army Project Manager for Training Devices (PM TRADE), and the Air Force Armstrong Laboratories completed a Tri-service Advanced Development System for computer-based training. Another by-product of this agreement was the development of the Manpower and Training Research Information System (MATRIS). A full-fledged element of the Defense Technical Information Center, MATRIS collects, stores, updates, retrieves, and disseminates budgetary and research information on people-related research within the Department of Defense.

If there was a shortcoming to the Tri-service Commanders' Conference concept it was that, while they could agree to voluntarily cooperate and coordinate, there was no accountability above the laboratories or outside the separate service chains of command.

At the direction of the Congress, the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee was successfully developed in the late 1980s and later served as a model for TAPSTEM. Some of the contributing factors leading to the decision to put the capstone on tri-service cooperation through creation of TAPSTEM were: a decade of successful coordination and cooperation to build upon, an in-place information system, and the stimulus of various task forces studying ways to consolidate and reorganize to give that final push.

In the summer of 1989, a charter was drafted for a TAPSTEM organization that would have three principal characteristics; namely, an inherently proactive management structure, the ability to exploit inter-service commonalities, and the ability to reach consensus among the services at a level of sufficient authority to effect change.

TAPSTEM Objectives

TAPSTEM was formally implemented in November 1990, by agreement signed by the Army assistant deputy chief of staff for personnel (ADCSPER); the assistant deputy chief of Naval operations for manpower, personnel and training (ADCNO(MPT)); the Marine Corps assistant deputy chief of staff for manpower and reserve affairs (DCS(M&RA)); and the commander, Air Force Human Systems Division. These four individuals, serving as the Executive Committee for TAPSTEM, are respectively: MG Fred A. Gorden, RADM S.F. Gallo, Jim Marsh, and BG George K. Anderson. TAPSTEM has four objectives:

- To increase effectiveness and efficiency in service resource utilization;
- To address organizational roles and resolve service organizational/functional alignment issues;
- To ensure program relevance and obviate duplication via a timely review process; and
- To define service issues that require resolution/coordination with other federal agencies outside TAPSTEM.

The TAPSTEM Organization

TAPSTEM is comprised of three elements: the Executive Committee, the Secretariat, and Joint Technology Coordinating Groups (JTCG) (See Figure 1).

The commanders of the ARI, the NPRDC, and the AFHRL serve collectively as the secretariat, rotating the chair annually. The secretariat has a true line management function with responsibility for both assuring inter-service coordination/cooperation and reporting formally to the committee.

The Joint Technical Coordinating Groups are organized around the two Reliance technology areas that are concerned with people-related research and development. Key research managers from the three services, who make up the groups, receive operational directions from the secretariat. They conduct working meetings by topical area, make recommendations to the TAPSTEM committee on inter-service distribution for program execution, changes in program direction or emphasis, new initiatives and other matters dealing with program requirements and relevance. Each JTCG prepares an annual technology area program review for the TAPSTEM and prepares briefings of selected topics for secretariat review and presentation to the TAPSTEM Flag Officer Committee.

Reliance Implementation

TAPSTEM also assumed the task of implementing the results of Project Reliance that were completed in the fall of 1990. Individual service laboratory programs were changed, based upon service laboratory strengths. For example, the Air Force discontinued human resources development research and became the focal point for research in visual systems and artificial intelligence applications to training. The Army discontinued force management modelling and intelligent computer-aided training research. A virtual environment laboratory has been established at Orlando, FL, where all three services will conduct virtual environment development work.

Figure 2 shows the service locations for both the Manpower and Personnel and the Training Systems Technology

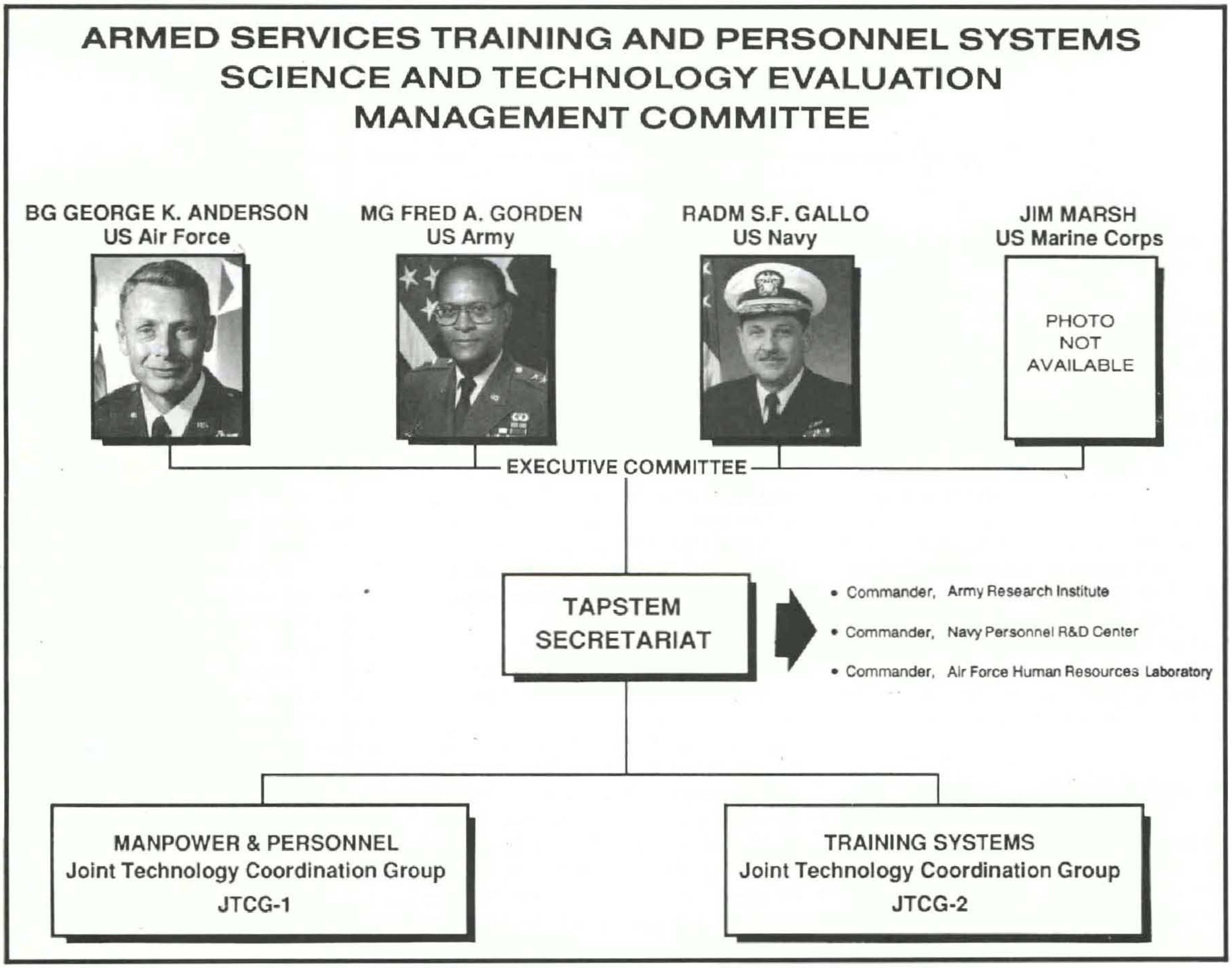


Figure 1.

TRI-SERVICE S&T RELIANCE

SERVICE LOCATIONS FOR MANPOWER, PERSONNEL AND TRAINING SYSTEMS TECHNOLOGY BASE R&D

ARMY	NAVY	AIR FORCE
• Selection & Classification - Service Unique Applications	• Selection & Classification - Service Unique Applications - Computer-based Entrance Testing	• Selection & Classification - Service Unique Applications - Basic Abilities Testing - Job Structures & Requirements
• Human Resources Development	• Force Management & Modelling	
	• Productivity Measurement/ Enhancement	
• Land Warfare/Rotary Wing Training	• Sea Warfare Training	• Air Crew Training Effectiveness
	• Training Devices & Features	
• Unit Collective Training	• Classroom Instruction	• Intelligent Computer-Aided Training

RELIANCE CATEGORY 3: IN-HOUSE WORK TO BE COLLOCATED TO A SINGLE SERVICE LOCATION WITH SERVICES RETAINING SEPARATE FUNDING CONTROL

Figure 2.

Areas. The "bullet" headings (e.g., Selection and Classification, Force Management and Modelling, etc.) are Reliance subareas and the dashes (e.g., Computer-based Entrance Testing) connote sub-subareas. Subareas are located at service sites by virtue of the mutual agreement among the services that the preponderance of R&D in a given sub-area will be accomplished at the Army, Navy or Air Force laboratory as indicated.

In the summer of 1992, the services began the process of relocating personnel who will continue their assigned work under the auspices of their parent service but at the designated site. This permits the service to avail itself of the critical mass at the site and to leverage the resources devoted to the work.

TAPSTEM Assessment

In its most recent review of TAPSTEM, the Office of the Deputy Director of Defense Research and Engineering (ODDDR&E) recognized several strengths that underscore TAPSTEM's ability to realize Reliance S&T objectives. Because it has clearly defined objectives which support the secretary of Defense's top priority of "quality personnel," TAPSTEM's potential effect on future force capability was rated high. Service laboratories' strong working relationships with OSD and with their respective service users was deemed a plus. Further, under Reliance and TAPSTEM, the services have worked together effectively to coordinate their efforts and to divide their labor in a manner that reflects service requirements and resources. The TAPSTEM's integrated management structure was seen to mirror the basic concept of Reliance and ODDDRE concluded that the TAPSTEM "demonstrated the advantages of coordinated management and execution."

TAPSTEM and the Future

To ensure representation of the full range of human performance R&D in TAPSTEM and to permit better coordination, resource allocation, oversight and program justification, TAPSTEM extended invitations to the Naval Training Systems Center, PM TRADE and the Air Force Training Systems System Program Office to participate in the Training Systems Joint Technology Coordinating Group. TAPSTEM has extended the scope of its coordination to include the Joint Logistics Commanders' Joint Technology Coordinating Group on Training Devices and Simulation through the TAPSTEM JTCG on Training Systems. TAPSTEM also seeks to expand its scope through the full range of the technology base by inviting relevant service research (6.1) project managers to brief the TAPSTEM secretariat and joint technical working groups.

Summary

The shift of national priorities is reducing the resources available to the Department of Defense but the shift has not diminished DOD's requirements to maintain a trained and ready force to carry out national policy. With the advent of distributed simulation systems, virtual environments, and the myriad high technology hardware and software being designed to support service training and personnel performance, TAPSTEM is poised to support the services in training and personnel systems technology as we anticipate the future.

THE ROLE OF THE JOINT ENGINEERS IN THE TRI-SERVICE S&T RELIANCE PROGRAM

By Dr. Robert B. Oswald
Director, Research and Development
U.S. Army Corps of Engineers

Introduction

The Joint Engineers are responsible for the oversight of the Civil Engineering (CE) and Environmental Quality (EQ) technology areas in the Tri-service Reliance Program. Current representatives are MG Peter J. Offringa, Army, RADM David E. Bottorff, Navy, and BG James E. McCarthy, Air Force. (See Figure 1). At the time this article was written, RADM Bottorff was commander, Naval Facilities Engineering Command. Since that time, Bottorff has retired from the Navy. He has been succeeded on the JE team by RADM Jack E. Buffington.

The CE and EQ technology areas focus on science and technology (S&T) research and development to reduce ownership costs while maintaining readiness and enhancing the overall physical infrastructure of the military services, mainly at bases and facilities. In addition, emphasis is placed on the restoration, pollution prevention, and stewardship of the environment, and compliance with environmental regulations. In both areas, the primary R&D goal is to provide advanced technologies and methodologies to improve quality and reduce operating costs while improving mission accomplishment and protecting and improving the environment.

Program Study and Implementation Phases

Study Phase

During the Study Phase of the Reliance Program, representatives of the Army, Navy, and Air Force developed detailed strategies for implementing Reliance. During numerous meetings, the proposed R&D efforts in the two JE technology areas were divided into subareas and further subdivided into sub-subareas. Division and subdivision boundaries were based on tri-service descriptions of work for each technology area. This effort produced two taxonomies, one for the CE and one for the EQ technology area, which included all R&D S&T efforts conducted by the three services. The CE taxonomy (Figure 2) has seven subareas and 22 sub-subareas and the EQ taxonomy (Figure 3) has seven subareas and 18 sub-subareas.

Following development of the CE and EQ taxonomies, each service provided detailed information on the dollars, manpower, and facilities invested in R&D S&T for each technology sub-subarea. These data were compared to determine the "degree of Reliance" and service participation for each subarea and sub-subarea based on the categories identified earlier in the opening article by George Singley. (See page 4). Results of these efforts were documented in strategic plans and used by the JE to form the basic structure for implementing the CE and EQ Reliance structure.

Implementation Phase

From September 1991 through May 1992, numerous activities took place, focusing on the implementation of the Reliance Program including development of integrated tri-service R&D programs and preparing program plan reports. During initial meetings, charters for the JE and the CE and EQ Panels were developed and subsequently ratified at the JE Charter Meeting on Nov. 26, 1991. Following that, all work focused on the integrated R&D program plan development and report preparation.

During the charting process, the JE established a JE Management Panel (JEMP) to support and assist the JE in program development, management, and execution. (See Figure 1). The JEMP reports directly to the JE and consists of two representatives from each service plus an executive secretary. The panel chairmanship and executive secretary positions are presently held by the Army but will rotate by service every two years, like the technology area panels. Beginning in FY94, the Navy will assume these positions, followed by the Air Force in FY96.

The charters describe the purpose, mission, and management structure down through each technology area panel. CE & EQ Panels were charted to serve as both technical and management bodies in their respective technology areas. Each is composed of a single representative from each service and both are currently chaired by the Army with the chairmanship rotating by service seniority every two years, similar to the JEMP. Technology subarea panels were also established under each panel to assist in planning, formulating, reviewing, and documenting the respective R&D programs. Each subarea panel coincides with its respective CE or EQ taxonomy, shown in Figures 2 and 3.

A major responsibility of the JE during the Implementation Phase was to develop and document, for the first time, integrated tri-service science and technology R&D programs (6.1, 6.2 and 6.3a) for both the CE and EQ technology areas. Planning for development of the R&D Program Plan consisted of establishing responsibilities and schedules and developing a format for these most significant plan reports. The second stage included JEMP reviews of the tri-service R&D programs at the subarea level, followed by JEMP guidance for multi-service integration and coordination of selected programs and establishment of joint programs between services. This guidance was approved by the JE on Feb. 5, 1992, and incorporated by each service into their overall S&T R&D program plans.

The final stage of the Tri-service S&T Reliance R&D Program Plan development focused on preparation and publication of the CE and EQ program plan reports. Each technology area report covers all individual and joint-service FY93-98 R&D programs planned by the three services in science and technology.

Each report provides a general description of the work conducted in each technology subarea with specific attention paid to joint-service and service coordinated programs. Yearly funding levels at the sub-subarea level are also provided. Of particular interest are the subarea "Roadmaps" which display every S&T funded project and descriptions of each project's tri-service requirements, deficiencies and R&D objectives, the technology approach, major milestones and technology transitions, and funding. Finally, an appendix provides a cross reference to the roadmaps and more descriptive information on each project. Both reports were completed and published in April 1992.

Accomplishments

The primary goal of the Tri-service S&T Reliance Program is to increase efficiency and reduce unwarranted overlap in tech base work within the DOD. As such, the JE have already made significant strides. Examples of their accomplishments in improving tri-service Reliance in the CE Technology Area include:

• Disestablishment of the Air Force Shock Physics Laboratory at Kirtland AFB, and collocation of all Survivability and Protective Structures S&T activites at the Army Waterways Experiment Station (WES), thus eliminating

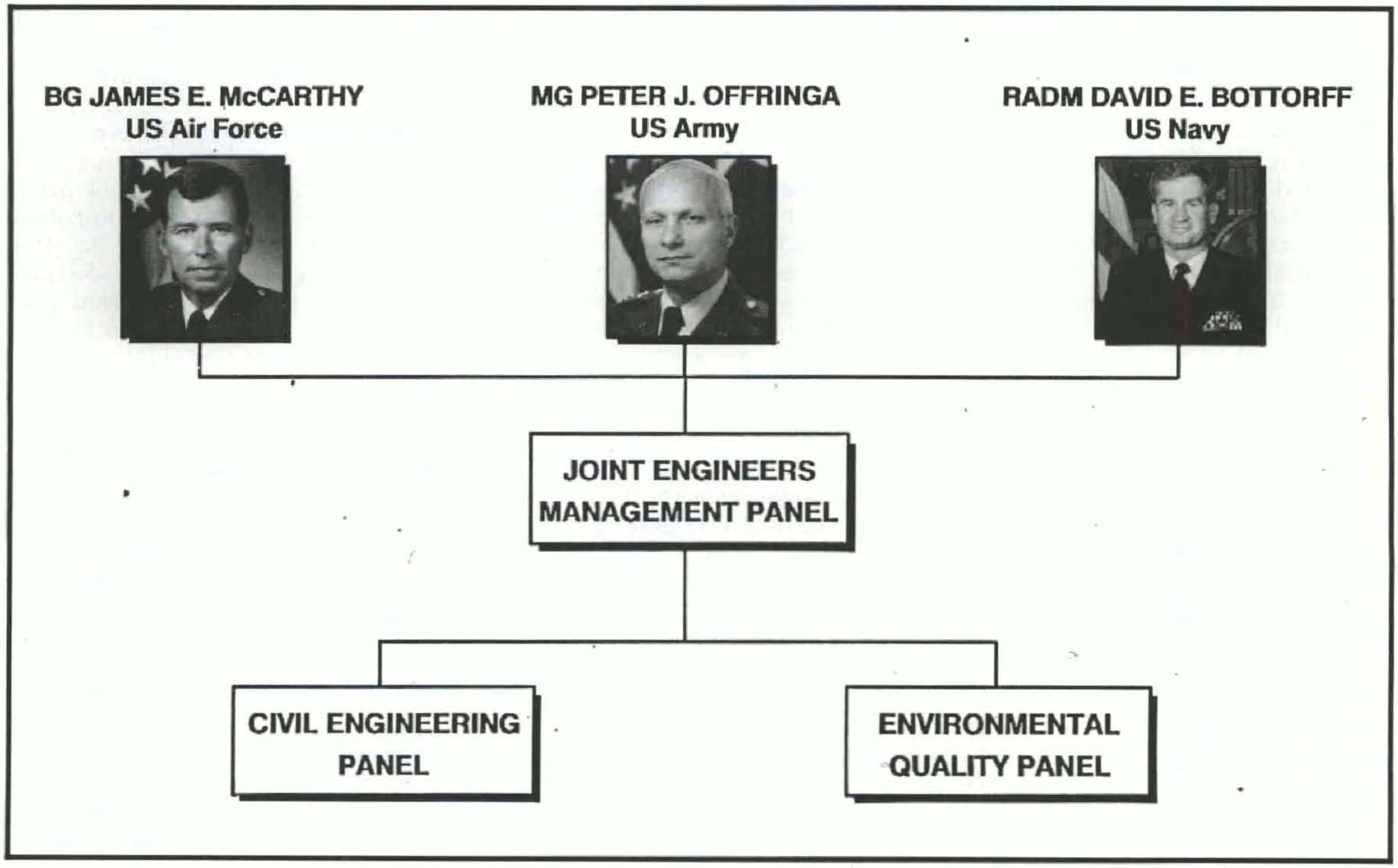


Figure 1.

Army and Air Force redundancy and permitting the reduction of 85 Air Force manpower spaces and associated facilities capital outlay;

• Relinquishment of Army S&T efforts in Large Space Structures to the Air Force, providing a savings of three Army manyears and corresponding facility capital outlay;

• Collocation of all S&T efforts in airfields and pavements at WES with reliance on the Air Force for rapid runway repair, providing savings of two Air Force and four Army manyears and associated capital outlays; and

• Development of multi-service R&D programs in the areas of mobile generators, seismic modeling, terrorist threat protection, heads up display/voice activated fire fighting support systems, multispectral camouflage, concealment and deception, projectile penetration modeling, and for engineering support in over-the-shore logistics.

The total accumulated impact of the above accomplishments is significant. Program enhancements have been achieved by the saving of over 100 total manyears, $2.5 million in effective personnel transfer costs, and $19.2 million in facilities capital outlays.

Compared to the CE technology area, EQ technology area R&D efforts are relatively young. Inter-service agreements prior to Reliance had not been fully developed. The EQ Reliance integrated program build process provided a timely means for developing cooperative and joint service efforts. Some of these joint service efforts include:

• Development of alternate solvents, paint strippers, and paint removing processes;

• Development of propellants, explosives, and other hazardous and toxic waste demilitarization, site decontamination and detection, and treatment;

• Tri-service requirements based cone penetrometer work for site assessment and monitoring and airborne/space borne monitoring;

• Air emissions studies of control and monitoring in the areas of firefighting, rocket and missile firing; and

• Noise impact assessment on shrinking habitat and endangered species.

Total program enhancements estimated at more than $26.1 million will be realized over the POM period in the EQ Subareas of installation restoration, pollution prevention, global marine compliance, and atmospheric compliance based on the development of these multiservice efforts.

In addition to the obvious benefits of program enhancement achieved during Project Reliance, each of the services has also benefitted from greatly strengthened coordination and unprecedented communication and cooperation.

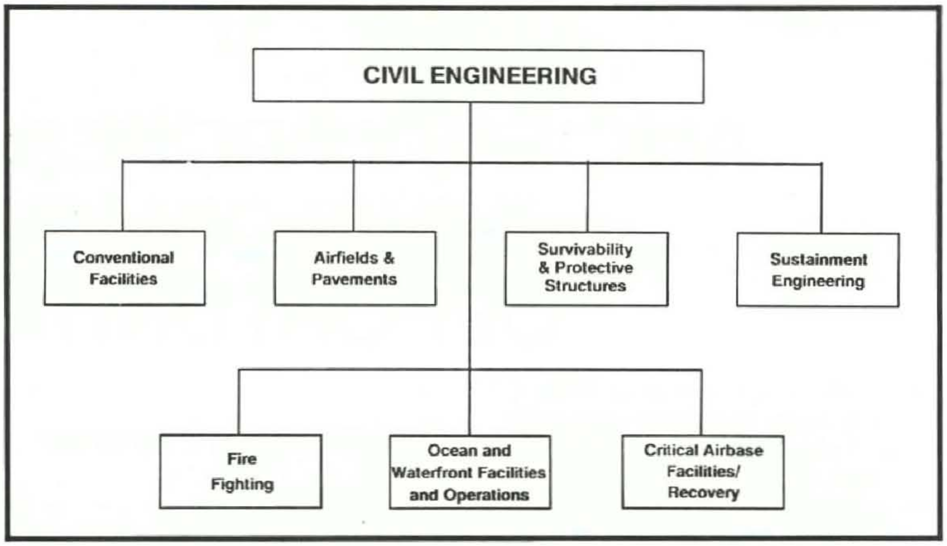


Figure 2. Civil Engineering Tri-Service Reliance Taxonomy.

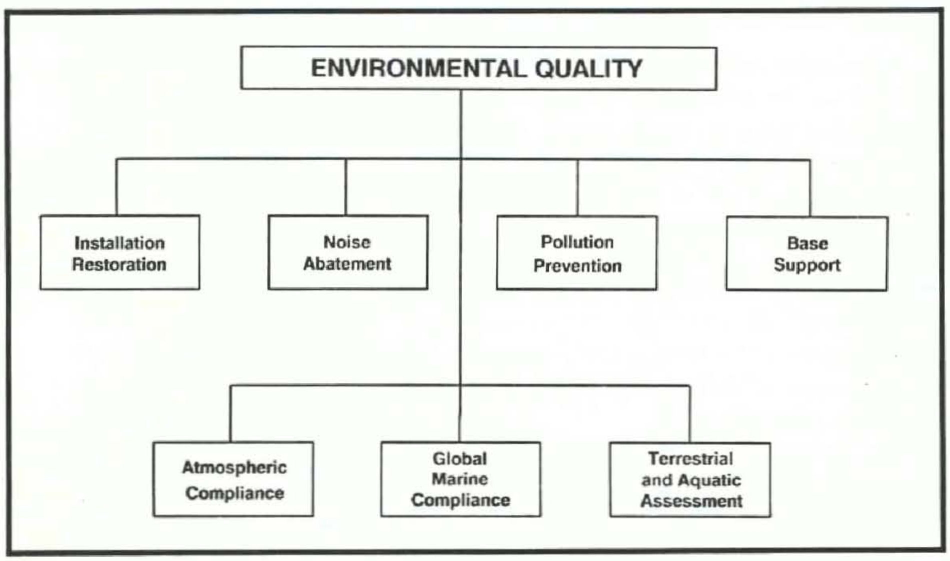


Figure 3. Environmental Quality Tri-Service Reliance Taxonomy.

The Future

As a result of achievements during the past two years in developing and implementing the Tri-service S&T Reliance Program, it is evident that even stronger cooperative R&D ties between the services will occur. Plans are already underway for development of a tri-service R&D Program database for R&D program plan information using a common format applicable to all services. This database will greatly simplify tri-service program planning, budgeting, review, documentation, and presentation to higher authority.

The JE have also accepted responsibility for expanding their role in the EQ area in response to the Congressionally initiated development of a DOD EQ R&D Strategic Plan. This initiative requires the establishment of a comprehensive tri-service Environmental Quality R&D program based upon tri-service user R&D requirements.

We look forward to expanding our horizons and developing coordinated programs and joint efforts throughout the R&D community, including other Defense and federal agencies, the private sector, and the international arena. The result will be an improved and more cost-effective technology base to meet the needs of DOD and the nation.

AMC-FAST PROFESSIONAL DEVELOPMENT OPPORTUNITIES

By Richard E. Franseen

When the Army Materiel Command Field Assistance in Science and Technology (AMC-FAST) Activity was initiated in 1985, it's primary mission was to solve problems for commanders. A secondary mission was to "develop professionalism." This secondary mission is accomplished by the two-year assignment of science advisers to general officers commanding major Army combat troop units; they gain immense experience by working directly with soldiers in the field to solve technical problems. Unfortunately, only a relatively small percent of AMC's engineers and scientists will ever have the opportunity to become science advisers.

In 1989, Jerry Reed, director of Harry Diamond Laboratories (HDL) and Dr. Carl Campagnuolo, the FAST quick reaction coordinator at HDL, initiated a program named "FAST-JR" or FAST Junior. This program provided HDL engineers and scientists, in grades GS-9 thru GS-13, professional development experience working two to eight weeks directly with soldiers in the field to solve specific problems identified by science advisers and to document the results in a technical report. GEN William G.T. Tuttle, the AMC commanding general at that time, liked this HDL idea so much that he directed FAST in 1991 to expand it to include all AMC labs and centers.

Then, during the past year, LTG Billy Thomas, (now retired) deputy commanding general for RD&A, assigned to FAST the management responsibility for the Design Engineers Field Experience with Soldiers (DEFEWS) program. FAST changed the name to Scientists and Engineers Field Experience with Soldiers (SEFEWS) to expand public perception of candidate eligibility. This program offers AMC engineers, scientists, and technicians the opportunity to gain professional growth through a foxhole level experience living with soldiers in a field environment and observing how soldiers use their weapon systems during a two-week field training exercise.

The purpose of this article is to

The FAST Junior Program

In a continuing effort to provide the most effective training and educational opportunities for AMC engineers and scientists (E&Ss), GEN William Tuttle, former commanding general, AMC, directed that all AMC laboratories and RD&E centers establish FAST Junior Programs. AMC-FAST was given the overall responsibility for executing the program in January 1991.

This program allows scientists and engineers in grades GS-09 thru GS-13 to work directly for one of the 19 AMC-FAST science advisers assigned to a major Army command. The two to eight week assignments are well defined jobs, matched to the skills of the FAST Junior who is technically supervised by the Science Adviser. FAST Junior personnel gain valuable experience in the field solving real problems by working directly with troops and fielded weapon systems.

The program is intended to provided E&Ss with field experience as well as to solve a real and important field problem. It is considered a proactive training experience in which the FAST Junior E&Ss have a "contractual obligation" with their lab or center director, regarding problem definitions, performance, and reporting procedures.

Currently, 73 personnel from AMC laboratories and centers have been placed in FAST Junior assignments. The program has proven to be an overall success story for the AMC-FAST activity, the sponsoring laboratory/center, and the FAST Juniors.

inform the reader about these AMC-FAST professional development programs, create interest in participation, and encourage discussion with others who have gained this type of experience.

Science Adviser Program

Science advisers assigned to FAST have worked on more than 500 problem solving projects, provided demonstrations, assisted in field evaluations, communicated field soldier problems to AMC lab and center personnel, and promoted the insertion of new technologies whenever possible to solve problems. Sometimes these new technologies were derived from maturing AMC technology base developments, but more often the technologies were derived from the commercial sector, where new products are constantly emerging, some with military application potential.

This work has made a significant contribution to field Army operational capabilities, increasing survivability of equipment and soldiers, improving soldier training, increasing soldier comfort and in reducing operating and support costs. Science advisers serve on the general staff of the major field commands and are a constant reminder that AMC has a genuine desire to do everything it can to ensure that our troops have the best equipment possible—the technological edge. Science adviser contributions have been praised by all ranks from four-star generals to squad level soldiers.

At the same time that the science advisers have been doing so much for others, they have been improving themselves in this almost unequalled professional development program. They start their FAST experience with an intensive two-week training course which includes briefings at the Pentagon and AMC Headquarters. They visit laboratories, RDE centers, depots, Training and Doctrine Command facilities, and FORSCOM installations. Included is special instruction on Army organization, staff procedures, military customs, and electronic mail. Beginning with this formal training, career development continues throughout their two-year tour.

In the course of their work they are actively engaged in field operations, inspections, demonstrations, and staff actions. In the field, they see how equipment is used. Experience in the field indelibly imprints fundamental knowledge of field operations, how commanders (corps division/brigade/company/squad) command, how they receive

Science advisers assigned to FAST have worked on more than 500 problem solving projects, provided demonstrations, assisted in field evaluations, communicated field soldier problems to AMC lab and center personnel, and promoted the insertion of new technologies whenever possible to solve problems.

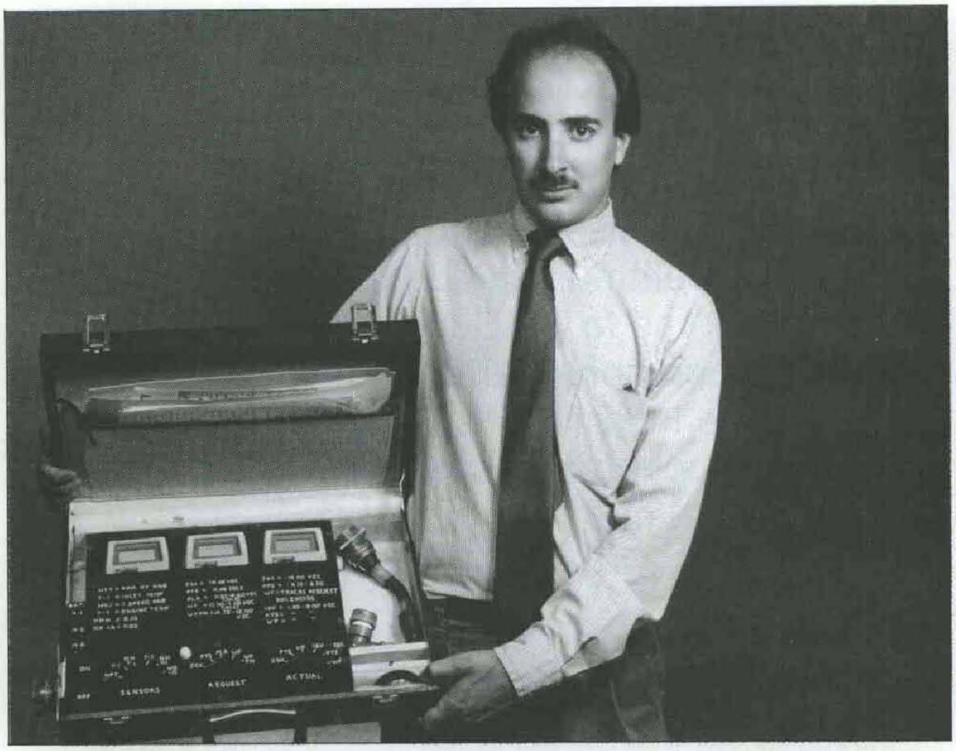
Scientists And Engineers Field Experience With Soldiers Program

The Scientists and Engineers Field Experience with Soldiers (SEFEWS) Program has been designed to provide AMC scientists and engineers an opportunity to be fully immersed in two to four week U.S. Army Forces Command (FORSCOM) troop unit field training exercises. Frank Tremain, deputy director, AMC-FAST, has been designated FAST SEFEWS program coordinator. He can be contacted on (703)704-1486 or DSN 654-1486.

Each major Subordinate command (MSC) will also have one or more SEFEWS coordinators (more than one if the MSC is dispersed geographically) who will maintain a list of personnel in their area who qualify to experience a SEFEWS assignment. There are medical and physical fitness requirements which must be satisfied to qualify.

FORSCOM will provide FAST a list of exercises and participating units which would like to have AMC SEFEWS participants. FAST will distribute available unit positions to the MSC SEFEWS coordinators who will match their available personnel with the openings. AMC-R 350-11, currently in draft, is the authority for this program and spells-out, in detail, requirements for participation in this activity.

A memorandum of agreement between AMC and FORSCOM is currently being staffed. In addition, FAST has begun its work in starting the program. In the near future, a SEFEWS recruiting poster will be distributed to all FAST quick reaction coordinators for posting in highly visible locations.



Steve Vinci, HDL FAST JR, with prototype M1 Tank Engine Analyzer.

Support Of FAST Professional Development Programs

The readers of this article can support the FAST professional development activities in a number of ways. First, if you are eligible, you can be an actual participant, science adviser, FAST junior, or SEFEWS member. Second, you can assist in talking up the existence of the activities and in encouraging eligible scientists and engineers to participate. Finally, when your colleagues return from their assignments, you can encourage the discussion of their experience.

The AMC-FAST professional development experience is mutually beneficial to the participating individuals and their home organizations who shoulder the cost involved. With continued support for these increased opportunities, all scientists and engineers (and technicians for SEFEWS) in AMC should eventually have a FAST professional growth experience with soldiers in the field.

orders, supplies and fire support. At the staff level, the science adviser sees how the staff evaluates their organizational equipment, how problems are identified, and how actions are taken to address their problems.

On a separate level, the science advisers are challenged to find solutions to problems. Based on their experience and support received from all AMC laboratories and centers, they initiate projects together with estimated cost, identify material solutions, oversee prototype development, demonstrations, and advise and assist in the process of fielding materiel that has proven to be a solution through real soldier use.

Essentially, the science adviser is an entrepreneur and acts like a project manager. In performing this function, the science adviser works closely with any one or several of AMC's labs and centers. This alone, provides a great learning experience in finding out what various labs and centers do and how they can give field support. This experience pays big dividends when the science adviser returns to his or her home organization.

In summary, the value of the professional development gained by science advisers is unique and matchless. There are 19 science adviser positions. The tours are for two years (plus one month for overlap) which means nine or 10 vacancies occur each year.

Vacancies are announced yearly in August with a closing date in November. The selection process runs through March, and then selected advisers visit the command for which they were selected to become oriented to available housing and prepare for their PCS move. The FAST two-week training program is in June and the tour starts in July or early August.

RICHARD E. FRANSEEN is director of the U.S. Army Materiel Command's Field Assistance in Science and Technology Activity. He holds a B.S. degree in mechanical engineering from Rice University and did post-graduate study in electrophysics at George Washington University. He graduated from the Defense Systems Management College Program Managers Course in 1985.

SHAPING COMANCHE THROUGH CONTINUOUS QUALITY IMPROVEMENT

By Merrick W. Hellyar

Introduction

The RAH-66 Comanche armed reconnaissance helicopter is the Army's number one priority and the cornerstone of the Aviation Modernization Plan. Its unique multi-role capability fulfills the essential armed reconnaissance and light attack missions while providing critical air combat coverage, a capability lacking in today's obsolete and costly light fleet.

Historically, new weapon systems introduced into the inventory demonstrate less than advertised operational effectiveness. This generally occurs because the development contractor loses sight of, or fails to pay sufficient attention to performance requirements in system design. To preclude a repeat of history on the new RAH-66 Comanche program, the Army initiated action years ago to establish contractor understanding and commitment to Army operational requirements.

During the competitive, down-select phase, supportability and operational suitability criteria constituted nearly half the selection weight. The winning Boeing Sikorsky Comanche team demonstrated a decisive commitment to both these criteria, and initiated techniques to make it happen.

Product Development Teams

Operational suitability requirements are being incorporated into the Comanche weapon system through the implementation of Continuous Quality Improvement as a design prerequisite. Comanche is being designed by teams of experts in engineering, manufacturing, quality assurance, logistics, finance, purchasing, as well as subcontractors, operational Army, and other experts working together on specific segments of the system. These teams, called Product Development Teams (PDTs), have as their common purpose the integrated development of a specific product from initial design through product delivery and support.

The combined knowledge of the team creates a powerful tool to recognize operational problems with previously fielded systems and design them out before the first parts are ever fabricated. They integrate their efforts with other similar teams to achieve a total weapon system design that maximizes operational effectiveness, as well as supportability characteristics. A further look into the structure and achievements of Comanche Product Development Teams provides considerable insight into the value of this innovative design approach.

The entire Comanche development effort is structured around a top level weapon system Product Development Team, supported by four teams assigned with the deliverable products: airframe, mission equipment package, support and training systems, and system test. Supporting each of the four

A primary benefit of concurrent engineering is doing the job right the first time, thereby preventing errors, reducing cycle time and cost, and satisfying customers.

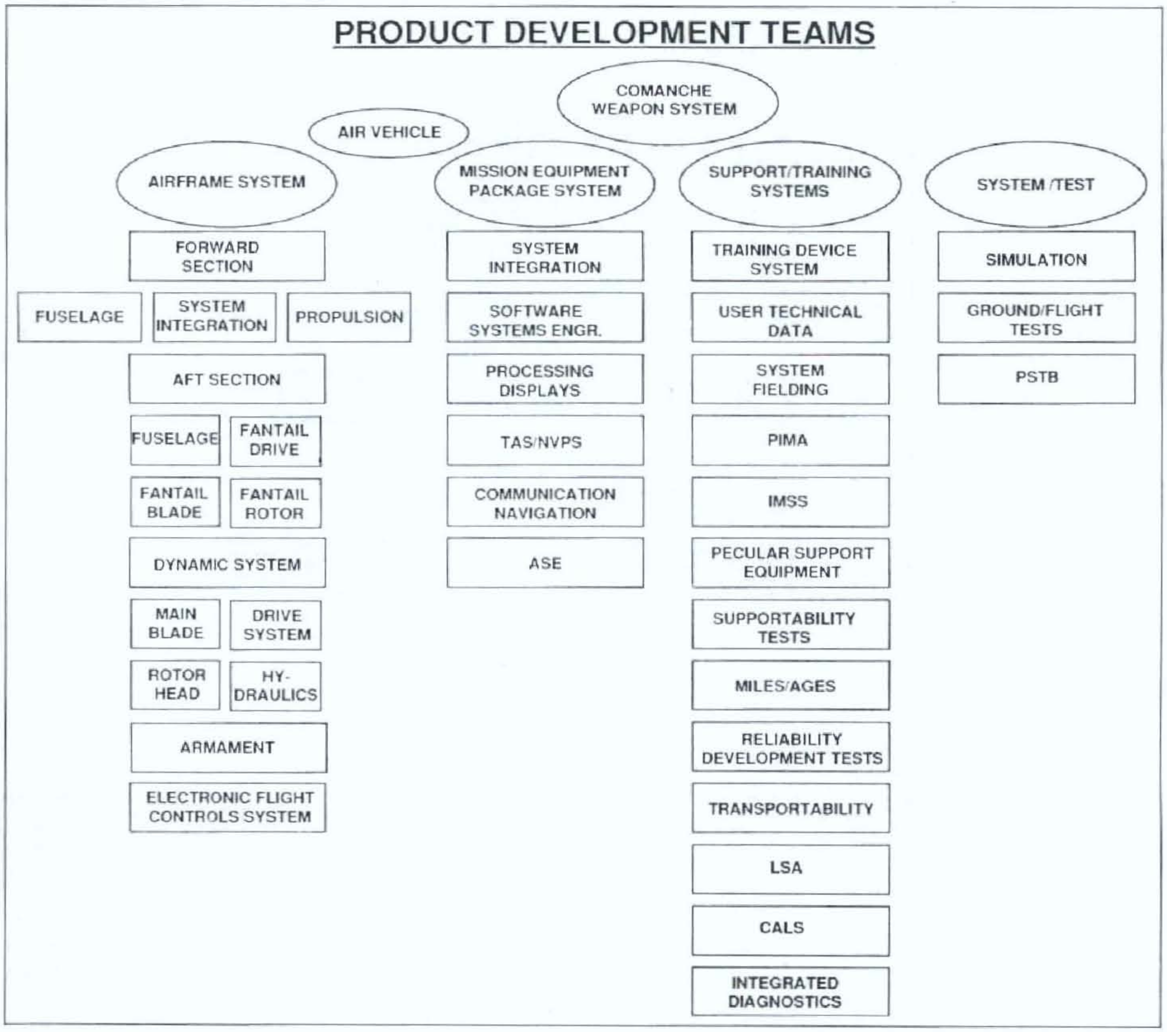


Figure 1.

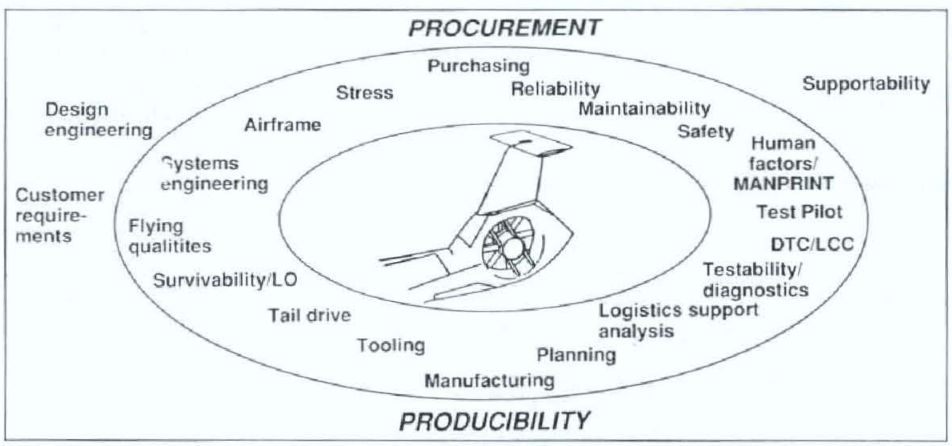


Figure 2.

teams are a series of teams focused on individual elements of each product (Figure 1).

Concurrent Engineering

Comanche Product Development Teams use a technique called concurrent engineering in designing their products. This technique requires the concurrent design of products and their related processes, including manufacturing and support. It causes the developers to consider, from the very beginning, all elements of the product life cycle from conception through disposal, including quality, cost, schedule, and user requirements. A primary benefit of concurrent engineering is doing the job right the first time, thereby preventing errors, reducing cycle time, and cost, and satisfying customers.

Early Boeing Sikorsky successes using concurrent engineering provide strong evidence of the progress toward achieving a supportable, maintainable and survivable weapon system. One particularly successful concurrent engineering effort involved development of the RAH-66 anti-torque solution, the FANTAIL (a trademark name) anti-torque system.

The FANTAIL team was first convened in August 1989 to ensure the Comanche tail rotor blade bearings would meet or exceed their reliability and maintainability goals. The teams scope was later expanded to include incorporation of the FANTAIL system on a modified S-76 as a flying technology demonstrator. The most critical factor in the team's success involved incorporating the right functions and team members for the job (Figure 2).

Another critical factor involved the acquisition of customer experience data on the U.S. Coast Guard HH65A (Dauphin) FENESTRON, that is similar in concept to the FANTAIL. This data enabled team members to design out reliability and maintainability (R&M) faults experienced with the Dauphin FENESTRON.

One of the striking differences between the "project" approach, where a single individual is given the responsibility to solve a problem and the concurrent engineering team (CET) approach involves data and information sharing. Under the previous "project" approach, the project engineer would normally contact by phone or memo those sources from which technical or management input was required. This method could take hours or days and invite error. Working as a singularly focused group, the FANTAIL Team had all the expert knowledge at hand.

The accomplishments of the FANTAIL team were convincing evidence of the value of the concurrent engineering process to the Boeing Sikorsky Comanche team. Challenged by a 17-month schedule, the team designed, fabricated, and flew the technology demonstrator 438 days after go ahead. Using an integrated, three dimensional, engineering data base, the team reduced downstream engineering change orders from a planned average of 4.6 engineering orders per drawing to 1.6 engineering orders per drawing. Hardware quality results were equally impressive.

Team Comanche

Another innovative continuous quality improvement approach implemented on RAH-66 to further involve the user and assure achievement of operational requirements is Team Comanche. Spearheaded by MG Dewitt T. Irby, Jr., the Comanche PEO, Team Comanche is an integrated government and contractor management concept designed to assure effective and timely Comanche Program Execution through provision for an appropriate program support resource structure; a management control system for assessing program execution; and the continuous improvement of key program processes.

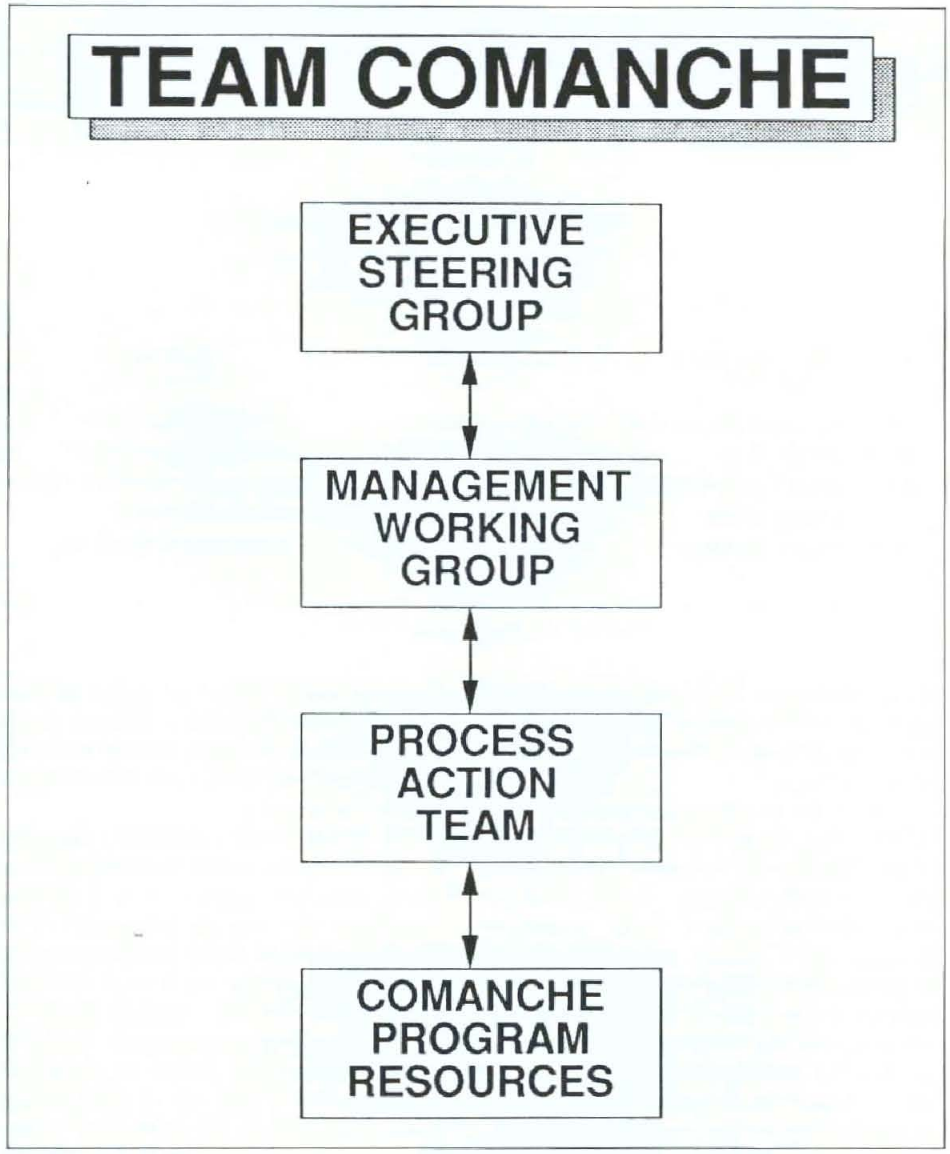


Figure 3.

All key decision makers in the Comanche program including the Aviation Systems Command, TRADOC, and senior contractor executives participate in a series of teams illustrated in Figure 3. The primary benefit of this structure is the increased involvement and communication among team members resulting in more informed, timely program decisions.

This structure is also used to identify areas where processes or expertise is lacking, identify process owners, the resources required to fix the processes, and performance measurement criteria. The bottom line is accomplishment of all cost, schedule, performance, and supportability objectives, and achievement of a successful Milestone II decision.

The most highly effective step taken to incorporate operational requirements into the Comanche design is establishment of the TSM (TRADOC System Manager) Forward concept. Under this concept, four highly experienced Army personnel, identified in Figure 4,

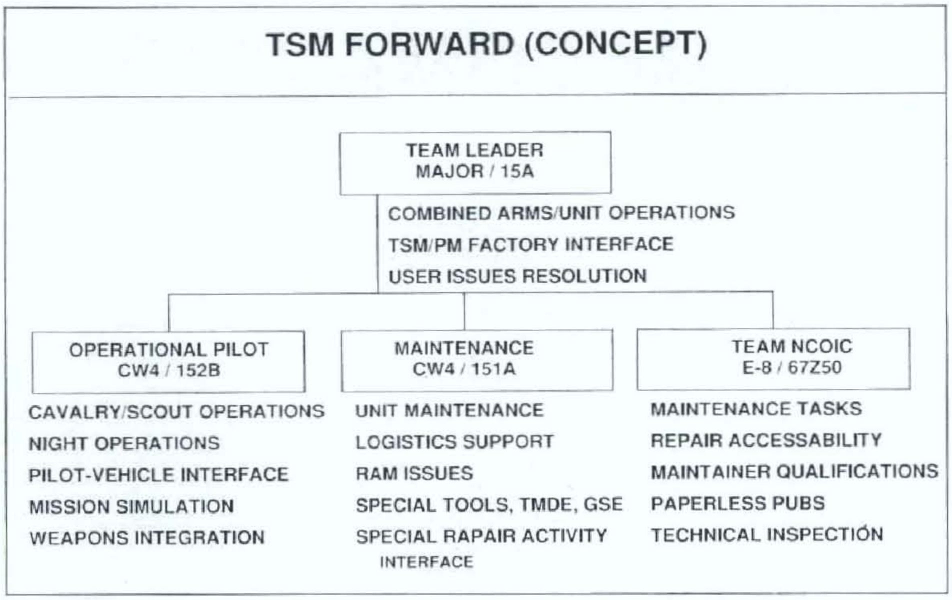


Figure 4.

representing the TRADOC system manager, are collocated with the contractor to participate in the design development process.

TSM Forward provides a method of addressing and prioritizing operational and Manpower Personnel Integration (MANPRINT) training issues, such as maintainability, battlefield resource management, safety, training, tactics, supportability, doctrine, and cockpit interface. It provides real time communication between the customer and the contractor within the Product Development Team (PDT) structure. It makes supportability more than traditional integrated logistics support by having the user provide continuous inputs into the design process.

Responsibilities of on site TSM personnel are to: maximize MANPRINT, operational, and maintenance input to design; expedite information flow; have daily interface with contractor personnel; prevent, eliminate, and report issues; monitor and tract user issues with design; and interface with sub-contractors as necessary.

The return on investment for the contractor and the user are immediate. From the contractor's perspective, TSM Forward provides a single point of contact for user information; daily access to operational perspectives; and daily access to MANPRINT considerations.

From an Army perspective, TSM Forward provides the ability to incorporate MANPRINT and operational inputs early; to quickly identify and eliminate potential problems by reacting to questions; and to keep the user/PM informed.

Conclusion

The Armament PDT is an excellent example of the active role TSM Forward is playing in the design of the weapon system and its impact on the operator. Last fall the Armament PDT, including TSM Forward members, went to General Electric to resolve supportability issues on the turreted gun loading system (TGS) concept. The evaluation topics included reliability, maintainability, MANPRINT, design, and operational suitability of the TGS.

Although the team concluded that the current design of the TGS was capable of performing its intended function, it recommended fabrication, assembly, and test of a representative proof of principle demonstrator of the complete TGS ammunition handling system to more fully evaluate the operation and performance of the system prior to final design completion. Such team interaction is clear evidence of the means by which the voice of the soldier is considered in design of the Comanche weapon system.

Continuous Quality Improvement is the cornerstone of Comanche design development. Through it, Comanche will provide the Army with operationally ready, leap ahead technology to conduct its critical armed reconnaissance/attack/air combat mission.

MERRICK W. HELLYAR is vice president of the RAH-66 Comanche Program and program director of the Boeing/Sikorsky Joint Program Office. He holds a B.S. degree in electrical engineering from Cornell University.

IMPORTANT NOTICE

The Army RD&A Bulletin office has relocated to Fort Belvoir, VA. All correspondence should now be addressed to:

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NON-DEVELOPMENT ITEMS: A MANPRINT CHALLENGE

Keeping the Soldier in the Acquisition Loop

By MAJ Lauris T. Jones III

Non-Developmental Item (NDI) is a term which encompasses the acquisition of materiel from a wide variety of sources. All military services have significant examples of NDI programs. For example, the Army modified the Chevrolet Blazer to perform as its Commercial Utility Cargo Vehicle (CUCV). The Air Force adopted a McDonnell Douglas passenger/freight aircraft to become the revered KC-10 tanker. An Israeli-developed short-range remotely-piloted vehicle was selected by the Navy, and the Marine Corps has repeatedly acquired Army weapon systems as standard epuipment.

Simply stated, NDI acquisitions are previously developed hardware or software that can meet the user's needs with little or no modification.

The necessity for NDI use has been documented at the highest levels. The 1987 National Defense Authorization Act requires the Department of Defense to use NDI to fulfill needs to the greatest extent possible. This has led to the perfunctory statement of needs in generic terms of required performance, function and essential characteristics. DODD 5000.1 further requires use of an existing U.S./allied military or commercial system to be assessed and thoroughly reviewed as an approach to meeting a requirement. Full consideration is required, when possible, for using "off-the-shelf" commercial products.

NDI presents some notable benefits in the acquisition process. State-of-the-art technology may be rapidly acquired by the services, research and development costs are reduced, and time to field can be abbreviated. The mobilization base is also expanded to include available commercial production facilities. And finally, logistic support costs may be reduced via already available training plans, publications, drawings and special tools. Such advantages may well justify selection or modification of an off-the-shelf item.

Although the user may get a system sooner with NDI, the challenge remains in such an accelerated process to ensure that the end product is fully suitable to the target audience and mission. Requirements must be carefully cross-walked against the performance capability of the proposed item. Existing commercial

Simply stated, NDI acquisitions are previously developed hardware or software that can meet the user's needs with little or no modification.

> **The Market Investigation will ultimately focus available technology on the user's requirements, and answer the all important question: Is NDI a viable option in this case?**

test data must be validated, and operational testing performed. Integrated logistics support activities normally accomplished in conventional preproduction phases may have to be radically accelerated, drawing heavily on manpower and funding resources.

Numerous total system performance concerns go hand-in-hand with the inherent test and logistics issues. Manpower and Personnel Integration (MANPRINT) constraints should not be traded-off too easily during the NDI process, nor should design influence be reduced. Judgements should not be automatically based on market place data. Human system integration requirements must be accomodated by the hardware.

Manpower, personnel and training are critical decision points relative to suitability of an off-the-shelf system. An accelerated acquisition process may not allow adequate reaction time for the timely generation of a complete Basis of Issue Plan and Quantitative Personnel Requirements Information.

The carefully prepared System Training Plan must focus on the soldier and his training devices. Operational safety and health hazard risks must be identified and independently evaluated for acceptability. The absence of military standards in commercial design leads to a question of soldier-machine interface in varying environments. Finally, stabilization of human factors considerations can become difficult when the "as is" system is modified to meet turbulent requirements.

Given that the success of MANPRINT has been traditionally dependent upon its ability to influence early program design towards user-system compatability, critical documents in the NDI process must be targeted. The MANPRINT practitioner cannot employ all the time-intensive studies inherent in a 15 year acquisition process. In the NDI buy, the concept arrives in the form of a fixed design, therefore human system applications must be evaluated in the absence of a complete integration effort.

To facilitate optimization of MANPRINT in a successful NDI life cycle, the System MANPRINT Management Plan, Independent Evaluation Plans (IEP) and the Market Investigation (MI) should all remain constant requirements. However, these documents can and should be prudently tailored to the specific acquisition circumstances.

The System MANPRINT Management Plan provides a basis for issue development and documentation through early analysis of total system performance objectives. The identified objectives are then used in establishing the critical MANPRINT issues to be included in IEP. These issues must address the Army's concerns and constraints as they pertain to the soldier performance and capabilities per system. Once these issues are included in the IEP, they can then be addressed as part of the formal Market Investigation.

The Market Investigation will ultimately focus available technology on the user's requirements, and answer the all important question: Is NDI a viable option in this case? Central to this evaluation process is the linkage established between Market Investigation questions and MANPRINT issues and domains. Care must be taken to provide an evaluation of not only the strengths and weaknesses of a system, but also the potential trade-offs and resultant performance impacts.

Features of available hardware that support soldier performance needs should then be embedded in the Test Evaluation Master Plan as system specific requirements, with the same included in the System MANPRINT Management Plan. Infusion from the MANPRINT Management Plan to other major program documentation, like the draft Integrated Logistic Support Plan and the Operational Requirements Document, must occur. Ultimately, the Request for Proposal will then convey to industry the critical system MANPRINT characteristics which will be required and evaluated.

Just as the NDI acquisition strategy must incorporate early consideration of MANPRINT issues, so should MANPRINT working groups and documentation flex to accomodate unique opportunities. The MANPRINT practitioner is thus challenged to initiate an efficient process early out. Tools such as the newly formatted System MANPRINT Management Plan and HARDMAN III modules may be appropriate for application to the accelerated early life cycle of NDI. Domain assessment agencies must be proactive, and eschew fixed policies regarding NDI. The material developer should carefully oversee the translation of user's needs into appropriate solicitation language, actively seeking human-system integration criteria.

Most important is the understanding that NDI is but a variant of the system life cycle process. The user still initiates that process by establishing the need and materiel requirement. Therefore, the user must be equally responsible for early initiation of the MANPRINT effort. For the combat and training developer, as well as the program manager and contractor, keeping soldiers in the loop is very much the bottom line. There is time in the NDI process for MANPRINT.

MAJ LAURIS T. JONES III is a MANPRINT acquisition staff officer in the Office of the Deputy Chief of Staff for Personnel, Department of the Army. A member of the Army Acquisition Corps, he holds a B.S degree in criminology and chemistry from Auburn University, an M.S degree in contract management from Florida Institute of Technology and is a graduate of the Program Managers Course at the Defense Systems Management College.

THE ARMY'S EYESAFE LASER RANGEFINDER PROGRAM

By Richard C. Renairi and Tom N. Nguyen

There has always been a need for accurate range information in military operations. Until the advent of the laser, the ability to satisfy this need was, at best, extremely limited. Manual rangefinding techniques include the use of maps, compasses, and the estimation of distance to a target by its relative size in sighting optics.

Laser rangefinders measure the time-of-flight of a single short pulse of laser light to and from a target. This time of flight is then converted to a range, which is displayed in the rangefinder's sighting optics. Accuracy of a laser rangefinder is dependent only on the frequency of the clock used to measure the time-of-flight of the light pulse.

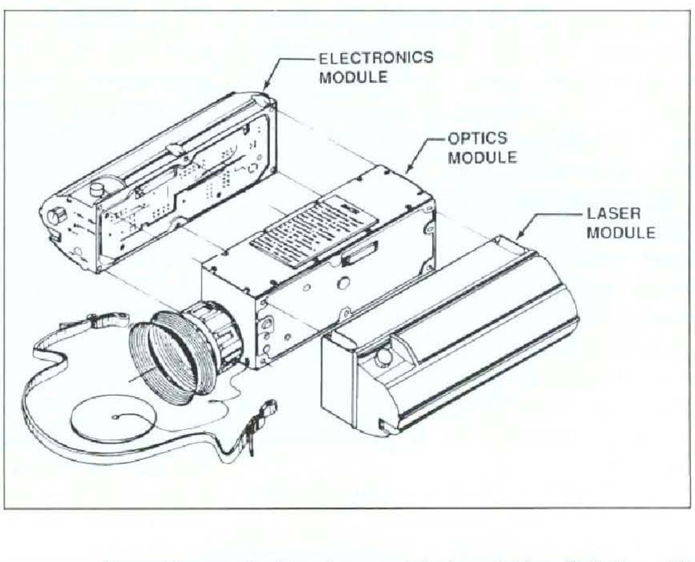
In 1980, the Army fielded the AN/GVS-5 Nd:YAG non-eyesafe hand held laser rangefinder. The use and widespread deployment of the AN/GVS-5 was limited due to concerns for eyesafe operation in training and force-on-force battlefield simulation scenarios. In 1983, the Army awarded contracts to develop 1.54 micron laser rangefinders to provide eyesafe operation for both training and tactical use. Concurrent with efforts to find the ideal eyesafe laser rangefinder, the Army was also in pursuit of a smaller package using Neodynium YAG as the lasing medium. In addition, developments in the fiber optics field and independent research efforts of several defense contractors to develop and produce eye-safe lasers produced promising results.

The Army awarded in 1988 a Development Production Prove Out (DPPO) contract to finalize the design, develop production tooling, prepare a Technical Development Package (TDP) for production and deliver 30 systems for Developmental and Operational Testing.

MELIOS Engineering Development

A number of significant changes were made to the Mini Eyesafe Laser Infrared Observation Set (MELIOS) program after the end of advanced development testing. While most of the operational

Mini Eyesafe Laser Infrared Observation Set.

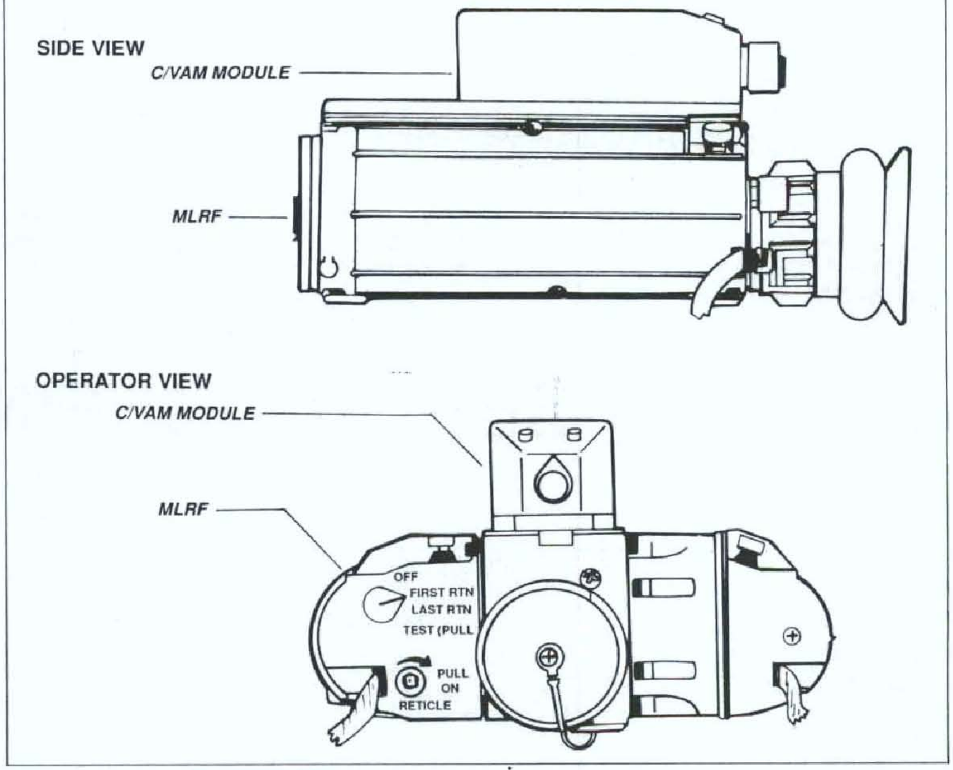


Compass Vertical Angular Measurement (C/VAM)

In 1989, the compass requirement for the MELIOS was separated from the DPPO contract. Industry Research and Development continued and several digital magnetic compass manufacturers made significant progress in achieving the required accuracy. Various systems have been developed that integrate tilt sensors, error compensation techniques and special algorithms to cancel out local magnetic effects. Following government review of available technology and determination that the development risk was low, the C/VAM effort was restarted in April 1990.

The MELIOS C/VAM effort runs parallel to the MELIOS production contract to develop 14 C/VAM modules for government DT/OT. Government DT/OT is scheduled to start in August 1992. The C/VAM module will be a self-contained environmentally sealed module which attaches to the top cover of the MELIOS optics and interfaces with the MELIOS to display azimuth and vertical angular measurement (VAM) through the MELIOS field of view. A complete illustration of the MELIOS equipped with C/VAM is shown below.

A Special In-Process Review for the C/VAM will be conducted in December 1992. If exit criteria are met, C/VAM then will be cut into the MELIOS second year production. All AN/PVS-6 production units will be capable of being interfaced with C/VAM.



parameters of the MELIOS remained the same, changes were made to the weight requirement, the battery to be used, and the maximum range requirement. In addition, a requirement for a compass was added.

Engineering Development and the Initial Production phases were combined into a Development Production Prove Out (DPPO) phase, where Initial Production becomes an option to be exercised upon successful completion of the Engineering Development phase, shortening the time to enter initial production by approximately one year.

The MELIOS DPPO contract was awarded to Optic-Electronic Corporation (OEC) of Dallas, TX, in September 1988. The Engineering Development MELIOS Laser Rangefinder is a battery operated laser rangefinder that is eyesafe at the exit aperture and weighs 3.5 pounds. It can determine and display the distance to a target which is 50 to 9995 meters away with an accuracy of plus or minus five meters. The MELIOS laser rangefinder can be mounted on a tripod or to the AN/UAS-11 Night Observation device. It is constructed in three modules which are replaceable at the direct support level. These modules are the electronics module, the optics module, and the laser module. Modular construction is shown below.

Qualification tests were conducted from March 1990 through August 1990 and demonstrated that the required operational capability requirements were met except for battery life and compass. Battery life demonstrated during technical tests and operational tests was 3400-3500 rangings. Given the technologies involved, significant advances in battery life are not expected in the near term. A new battery, BA-6516, currently in development by the U.S Army Laboratory Command, is however expected to provide approximately 4000 rangings. Compass development is a parallel effort and is discussed in the adjoining sidebar.

At the In-Process Review (IPR) III in December 1991, a decision was made to proceed into the Production and Deployment Phase. The MELIOS was Type Classified as Low Rate Initial Production.

Production

A three-year, multiyear production option was awarded to Varo, Inc. for 8000 units with full competitive reprocurement data at a cost of approximately $9500.00 each. (Varo, Inc. purchased OEC in 1990)

To date, the MELIOS development effort has maintained an established aggressive schedule. Since the MELIOS is an eyesafe and compact modular design, it can easily be integrated into any soldier training exercises. In addition, improvements in the repetition rate promise evolutionary refinement to the current design. The MELIOS program povides the Army with a fully eyesafe laser rangefinder.

RICHARD RENAIRI is the project leader for MELIOS development and is assisted by TOM NGUYEN. Both are employed at the U.S. Army Communications Electronics Command's Night Vision and Electro-Optics Directorate.

The Great Coffee Dilemma...

A MANAGEMENT FABLE

By MAJ Jack A. Oliva

Once upon a time there was appointed a new CEO. The CEO was great and powerful. The new CEO made it known that the most important thing to him was good coffee. Luckily the executive secretary made good coffee. She had come up through the ranks in the old fashioned way and had learned the art of coffee making from years of apprenticeship. Coffee making for her was a craft. With her skill, the company was able to function smoothly.

As the company grew and became more successful the requirement for coffee grew. All the lesser executives saw coffee as a perc of the front office. More than a perc, being able to drink coffee from the CEO's office was a mark of status. As the requirement for coffee grew, the executive secretary found it harder and harder to keep up with her other duties and still keep the coffee pot full. That's when it happened.

It seemed reasonable enough at the time. The administrative assistant reasoned, "Simply get some other secretary to make the coffee when the executive secretary is busy." The administrative assistant told the office manager to just make sure that when needed, someone would help out by making the coffee. No one in particular was identified or trained.

One day the executive secretary was out of the building on an errand and the office manager grabbed someone from the secretarial pool to make the coffee. This secretary had not been schooled and apprenticed in the art of coffee making. Additionally, she had no way of knowing the importance the CEO placed on the quality of coffee. Besides, this coffee business was not her job, she never considered herself personally responsible for the quality of the coffee. All these factors combined to create a disastrous result: the CEO got bad coffee.

The first response to the tirade that followed was that the office was reorganized to ensure that the executive secretary was ALWAYS available to make the coffee. This stop gap action worked well for the next six months until the executive secretary retired. When she left, the void was immediate. Although coffee had become a critical function, there was no plan in place. As you could guess the CEO got bad coffee and there was much sorrow throughout the office.

The CEO took charge personally. He personally identified the 10 steps required to make good coffee. The list of 10 steps was distributed throughout the company. But the published list was not all inclusive nor did it teach the philosophical basis of good coffee. Good coffee is in the taste of the person who drinks it. Knowledge of the customer's taste is vital in making good coffee for that customer. The list did not address any of these hard to define parameters. It was a list and it was simple to follow. The results were not uniform as there was much room for interpretation. For example: did four spoons of coffee mean level, heaping, or full? Sometimes the coffee was good, other times not. Since the CEO had personally made the list, he was sure that the problem was simply a matter of people not following the instructions.

Therefore, the CEO created a new office to function as an inspection agency called the IG (Inspector of Grounds) to check people randomly to ensure the 10 steps were being followed. Since this was not the problem, the inspections did not improve the quality of the coffee. When the IG was questioned about why his inspections failed to improve the quality of the coffee, he explained that the secretaries simply did not take the issue seriously enough. Clearly what was needed was the direct involvement by the chain of command.

This was easy to fix. The CEO declared that all section heads were responsible for coffee made in their areas. This of course did not address the root cause of the problem. The coffee was still not consistently good. This caused the section heads to be battered routinely and to finally seek help. The answer, they told the CEO, was obvious. Coffee was a complex issue; what was needed was functional area experts.

The company reorganized and appointed functional experts to head new offices. The 10 new offices had responsibility for each of the 10 steps. For example, the Filter Office was responsible for all coffee filters. They became experts on the filters available, sizes, shapes, materials, etc. They put research and development money into exploring new filter technologies. They hired and trained people to be filter experts and promoted them based on how long they had worked in filter jobs. All 10 offices became experts in their respective area. The Personnel Office developed a coding system and career path for each specialty. Career managers were appointed to insure that all the right development assignments and schooling were available to have a work force dedicated to its assigned specialty.

The IG continued to inspect and as a result of everyone's efforts each office was able to attain a 90 percent success rate in their area of responsibility. But somehow quality was still not up to par uniformly. So a test agency was formed. The testers became experts in what a good cup of coffee should be and tested each pot to ensure the CEO got only the best. To be 99 percent sure that it requires three cups tasted by independent testers. As a result of these measures the CEO only drank good coffee. Everything was fine. Or was it?

The cost of a pot of coffee had increased 2,000 percent in the course of the fable. The manpower requirements to inspect and test the coffee were almost as much as the manpower to make the coffee. Testing three cups per pot meant that 25 percent of the coffee yield was consumed in testing. Each functional area bought only the best ingredients available. The filters where imported from a company in Africa that made them by hand ($5.00 a filter). The Coffee Bean Department bought only the best beans grown on a small hill in Hawaii ($30.00 a pound). Each area bought only the best ingredients without regard to what it contributed to the final product. The functional areas were by nature focused on their part of the process without regard to whether it added quality to the final product.

Yet another problem forcing up costs was the fact that quality had gone down abysmally. With each office having a success rate of 90 percent, 10 percent of the yield was lost at each step. For a 10-step process, that meant that for every 100 pots that are started only 35 made it through the process. If the testers consume 25 percent of that yield in testing the real yield is only 26 pots per hundred.

In the end, the company went bankrupt. The overhead costs on the items they manufactured priced them out of the market. Ultimately, low priced foreign competition ate away at their market share and the company closed. The CEO now does his own coffee.

Lessons Learned

This short fable is replete with lessons on many levels. Presented here are just a few thoughts:

- Transition from a craft, or prototype to mass production is a serious step that must be well planned. Transition in this fable was by evolution from a one secretary, part time job to a coffee empire. Early indications of the growth of demand and the increased emphasis by the CEO should have led the staff to come up with a plan to meet the need in the absence of the executive secretary and account for growth. While this type of transition gets a lot of attention when the subject is a major product on the shop floor, the transitions that take place in the company infrastructure can be just as damaging to the bottom line if left unmanaged.

- The CEO and the company allowed a perc to grow into a major part of the business. Coffee had nothing to do with the product the company was manufacturing. Many such programs and efforts take root and grow like weeds. Without careful and continuous pruning the weeds grow and sap the vineyard. Management at all levels must constantly seek out those things that do not add value to the product.

- Executives seldom understand all the dynamics of a situation and should refrain from fixing things personally. Executives should work on executive level problems. When they try to personally fix something, one of two things happen. Either they only fix a symptom and/or create more problems or, in those instances where the executive delves deep enough to understand the totality of the problem he/she has ignored the executive level duties in order to find the time. Neither is a good solution. It is hard for executives used to action to refrain but, refrain they must. Identify the problem and your vision of success and then cause the people who work in that area to figure out how to fix it. In the fable, it never occurred to the CEO that the substitute secretary was the only secretary in the pool who didn't know how to make coffee. If the administrative assistant had asked the executive secretary she could have named three others who could have done the coffee in her absence. If the alternate secretary had understood the situation, she would have explained up front that she was not qualified.

- Instead of recognizing the need to develop a process and training system to produce coffee experts, the organization allowed the system to collapse before taking action. This caused them to start from scratch when the executive secretary retired. Action would have been easier if they had an experienced base to build on.

- Publishing check lists causes people to focus on the steps and not the product. Inspecting the steps and giving a grade of 90 percent can be meaningless. If the step that was missed is "put in the grounds", you have 90 percent and no coffee. (The author is grateful to MG K.C. Luer for his insight as commander of the 5th Infantry Division where he frequently used this example.) Focus on the process is good when it improves the product. You just have to be careful not to cross from process focus to process fixation. Inventing organizations with responsibility for steps and no one clearly identified to be responsible for the product only reinforced the process fixation.

- You cannot test quality in at the end. The testers should have been used to refine the 10 steps. They could have provided early feedback that cheaper filters work just as well as expensive ones. If the testers had focused their attention on refining all of the parameters in the process and if an investment were made in statistical process controls, there would have been a reasonable assurance of good coffee without consuming 25 percent. Another fallout of this approach is that yields would have gone up, costs would have gone down, quality would have been built in, and fewer resources would have been used in inspection and testing. These are the basic tenants of Total Quality Management.

Management of infrastructure can be as important as management of main product lines. Early identification of key missions and capabilities and how they add value to the bottom line is vital to proper resource distribution. Knowing the customers and what they perceive to be quality products and services allows for clearly articulated goals. The goals then become the focus and the process is identified to attain the goals in the most cost effective manner. The development of the process can not be done by any individual. All the functional experts, the testers, the inspectors and the accountants must work together to define the optimum process. Once the process is identified, it must be revisited frequently to ensure the end result still meets the customers expectations and is still the most cost effective way to meet the requirement.

MAJ JACK A. OLIVA is special assistant to the deputy commanding general, Army Materiel Command. He has worked extensively in formulating strategies to improve the acquisition process and acquisition management systems.

THE ATMOSPHERIC AEROSOLS AND OPTICS DATA LIBRARY

Informing the Smoke and Aerosol Community

By Anthony Van de Wal, Fidel Tibuni, and Roger E. Davis

Introduction

It's January 1991. War between the United States and Iraq is imminent. You are a researcher at the U.S. Army's Atmospheric Sciences Laboratory (ASL), a specialist in battlefield atmospheric models.

Army Central Command (CENTCOM) has requested that ASL develop a Tactical Decision Aid (TDA) to give tank commanders heading for Kuwait critical information on how the electro-optical (EO) systems in their M1A1 Abrams tanks will perform in a battlefield environment that includes obscurants such as blowing sand and smoke from the threatened flaming trenches of oil.

At stake are lives and equipment that have never operated in conditions like these before, let alone seen real combat. The accuracy of the TDA, and the atmospheric model you build to support it, must be unimpeachable, and the Army needs it yesterday. Where do you find the hard data, particularly data on crude oil smoke characterizations, you need to build the model and the TDA?

The scenario painted here was intentionally dramatized, but is not totally fictional. Army researchers faced very similar, very real problems in the months preceding Operation Desert Storm. There is, fortunately, a very real, very powerful tool to help meet such challenges—the Atmospheric Aerosols and Optics Data Library (AAODL).

The AAODL Database

Many of the high-technology military weapon systems currently fielded or under development contain critical EO components whose function depends upon the quantity and quality of electromagnetic radiation propagated through the atmosphere. The performance of these components, as well as the performance of the weapon platforms they support, is generally degraded by atmospheric conditions and aerosols and gases found on the battlefield.

The problem of degraded performance in adverse atmospheric conditions has sparked a major DOD concern as to the true capability of high-technology weaponry in realistic battlefield environments. In addressing this concern, the Army supports ongoing programs to determine the adverse effects of both natural and man-made battlefield atmospheric obscurants

Official U.S. Air Force photograph

Technicians operating a test smoke generator at Smoke Week XIII. Characteristics of the obscurant used are in AAODL.

Upon weapon systems capabilities. These programs include laboratory studies, field tests, analysis, and modeling.

From these programs, large volumes of data have been generated characterizing and quantifying the physical attributes of battlefield contaminants and their effects on systems performance. Over the last decade, beginning in 1981, the CounterMeasures and Test Directorate (CMTD) and ASL have co-sponsored the AAODL database to centralize, document, store, and disseminate this information. AAODL is managed by Science and Technology Corporation (STC) in Las Cruces, NM.

A major goal of the AAODL is to provide a research-quality database that is easily accessible by the smoke and aerosol community. The AAODL provides smoke/obscurants modelers, analysts, EO systems developers, field test designers, and wargamers with the information they need to assess the effects of obscurants and atmospherics on weapon system performance.

Data Types And Sources

Sources of data archived in the AAODL include field tests, laboratory measurements, and theoretical modeling. These sources yield data that can be generally broken down into three categories: human and sensor performance data, munition/obscurant characterization and performance data, and meteorological data. Supplementary data include sensor characterizations, field and laboratory test documentation, model support and documentation, and imagery.

Design And Operation

The heart of the AAODL is the computerized database library maintained on a SUN network. The network links the SUN 386i and PCs to a main server. Access to the computerized data is accomplished through the ORACLE database management system; downloaded digital data can be either in ASCII or ORACLE file format.

The computerized library is made up of over 50 individual databases, segregated by field test, laboratory measurement, or model assessment. A reference database, called DBKEY, provides summary information on the content of the individual databases.

In addition to the computerized portion of the library, AAODL also includes a growing library of more than 700 video tapes, printed documentation and data, and access to many computer analysis algorithms and obscuration models. The accompanying illustration shows the basic structure of the AAODL.

Special Features

Currently under development as a complement to the video tape library is a video compression capability. When completed, the technique will provide video frame averaging and frame compression. Compressed images will be stored on optical disks.

For researchers and developers working with classified systems, the classified AAODL is operational at the STC facility in Las Cruces. The classified database emphasizes pertinent sensor performance data.

AAODL Contributions

Since its inception, the AAODL has contributed significantly to the smoke and obscurant community's effort to assess and predict the effects of atmospheric degradation on EO systems. The following paragraphs offer a few examples of these contributions.

Several of the modules in ASL's Electro-Optical Systems Atmospheric Effects Library have used AAODL data extensively for validation. AAODL data on human responses to targets in obscuration have been used for evaluation of target contrast models and to determine transmission thresholds for detection.

Using data from AAODL, the effects of atmospheric stability on obscurant cloud formation, duration, and effectiveness have been studied and quantified. Munition/obscurant data from the AAODL have also contributed to assessments of fielded and developmental systems. For example, the AAODL contains extensive data sets on obscurant clouds from smoke grenades and generators.

AAODL data have been used for comparative analyses of EO systems such as laser rangefinders. Archived data have also been used to evaluate the performance of characterization systems used in field testing. The result of one such evaluation led to changes in data acquisition procedures for transmissometers, thereby improving the overall quality and reliability of transmissometer data.

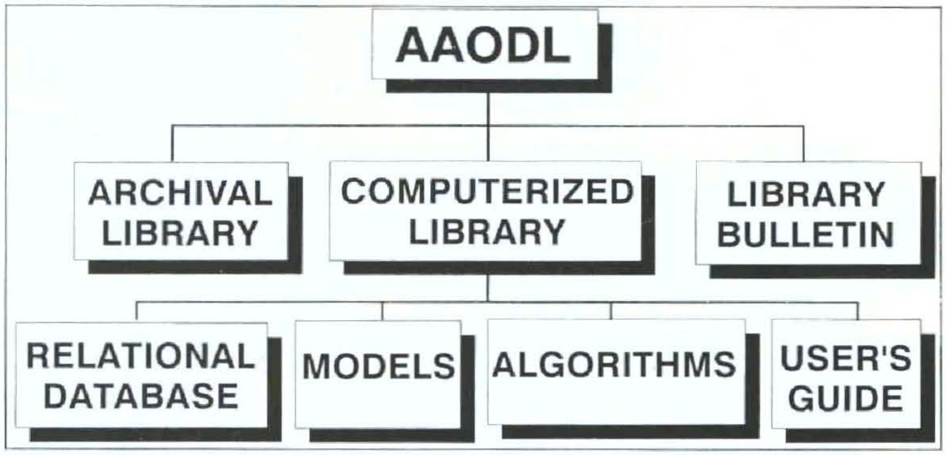
As alluded to in the introduction, the AAODL played a part in the decisive victory of Operation Desert Storm. AAODL models were used to estimate the sizes and optical effectiveness of specific obscurant/dispersal systems. A meteorological data set from the AAODL was also used to assess the area's probable inclement weather.

Using AAODL, physical properties of obscurants as measured in the laboratory have been compared to the same properties as measured in the open atmosphere. The consistency between these measurements is crucial to modelers and analysts developing TDAs that require accurate predictions of obscurant performance in all spectral regions.

User Services And AAODL Access

AAODL user services include the annual publication of the AAODL bulletin, support of the AAODL database user's guide, and personal attention to users' requests and requirements. The AAODL is a DOD sponsored database; therefore, distribution is limited to U.S. Government agencies and their contractors. To obtain data or information from the AAODL, a request to access must be sent to: U.S. Army Atmospheric Sciences Laboratory, ATTN SLCAS: (Fidel Tibuni) White Sands Missile Range, NM 88002-5501. A government contract number must be included in requests from contractors.

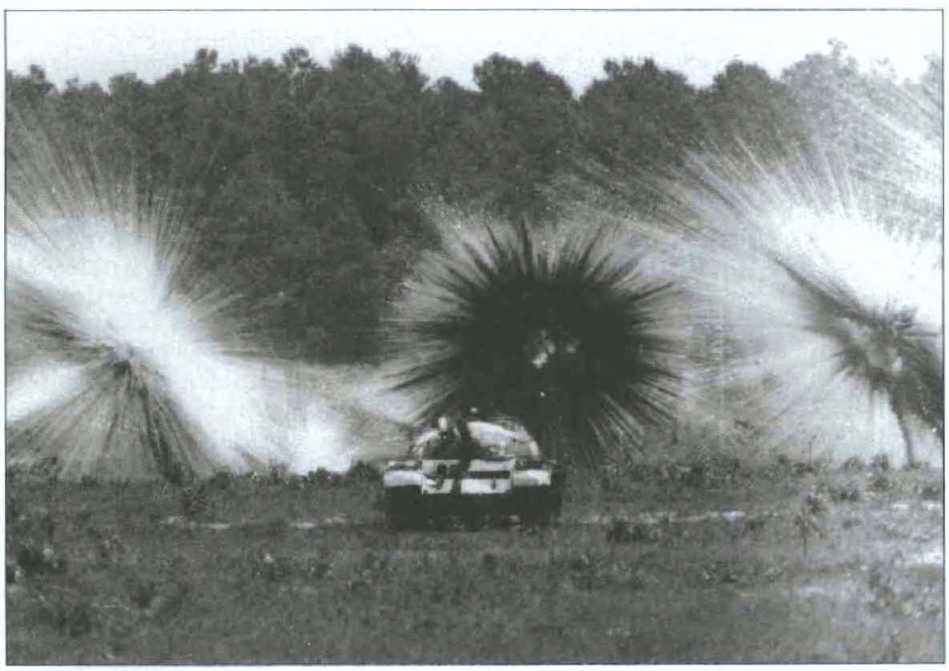
The majority of AAODL users who submit requests ask that the data be extracted by AAODL personnel and sent to them. Data can currently be supplied as printouts or on magnetic media. Users typically prefer data transfer on floppy diskettes or nine-track tapes (up to and including 6,250 bpi). Video tape, graphics presentations, and table printouts are also used as transfer media. Users can also obtain data personally by visiting the Las Cruces computer facility or by remotely accessing the AAODL via modem. No classified data can be accessed remotely.



The AAODL database structure.

Summary

In summary, the AAODL is a unique resource for smoke/obscurant modelers, analysts, systems developers, and field test designers. The "real world" nature of the data archived in the AAODL is crucial to researchers in the smoke and aerosol community studying the complex interaction of obscurants, atmospheric conditions, and military EO systems.



Official U.S. Air Force photograph

Smoke grenades being detonated in an EO systems test at Smoke Week XIII. Data are in AAODL.

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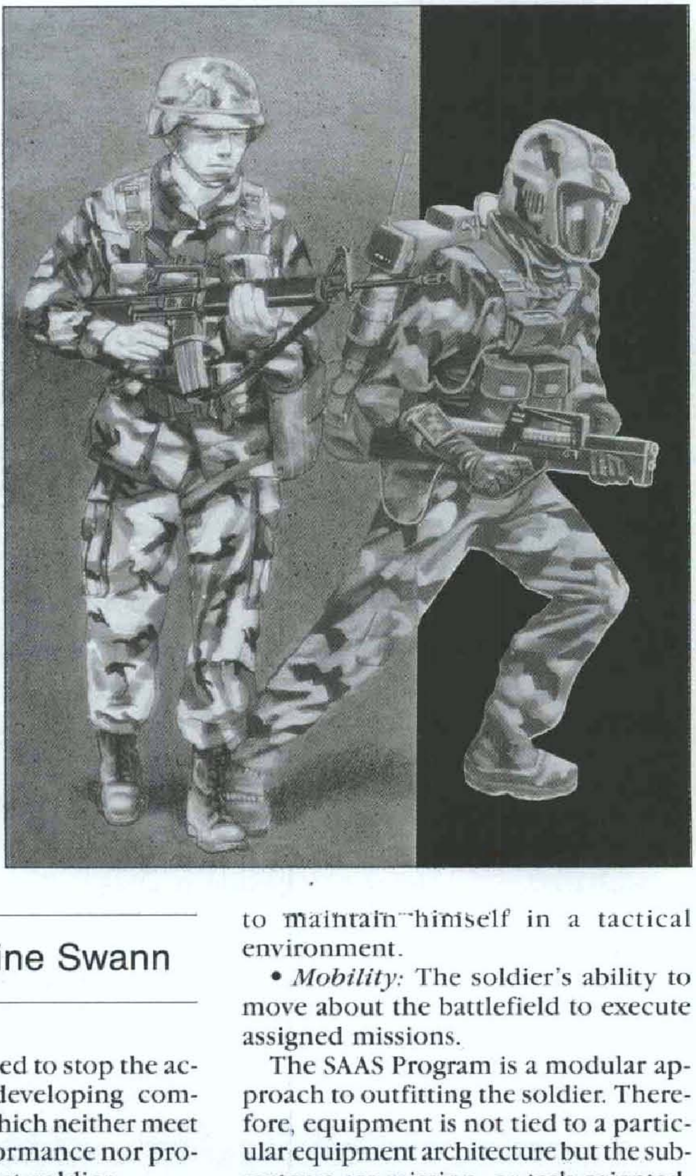
SOLDIER AS A SYSTEM SYMPOSIUM



By Dr. Madeline Swann

The Soldier As A System (SAAS) Symposium/Exposition was held earlier this year in Crystal City, VA. Sponsored by the U.S. Army Materiel Command (AMC), the symposium drew more than 700 attendees from government and private industry. Also, six foreign governments—Japan, Great Britain, Australia, Korea, Israel, and Spain—were represented.

The SAAS Program is an AMC effort supported by the U.S. Army Training and Doctrine Command and the U.S. Army Medical Research and Development Command. The soldier system is the individual soldier and everything worn, consumed, or carried for individual use in a tactical environment.

In the past, individual items of soldier equipment and rations were considered as separate, unrelated requirements. The need to maintain compatibility with the items already fielded, discouraged innovative design concepts. There was little system integration of these items. Therefore, it was up to the soldier to make things work. This method of outfitting the soldier has lead to soldier overload and loss of performance efficiency.

The SAAS Program is a distinct departure from the existing "make it work" mentality. It is designed to stop the accepted practice of developing compromised solutions which neither meet the standards of performance nor protection for the combat soldier.

The program integrates and maximizes the warfighting capabilities of lethality, command and control, survivability, sustainment, and mobility to improve soldier performance through the integration of doctrine, training, leader development, organization, and materiel to counter the threat. The five soldier system warfighting capability areas are defined as:

• *Lethality:* The soldier's ability to defeat the enemy soldier and his equipment.

• *Command and Control:* The soldier's ability to direct, coordinate, and control personnel, weapons, equipment, information, and procedures necessary to accomplish the mission.

• *Survivability:* Protection for the soldier against threat weapon effects, diseases, and environmental conditions.

• *Sustainment:* The soldier's ability to maintain himself in a tactical environment.

• *Mobility:* The soldier's ability to move about the battlefield to execute assigned missions.

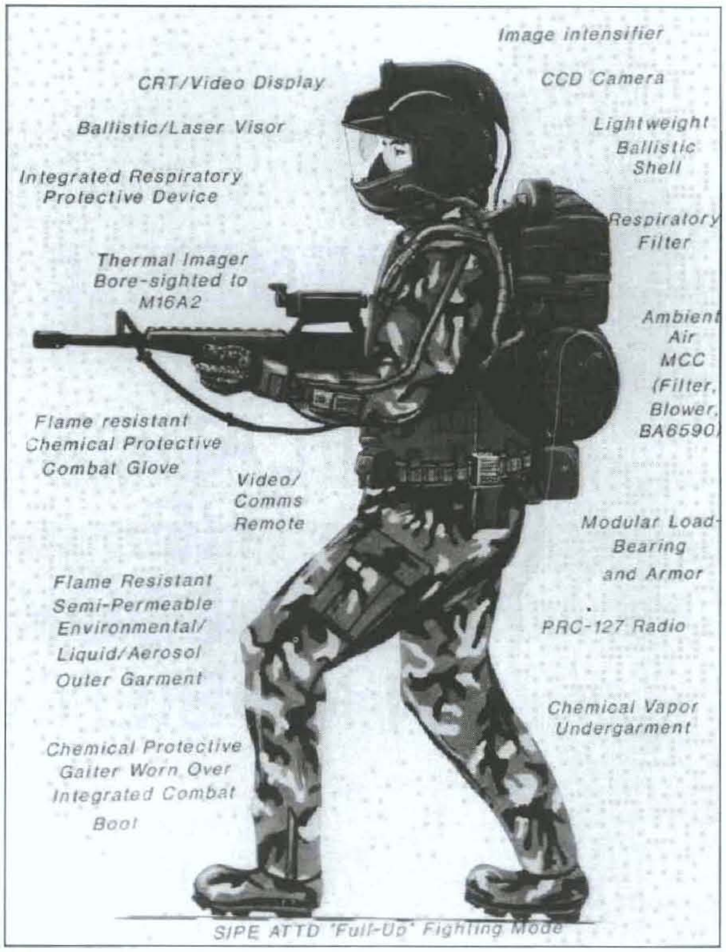
The SAAS Program is a modular approach to outfitting the soldier. Therefore, equipment is not tied to a particular equipment architecture but the subsystems are mission- or task-oriented. This program is a continuous process with technology demonstrations, advanced technology demonstrations, preplanned product improvements, etc.

Participants in the SAAS Symposium/Exposition were the TRADOC system manager (TSM) - Soldier, who determines soldier system requirements; the project manager (PM) - soldier, who is responsible for the development and procurement of soldier system equipment; and the Technology Base Executive Steering Committee (TBESC) who oversees and coordinates the technology base programs necessary for the development of the soldier system. The AMC organizations included: the Armament Research, Development and Engineering (RDE) Center, Belvoir RDE Center, Communications-Electronics RDE Center, Chemical RDE Center, Electronics Technology and Devices Laboratory, Harry Diamond Laboratories, Army Research Laboratory, Human Engineering Laboratory, Natick RDE Center, and U.S. Army Test Measurement and Diagnostic Equipment Activity. The U.S. Army Medical R&D Command, Army Research Institute, U.S. Special Operations Command, U.S. Marine Corps, and the Defense Advanced Research Projects Agency were also represented.

The concurrent symposium and exposition focused on the technologies that will enhance the individual soldier's warfighting capabilities in the 21st century. The symposium was opened by LTG Samuel Wakefield, deputy commanding general for Combined Arms Support, U.S. Army Training and Doctrine Command/commanding general, U.S. Army Combined Army Support Command and Fort Lee, VA, who discussed the Department of the Army's focus on the individual soldier. Keynote speaker, Dr. Fenner Milton, Office of the Assistant Secretary of the Army (Research, Development and Acquisition), outlined the new science and technology strategy in relation to the Department of Defense Science and Technology Thrusts, particularly Thrust 8, "Sharpening the Warrior's Edge."

Dr. Robert Lewis, technical director, Natick RDE Center and TBESC chairman, followed with an overview of the SAAS Program with emphasis on the integration and coordination between organizations to insure the development of the technologies.

Following these briefings, additional presentations on the requirements of the soldier system were provided by the TSM - Soldier, U.S. Special Operations Command, Marine Corps, PM - Soldier, North Atlantic Treaty Organization (NATO) Industrial Advisory Group, and Test Measurement and Diagnostic Equipment Activity. Topics of discussion focusing around future needs included: ballistic/laser visor; integrated respiratory protective device; full solution fire control; objective individual combat weapon; multithreat warning capabilities; flame resistant semi-permeable environment/liquid/aerosol outer garment; information storage; secure voice communications; modular load-bearing and armor; microclimate cooling; integrated night vision and heads up display; lightweight ballistic shell; signature reduction; lightweight power; individual soldier command, control and communications; and medical materiel, i.e., drugs, vaccines, or antidotes.



Soldier Integrated Protective Ensemble Advanced Technology Demonstration.

The Soldier Integrated Protective Ensemble (SIPE) Advanced Technology Transition Demonstration (ATTD) was the final briefing on the first day of the symposium/exposition. SIPE is the first attempt to demonstrate a modular head-to-toe individual fighting system for the ground soldier to sustain combat effectiveness while providing balanced protection against multiple battlefield hazards.

Briefings on the second day of the symposium/exposition focused on technologies essential for the development of the soldier system, i.e., high resolution displays for head-mounted applications, weapons systems, soldier command, control and communications, medical RDTE support, individual power, microclimate conditioning, nuclear, biological and chemical protection, and clothing and individual equipment.

The SAAS Exposition featured 38 exhibits from AMC organizations, the U.S. Army Medical R&D Command, the U.S. Marine Corps, TSM-Soldier, PM-Soldier, and the Defense Advanced Research Projects Agency.

The Soldier As A System Symposium/Exposition allowed the participants not only the opportunity to discuss technologies, but to actually see technology demonstrations that will enhance the soldier of the 21st century. A quote from the TSM - Soldier summarizes the need for this critical program: *"Technology is the key to protecting our most valuable and most vulnerable asset; our most complex battlefield system—the soldier."*

DR. MADELINE SWANN is a chemist at the Army Research Laboratory (Provisional). She holds a Ph.D. in chemistry from Howard University. As an action officer at the U.S. Army Materiel Command, Office of the Deputy Chief of Staff for Technology Planning and Management, she was the manager of the Army-wide Soldier As A System Program.

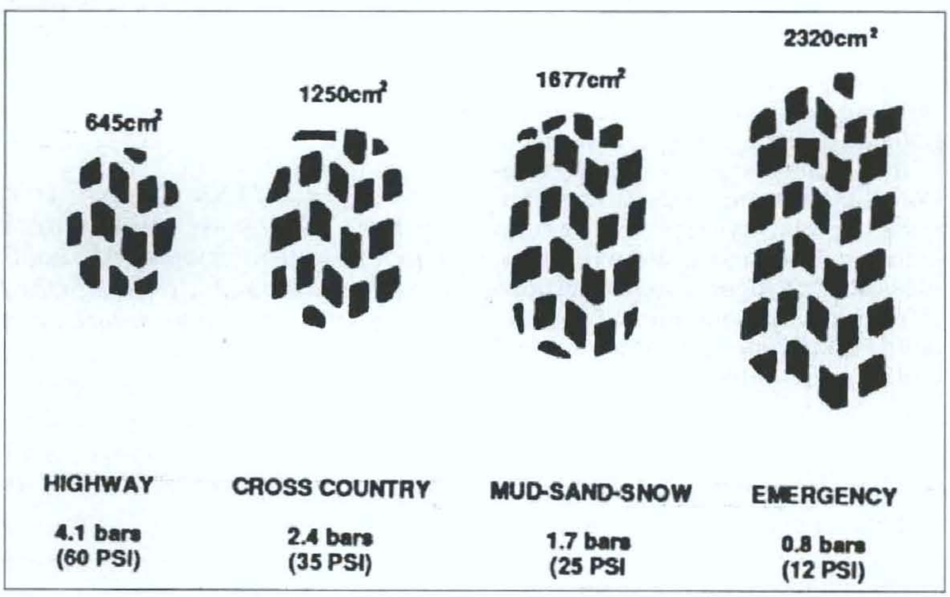
CENTRAL TIRE INFLATION: THE NEW LOOK IN MOBILITY

By C. Douglas Houston Jr.

As long as any form of conveyance has traveled on wheels, the footprint of the wheel and its pressure on the ground have been the determining factors on how well the conveyance moved, if at all.

The Combat Support Program Executive Officer's never ending search for optimized mobility has led to the incorporation of a new mobility aid into our M939A2 5-ton truck family. A new central tire inflation system (CTIS) makes possible a change in the area of the tire's footprint automatically at the will of the driver. Selection is made by the driver from his operating position.

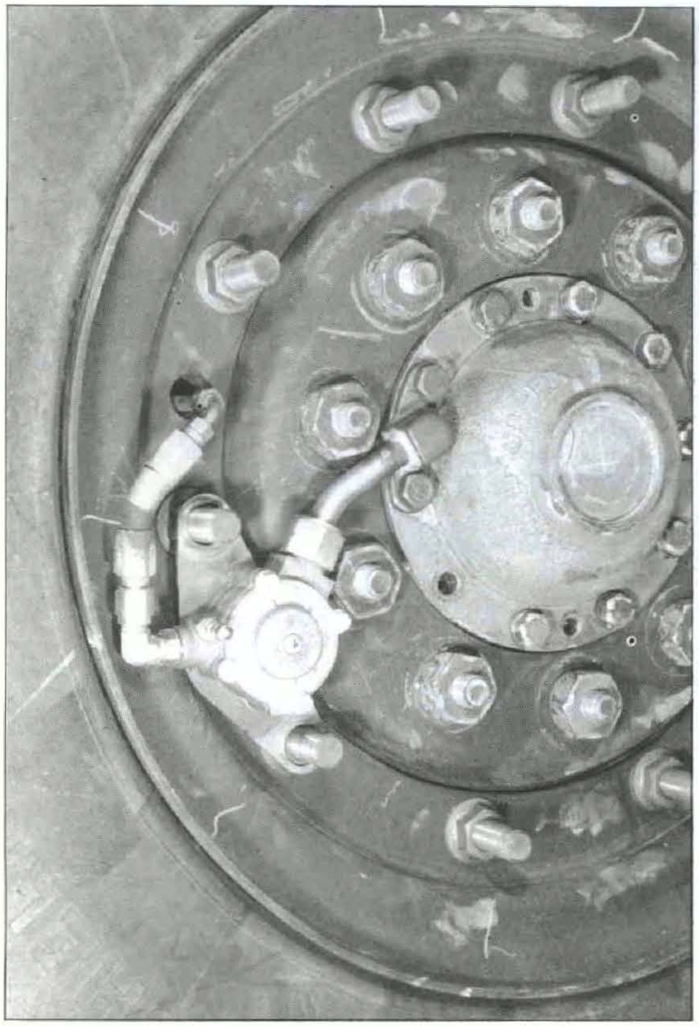
The driver's options range from normal highway pressure,—60 pounds per square inch (PSI)—deflating to 35 PSI for cross country travel, then lowered still further to 25 PSI for soft, sandy terrains, providing the largest normal footprint available. There is one more measure of traction available, should a task be demanding. Tire pressure may be selected to 12 PSI, but limited to 12 minutes. The "emergency" mode provides this operation. While the driver may re-select emergency for an added 12 minutes, this is done with discretion because of unusual stress imposed on the tires. When terrain conditions change, the driver simply selects the next appropriate mode, and the system adjusts the tires to suit the road, or whatever terrain. All of this is accomplished on the move, with no delay in travel.



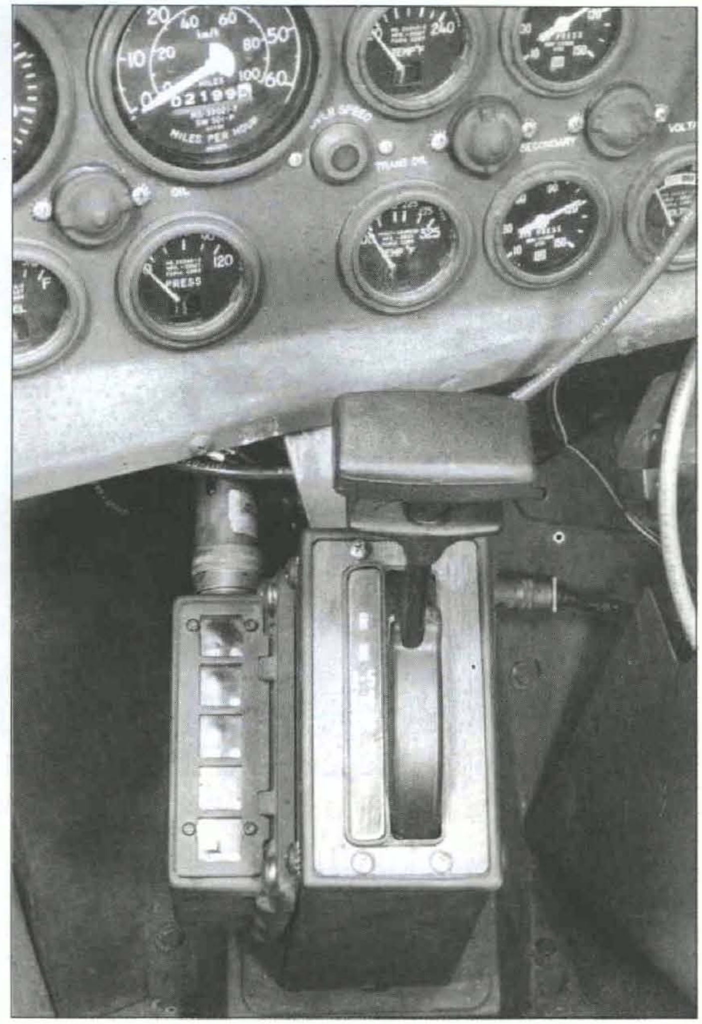
Comparison of footprints at each pressure.

If per chance the driver fails to reselect a higher pressure when entering pavement and higher speeds, the CTI system automatically overrides the selected condition and re-inflates the tires to normal highway pressure. Tire pressures are held to within three PSI of each other in each operating mode.

Another important provision has been designed into the CTIS, permitting a run flat operation. If a tire is



The wheel valve permits air in or out of the tire.



Five CTIS options are selected at this driver's control station.

damaged, but able to hold some pressure, the driver may be able to reach home without changing to the spare. This option is available in the "Run Flat" mode on the control panel. All other tires are maintained at pressure, with air directed to the damaged tire as it bleeds off air. Should the demands of the central tire system deplete the truck's air supply to a hazardous level, the air to the CTIS is automatically cut off. This prevents the loss of air required for braking and other operational functions.

The CTIS concept is by no means new. The first example in production hardware was probably found in the World War II DUKW ("Duck"). This was an amphibious landing vehicle requiring the ability to vary its footprint for operating on beaches and then moving onto highway surfaces.

Needless to say, it was a manually controlled system, with air passed through the hubs of the wheels via hoses extending down from the hull of the vehicle. This vehicle certainly provided early proof that a central inflation system was practical, and that the variable footprint concept was effective.

Tubeless tires are well suited to a CTI system. When tubed tires are run at lower pressures, considerable heat builds up from chafing between the tube and the casing. Also, the tube tends to shift within the tire, potentially tearing away the valve stem.

The other important ingredient contributing to the success of a CTIS is the radial ply tire, which permits a low, or even flat tire to roll straight. Bias ply tires have a tendency to shift laterally when low or near flat, causing unstable operation at lower pressures. Radial ply tires roll reasonably straight, even when totally flat.

The M939A1 truck family was equipped with tubeless radial ply tires, a major improvement in mobility and fuel economy. It was also an important step toward the incorporation of a Central Tire Inflation System. When the M939A2 series was in its planning stages, the supporting technology for CTIS had advanced to the point where it could be integrated into the new vehicles.

With the release of the new M939A2 truck family, the Army fielded its first enhanced mobility, CTIS-equipped vehicles since World War II. Eaton Manufacturing Corporation was the subcontractor under BMY, the manufacturing contractor for the new vehicle series. Numerous performance requirements were established for this new and sophisticated CTI system.

The CTI system places an extensive demand on a truck's air supply and this air must be free of moisture to protect operating components from

The World War II "Duck" was CTIS equipped.

corrosion. An air dryer performs this function as air is routed to storage tanks from the compressor. The air compressor has a capacity of 13.2 cubic feet per minute at 100 PSI. Since its air is drawn from the engine's turbocharger, its delivery is extended further. Inflate and deflate times are critical to the system. The controller strives to maintain this equalized pressure as the vehicle travels. All wheels are monitored at 15 minute intervals to insure that no pressure change has occurred. A low tire reading signals that an irregular condition exists. As replenishing air is directed to a tire, an indicator on the control module displays the procedure.

The M939 family of trucks was being issued to user units when many were deployed in support of Operation Desert Storm. This provided an unexpected opportunity to observe performance of the system in a real world environment. Extensive user feedback was was received by the U.S. Army Tank-Automotive Command (TACOM), giving reassurance that the CTIS was doing its job and, in many instances, performing beyond earlier expectations of the users. Several stories were told of a 5-ton truck pulling mired vehicles out of an otherwise hopeless situation. While TACOM had never a doubt about the performance of the CTIS, these experiences served to reinforce the value of the system. CTIS has earned its first medal!

C. DOUGLAS HOUSTON retired from the U.S. Army Tank-Automotive Command in 1988 after 27 years as project engineer, supporting the PM, Medium Tactical Vehicles. He has returned temporarily from retirement to work in the same area, on Operation Desert Storm projects in the 5-ton truck program. He holds a B.S. degree in electrical engineering from Michigan Technological University.

IMPORTANT NOTICE

The Army RD&A Bulletin office has relocated to Fort Belvoir, VA. All correspondence should now be addressed to:

Army RD&A Bulletin
Building 201, Stop 889
Fort Belvoir, VA 22060-5889

Our new phone numbers are (703)805-4215/6 or DSN 655-4215/6.
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ETHICS—DOING THE RIGHT THING

By Norman R. Augustine
Chairman and
Chief Executive Officer
Martin Marietta Corporation

The following is based on remarks delivered by Norman R. Augustine, to the Colorado Corporate Responsibility Awards luncheon, Aug. 7, 1992.

A visit to the bookstore reveals a number of intriguing recent best-seller titles, including, "Looking Out for Number One" . . . "Winning Through Intimidation" and "Cheating 101: The Benefits and Fundamentals of Earning the Easy 'A'."

I really can't say if ethical lapses are more prevalent now than in the past, but the considerable public discussion about ethics today could imply that more people are concerned about doing the right thing. And that really is what ethics is about.

Potter Stewart, the former U.S. Supreme Court Justice, defines ethics as "knowing the difference between what you have a right to do, and what is the right thing to do."

There are people who believe that if it's legal, it's ethical. Justice Stewart obviously doesn't agree with that. Neither do I. You have a legal right to burn the flag. But I believe it's the wrong thing to do. Racial discrimination was legal at one time. But it always was wrong. In business, hostile takeovers are legal—but I believe they are wrong.

When I was an undergraduate at Princeton, it was interesting to watch the evolution of students' attitudes toward the University Honor Code—which was a central part of the educational scheme of things. During an exam, freshmen were afraid to lift their eyes for fear they would be thought to be cheating. By the sophomore year, there was such great pride in the system that no one would have dreamed of violating it. By the upper-class years, the code was just a normal aspect of student life, and the possibility of cheating simply did not occur to most students. In fact, in four years I never saw anyone cheat.

At the University of Virginia, I am told that when a violation of the ethics code occurs, a small announcement surrounded by a black border is placed in the student newspaper simply stating that a student, unnamed, has left the university.

In contrast, at ancient Olympia in Greece, where the original Olympic Games took place, the athletes' entrance to the arena is lined with statues—not of those having achieved great victories, but statues of those who have cheated. To this day, one is beset by a hollow feeling in the pit of the stomach when viewing those statues—which have stood for some 27 centuries as monuments to the lapses of character of various individuals.

Ethics has to do with hitting the target the hard way. First one has to have ethical values. Then one has to live up to them. One can't make up ethics along the way. That's the most common pitfall of all: to rationalize one's ethics to meet the circumstances.

Fortune magazine has pointed out the insightful observation of Alexis deTocqueville about American ethics that "America has become great because it is good." All of us must work hard to deserve that accolade.

The problem is that people sometimes adjust their ethical values to meet immediate pressures. I am reminded of one of my favorite cartoon characters, Charlie Brown. Charlie was target-shooting one day, practicing with his bow and arrows. He would pull the string back as far as he could, and let the arrow fly into a fence. Then he would run over to the fence and draw a target around the arrows with a piece of chalk.

Of course, Lucy soon showed up and saw what he was doing. "That's not the way to have target practice," she shouted. "You're supposed to draw the target and then shoot at it."

But an unrepentant Charlie dismissed the matter, saying, "I know that, Lucy. But if you do it my way, you never miss!"

Ethics has to do with hitting the target the hard way. First one has to have ethical values. Then one has to live up to them. One can't make up the ethics along the way. That's the most common pitfall of all: to rationalize one's ethics to meet the circumstances.

Sometimes the ethical choices faced are easy. Such was the case some time ago when Martin Marietta was in competition for a major contract. The day before we were to submit our proposal, we received in the mail a copy of our competitor's price sheet. It presumably came from a disgruntled employee of our competitor.

We opened the package, not knowing what was inside. Once we realized what it was, we informed both the government and our competitor what had happened. We did not change our bid price.

Incidentally, we lost the contract—and some of our employees lost their jobs due to lack of work.

And that brings me to another facet of ethics. I wish I could say that ethical behavior always pays off. I absolutely believe that it does in the *long term*; but, unfortunately, not always in the short term.

Not only do we have to understand ethical dilemmas, but we also must have the moral fortitude to act. Ethical people, of course, believe in honoring their word; respecting the law; acting honestly; respecting other people's property; being loyal; working hard.

But even these values can be misplaced. Optimism is not unethical. In fact, in most cases it's even admirable. But in business, misrepresentation under the guise of optimism is a serious crime.

Information is valuable, but it's ethical only as long as you have a right to have it.

Profit is valued, as long as you've earned it.

Loyalty is appreciated, as long as it isn't misplaced. The Iraqis following Saddam Hussein could be said to be loyal.

Pro football teams labor all season to get into the playoffs with the "home-field advantage." Yet last year, I was surprised to see a letter-to-the-editor of the *Washington Post* charging Redskins coach Joe Gibbs—a highly ethical man, in my opinion—with being unethical in, as the writer asserted, encouraging the crowd to make plenty of noise in an upcoming playoff game so it would be difficult for the opposition to hear the signals being called. It probably did not occur to the 55,000 people in the stands that what they were doing might be considered unethical. Was it? Was the purpose to encourage the home team? Or was it to interfere with the other team's right to a fair chance. Or was it simply "part of the game?"

W. C. Fields, the relatively rude, heavy drinking comedian of the 1930's and '40s, once was deeply immersed in a book just before he was about to begin a performance. A friend saw him reading and to his amazement, noticed it was the Bible!

The friend asked, "Bill, what are you doing reading the Bible?" To which Fields replied, "I'm looking for loopholes!"

When it comes to ethics, there are no loopholes. There are no compromises. There are no back doors.

But to be regarded as an ethical person or an ethical organization may well be the ultimate reward.

Army Selectees for Acquisition Scholarships

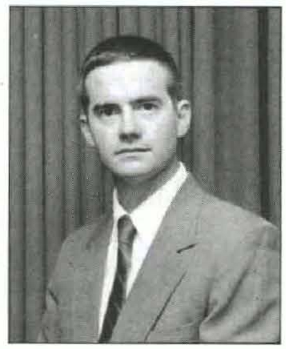
Deputy Secretary of Defense Donald J. Atwood recently administered the oath of office to the first 10 Defense Acquisition Scholarship recipients in a ceremony hosted by Under Secretary of Defense (Acquisition) Donald J. Yockey. The service breakout of selectees was as follows: Each of the tri-services had three scholarship selectees and the Defense Logistics Agency had one.

The three Army selectees were: Charlotte Cates of Fort Deposit, AL; Whitney Philbrick of Poughkeepsie, NY; and Monique Anneker of Miami, FL. (See photographs and biographical information shown at right.)

This fall, these students will enter M.B.A. degree programs, and upon completion of their degrees, will work in acquisition positions with the Army.

Army RD&A Bulletin interviewed the Army's three scholarship selectees just prior to the ceremony.

Charlotte Cates is pursuing an M.B.A. degree from the University of Texas, Austin. She holds a B.S. degree in mathematics from the University of Alabama, Tuscaloosa. Cates has an undergraduate GPA of 3.7 and has received numerous awards and honors, including University of Alabama Presidential Scholar, 1988-1992; Alumni Honors Scholarship, 1988-1992; Computer Based Honors Program Scholarship, 1988-1992; and Barry M. Goldwater Scholarship, 1990-1992. She was president of Pi Mu Epsilon Mathematics Honor Society from 1990-1992. Cates has served in campus volunteer activities, and has worked as a computer research assistant at the University of Alabama.



Whitney Philbrick is pursuing an M.B.A. degree from the Darden School of Business, University of Virginia. He holds a B.S. degree from the School of Management, Syracuse University, NY. In addition to maintaining an undergraduate GPA of 3.6 while at Syracuse University, Philbrick was elected to Phi Kappa Phi, National Academic Honor Society; Beta Gamma Sigma, National Management Honor Society; and Alpha Mu Alpha, Marketing Honor Society. He served as a second and first lieutenant in the U.S. Marine Corps from 1989-91 and has worked as a marketing assistant with IBM.

Monique Anneker is pursuing an M.B.A. degree from the Crummer Graduate School of Business at Rollins College in Winter Park, FL. She holds a B.S. degree in accounting from Florida International University. Anneker has an undergraduate GPA of 3.5, was on the President's honor Roll from 1986-1988 at Metropolitan State College, Denver, and received an Accounting Association Scholarship in 1989. She has served as an IRS Volunteer Income Tax Assistant and has been employed as a Workers' Compensation Claims examiner at the U.S. Department of Labor and as a statistical research assistant at Florida International University.

RD&A: What do you expect to gain professionally as a result of the training and education you will receive in this scholarship program?

Cates: As a participant in this scholarship program, I will have the opportunity to earn a master's in business administration degree and, upon doing so, to gain significant work experience in the Army's acquisition force. Having only recently completed my undergraduate degree, I feel that participation in this program will be very beneficial to me, allowing me to increase my knowledge of business, improve my interpersonal skills, and receive valuable training and work experience which will benefit me in my future endeavors.

Philbrick: I look forward to the first-class education from our individual schools, the bonus of the Army Acquisition program, the training after we leave school and come on board. All of this will give us in-depth views of high-level decision-making both in the private and public sector in less than three years. The additional responsibility we will be able to shoulder, and the confidence in our own abilities to make high stakes, high-level decisions will be valuable and will improve us as people and as managers.

Anneker: I expect to land a valuable position when my educational experience is completed. This position should enable me to put my training to work while at the same time broadening my horizons.

RD&A: What do you expect your contributions to be to the acquisition function of the Army as a result of this advanced degree scholarship program?

Cates: I hope to apply the knowledge and skills which I have attained in my undergraduate career and which I will attain in my graduate career to contribute positively to my acquisition career field.

Philbrick: Very simple, we will save money; we will equip, arm and clothe our military forces with world-class, world-beating equipment; we will also save lives.

Anneker: My contribution to the Army will be in the form of a professional dedication to the positions I will enter upon graduation. I expect my advanced degree to supplement my undergraduate background in accounting and to improve my business acumen and my oral and written presentation.

Civilian Acquisition Corps Accession Board Results

Congratulations to the individuals listed below who have been accepted into the Army Acquisition Corps.

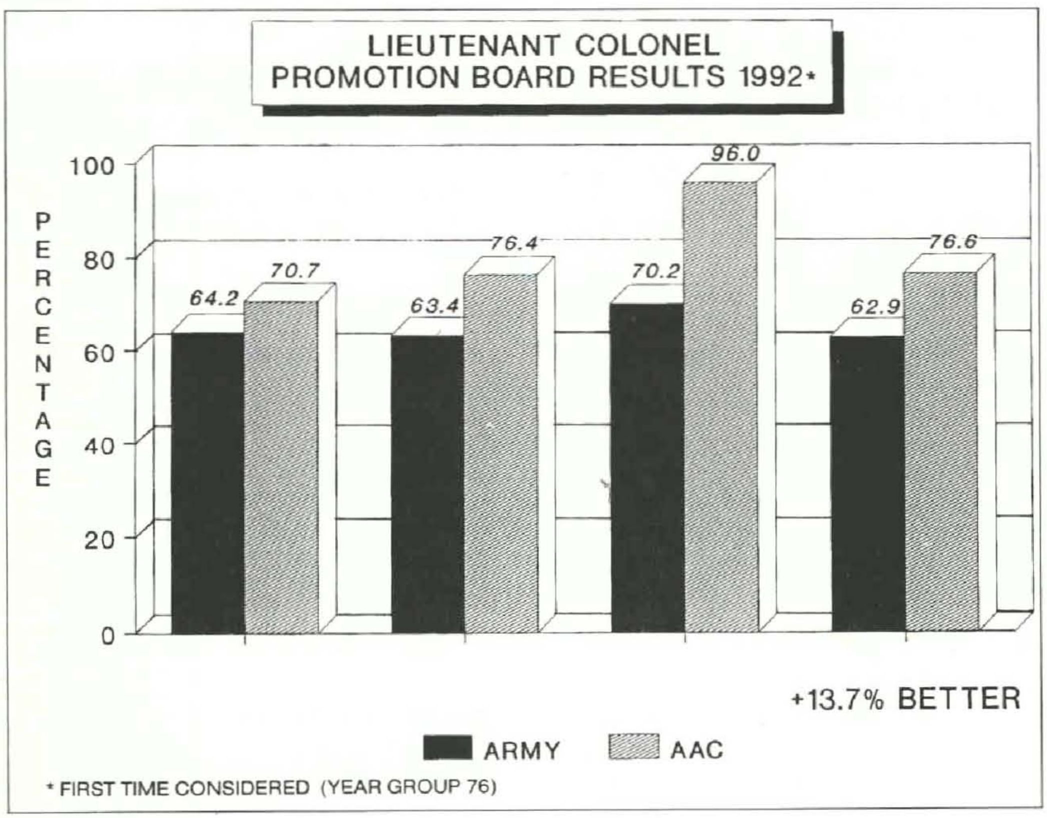
Abdoun, Mohsen M.
Abramson, William L.
Agattas, James M.
Allcott, John H.
Alsman, Mathew D.
Anderson, James M.
Andrejkovics, Richard S.
Arch, Edward
Armbruster, Vicky R.
Arne, Nathan D.
Ashley, William L. III
Aumeller, Robert W.
Baird, Keith M.
Baker, Phillip L.
Baker, Radford
Balint, Denis M.
Balint, Stephen V.
Ball, John M.
Balla, Eugene
Banyard, Richard O.
Bardall, Kenneth R.
Barnes, Charlie M.
Bartholome, Randall J.
Bartholow, Brooks O. III
Batts, Blannie Q.
Belt, Richard N.
Bendall, Doris F.
Bender, Richard
Benskin, Janet M.
Bera, John P.
Berzins, Juris
Blackburn, Darryl A.
Bloom, Janet L.
Blum, Eugene W.
Boda, Gabor F.
Bogosian, Paul
Borges, Arlindo A.
Botti, Charles W.
Botticelli, Richard D.
Bowersox, Wilbur G.
Bowles, John T.
Boyle, Thomas C.
Brannon, James E.
Branson, Ronald R.
Brickley, David P.
Broach, Billy G.
Brobeil, Karl R.
Brown, James W.
Browning, Daniel J.
Brunvoll, Howard A.
Brynildsen, Robert S.
Buccieri, Joseph M.
Buhrkuhl, Robert L.
Bundshuh, Michael J.
Burton, Hugh A.
Butler, Robert E.
Butler, Robert G.
Butler, Sharon W.
Bynum, Mildred L.
Cadell, James N. II
Caggiano, Thomas J.
Calaway, Robert J.
Callahan, Joseph C.
Cantemiry, Eugene G.
Cappetta, Fred E.
Cardenas, Ignacio
Cardon, Phillip D.
Carl, William H.
Carlson, James R.
Carstens, James W.
Carter, Mary S.
Case, Donald S.
Chaloux, Paul N.
Chanin, Harold
Chapman, John R.
Chen, Nickie N.
Cherry, Gene A.
Chesnulovitch, Douglas M.
Chiarizio, James R.
Chouinard, Robert J.
Cianciosi, Angelo Jr.
Cipkowski, Jerome T.
Cluck, Charles D.
Coleman, Charles E.
Collins, Marshall F.
Cooper, Carol
Corgiat, Anthony M.
Corn, Ronald M.
Cornett, Edwin
Crandall, Valeta R.
Criss, Craig
Cronogue, Thomas A.
Culver, Lumis M.
Cunningham, Voncile
Cutright, Hayden G.
Da Ponte, Ronald G.
Dabrowski, Stanley V.
Dansbury, Donald J.
Delvecchio, Joseph M.
Dempsey, James P.
Deppe, Robert M.
Devine, Donald E.
Dietz, Carl C.
Digney, Charles E.
Dimasi, Gabriel J.
Dlugosz, Ronald J.
Dockter, Douglas A.
Donadio, Vincent J.
Dooley, Jerry L.
Dubois, Merton S.
Duerinck, Philip L.
Duerr, James C.
Duley, Archie M.
Duncan, Gene D.
East, Kenneth A.
Eckstein, George S.
Edwards, John F.
Ells, John F.
Embry-Jones, Gloria J.
Epps, Willis
Epstein, Alan
Esposito, Michael A.
Falchetta, Vincent T.
Farnan, David N.
Felth, Patricia L.
Fieltsch, David G.
Finnestead, Rodger L.
Firrincili, George M.
Fischer, Charles J.
Fisher, Lewis L.
Fishman, Judith L.
Fitzgerald, Thomas F.
Folkl, James J.
Franseen, Richard E.
Franz, Alfred H.
Frasier, Diane J.
Frauen, Lawrence L.
Freese, William E.
Fuller, William W.
Gaddy, Sidney W.
Galysh, Taras J.
Gandy, Ted W.
Garv, Erik G.
Gebert, Steve A.
Gerlach, John D.
German, Bruce D.
Gerritsen, Douglas J.
Gidley, Norman A.
Gillispie, John K.
Gilmour, Richard C.
Glass, Richard L.
Goes, Michael J.
Goins, Linda P.
Gonzalez, Roberto
Goodbody, John J.
Goodman, Stanley A.
Granger, Paul
Gravenstede, Nelson F.
Green, Martin J.
Green, Richard C.
Greer, Donald R.
Grenert, James E.
Griffin, Wade Jr.
Griffith, Thomas E.
Groeber, Edward O.
Grosser, Jack H.
Grottendick, Philip F.
Grundy, James H.
Gysiewicz, John W.
Gurgos, Michael J.
Gutfleisch, Leonard P.
Gwaltney, James H.
Haga, Mary F.
Halle, Roger K.
Haritos, Tassos A.
Harju, Willard P.
Harold, Roger V.
Harrison, Dale A.
Harrison, Michael B.
Harrover, Robert C.
Hartwell, Michael
Hatley, Gerald W.
Haug, John G.
Havrilla, Alan R.
Heiser, Francis A.
Hemby, Bobby J.
Hepler, Leslie J.
Hill, Jerry W.
Hill, Robert J.
Hitchcock, Gary
Hitschman, Max P.
Hoffman, Morris R.
Hoffman, Thomas D.
Hofman, Mark A.
Holmes, Dana E.
Holvoet, John E.
Holweck, Ralph D.
Horlacher, Donald R.
Hornsby, Theodore L.
House, Murphy T.
Howe, Edward E.
Hung, Tonney H.
Husson-Turke, Sally L.
Infanti, Anthony S.
Invernale, Frank F.
Jacobson, John R.
Jasper, Louis J. Jr.
Johnson, Willie Jr.
Johnston, Larry D.
Jones, Francis L.
Jones, James R.
Jordan, Rosalie M.
Juska, Gintaras
Kaminske, John H.
Karavias, John J.
Karkoski, Frank
Kazmerski, Dennis L.
Keeton, John D.
Kelley, Michael B.
Kennedy, Joanne M.
Kent, Gary L.
Kerry, Sarah P.
Kerry, Vernon A.
Khan, Murad A.
Kien, F. Michael
Kirkwood, James S. Jr.
Kitchens, Phyliss F.
Knight, Gilbert J.
Knofczynski, Joseph J.
Koenig, Leo C.
Konrad, Bruce
Korduba, Bohdan
Kotch, Dennis W.
Koutouzakis, John S.
Kowaluk, Bohdan S.
Krahl, William F.
Krasnicki, Dennis F.
Kreck, Joseph A.
Kuper, Robert J.
Kurowsky, Ronald V.
Lacomb, Augustus J.
Lacy, Paulette N.
Lambert, Virgil F. Jr.
Landtroop, Dianne B.
Lange, Paul A.
Laplaca, Anthony A.
Larue, Glenn D.
Latson, Lynda
Lavin, Thomas J.
Lawyer, Robert A.
Leadingham, Danny R.
Leff, Abram
Lehman, Carol A.
Leitheiser, Paul J.
Lepera, Delores R.
Lepore, John
Lesaca, Augusto M.
Lewandowski, David M.
Liao, Chongkwang
Lipari, Mario V.
Livingston, Aubrey L.
Lombardo, Santo M.
Lorenz, Robert C.
Lovingood, Eston A.
Luedeke, James A.
Lypeckyj, Lubomyr A.
Macfarland, Maureen E.
Mandala, Charles
Manning, David W.
Maples, James H.
Marchant, George W.
Marchese, Vicent P.
Marinellie, Robert R.
Marsh, Robert A.
Martin, Francis A.
Martin, Steven E.
Martino, Nicholas A.
Marttila, Richard B.
Maryanski, Richard J.
Masucci, Charlotte F.
Maynard, Arnold O.
Maziarz, James J.
McArthur, Charles J.
McConnell, Lawrence J.
McElven, William H.
McFalls, Michael T.
McGee, Michael E.
McGee, Michael L.
McGovern, William F.
McIvor, Thomas R.
McKechnie, Robert M.
McKenzie, Janice L.
McMillin, Raymond A.
McMurry, Jerry M.
Mehney, Daniel G.
Metzger, Bruce J.
Metzler, Thomas R.
Meyer, Thomas C.
Miatech, James K.
Michelli, Thomas J.
Miemis, Juris
Milanov, Robert T.
Milczynski, Barbara
Miller, Roy W.
Miller, James R. III
Millett, Jack R.
Mongiardini, Gene A.
Monroe, Rex R.
Monroe, Riley W.
Montgomery, Alvin E.
Moore, Thomas M.
Morgan, Kenneth M.
Morton, Glen A.
Mudd, Clemence P. Jr.
Mueller, Joanne R.
Munday, Jackie L.
Mydosh, Joseph H.
Myers, Joseph A.
Nathan, Dan
Nee, Lawrence J.
Nelson, David M.
Neubauer, James J.
Newcomb, Wallace B.
Newman, Arnold
Newman, Julian H.
Niemann, John R.
Noblitt, Ronnie D.
Norckauer, Heber R.
Notte, Gary D.
Nowak, Jerome
Nowak, Joseph C.
Noyes, David M.
O'Brien, James V.
O'Bryant, James L.
Oliva, George R. Jr.
Opat, Henry J.
Ossian, Frankie V.
Oxenberg, Paul
Ozimek, Jeffrey M.
Palman, John L.
Parcher, James L.
Parker, Joseph E. Jr.
Paro, Eugene E.
Parrott, Dale R.
Paskulovich, Donald R.
Pasqual, Thomas R.
Patil, Ashok S.
Pattison, Michael R.
Pawlowski, Paul E.
Pease, Walter T.
Pellen, Robert S.
Pence, Richard R.
Penney, Frank E.
Pepe, Salvatore III
Perdue, Thomas M.
Perry, Joseph R.
Petrone, John T.
Pickett, Kenneth G.
Pierce, John B.
Piper, Colin B.
Poll, Dennis B.
Poston, Juliet
Powell, William B.
Price, Steven A.
Procyk, James M.
Pullins, Miriam H.
Putman, James D.
Rabon, Lynwood M.
Radkiewicz, Robert J.
Ray, James A.
Raymond, Richard W.
Reiff, Arthur A.
Reilly, William P.
Reisman, Robert A.
Rencher, William R.
Resch, Robert A.
Restaino, Joseph M.
Ribe, Floyd S.
Rich, Marvin
Richardson, Randy J.
Richey, Stephen O. Jr.
Rickenbaugh, James W.
Riddle, Ralph D.
Riley, Linford D.
Rittenhouse, Sandra S.
Rivamonte, Joseph M.
Rizzo, Richard A.
Roark, Dale L.
Rohde, Robert S.
Ronan, Patricia A.
Rosamilia, John A.
Rosendorf, Lawrence L.
Rowe, Diana L.
Ruffus, Michael R.
Ruhmann, Frank H.
Sacco, Gasper J.
Salamon, Joseph P.
Sandhu, Davinder P.
Santa, Harry N.
Satchfield, James M.
Sayne, Martin W.
Scarpino, Charles J.
Scerbo, Ferdinand A.
Schlenner, Robert J.
Schneider, Jeffrey P.
Schornstein, Stuart J.
Schuh, George J.
Scott, Henry C.
Sedarbaum, Elliot I.
Seeling, Ernest R.
Seitz, David F.
Serao, Patrick A.
Shell, Edwin A.
Sheplak, John S.
Sherer, Wayne
Shook, Clifford D.
Sibert, Patricia G.
Simmons, Jerry C.
Slivovsky, John
Smith, Dillard R.
Smith, Edwin D.
Smith, Irvin L.
Smith, Jeanne L.
Smith, Patricia A.
Smith, Phillip T.
Smith, Richard E.
Snyder, James M.
Solon, Michael H.
Soos, James E.
Spangher, Jeffrey G.
Sparks, Richard K.
Spitzer, Richard L.
Staggs, Donald H.
Standifer, Samuel G.
Stanley, Anthony M.
Starks, Michael W.
Stevens, Patrick J.
Stevens, Peter E.
Stevenson, Hugh T.
Still, Herman C.
Stoback, Alfred J.
Stone, Richard D.
Stoops, Gerald O.
Straffon, Nicholas L.
Strickland, Kern W.
Sucich, Louis A. Jr.
Suggs, Harold J.
Sulak, William J.
Sullivan, James H.
Surman, Daniel J.
Swenson, Eric R.
Szantai, Frank M.

Tackett, Linda M.
Tarbell, Allan B.
Tarquine, Robert B.
Themak, Henry A.
Thompson, Vincent G.
Tierney, Thomas G.
Tower, James R.
Townsend, Roy R.
Trach, Todd O.
Tranchina, John P.
Trendley, Charles C.
Trevey, William E.
Tsoubanos, Christos M.
Tucker, Constance M.
Valles, Richard J.
Vanderwaerden, Gustaaf A.
Vanderzon, Christianu J.
Vickers, John L.
Von Husen, Robert
Von Schwedler, Richard F.
Wade, James J.
Wagner, Joel G.
Wagner, Richard Q.
Wake, Sallie H.
Waldman, John B.
Walkenhorst, John C.
Wall, Martin R.
Warnasch, Albert E.
Warne, William K.
Warren, William J.
Wegrzyn, Curtis R.
Weinraub, Robert A.
Weiss, Robert A.
Welch, Francis H.
Wend, Dennis J.
West, Wilber E.
Westley, Robert S.
Westmoreland, Maxwell E.
Whelen, George A.
White, Laudrey E.
White, Margaret K.
White, Michael J.
White, William P.
White, James A. Jr.
Whitman, Robert E.
Widmaier, C. Kinsley
Wilkerson, Robert T.
Williams, Charles R.
Williams, Jimmy H.
Williams, Keith S.
Wilson, Gerald D.
Winer, David A.
Wollam, Joseph M.
Wood, Andrew J.
Woods, John J.
Worth, Robert D.
Yakel, James H.
Zirbel, Sharon C.
Zoltowski, John R.
Zuccheri, Hugh R.
Zushin, Albert R.
Zweig, John E.

LTC Promotion Results

Congratulations to the following Army Acquisition Corps (AAC) officers who were recently selected for promotion to lieutenant colonel. Overall AAC average was 76.6 percent compared to the Army average of 62.9 percent.

Name	FACD	BABR
ADAMS, James Clifton Jr.	97	IN
ALEXANDER, Steven Mark	51	CM
ALFSEN, Thomas Gordon	97	MP
ALMOND, Robert Lenox III	51	IN
ARNONE, Robert Francis	51	FA
ARNY, Jan Weaver	51	MI
ASADA, Michael Kazumi	51	AR
BALL, Charles Randolph	53	MI
BARLOW, Wellsford Vernie Jr.	53	SC
BARTON, Christine Marie	53	MI
BAVIS, Lawrence Timothy	51	OD
BISSELL, Rodney Conway	97	OD
BOTHE, Edward Randolph	53	TC
BRAMBLETT, Howard Travis	51	AV
BRINSON, Wade Hamilton	51	AV
BRODOWSKI, Jerrold Joseph	51	OD
BRYANT, Bradford James	51	SC
BUCKSTAD, Robert Douglas	53	FA
BURDETTE, Randall P.	51	AV
BURNS, Sharon Lennette	51	CM
BYRNE, Patrick Edward	51	OD
CANNON, Samuel Michael	97	AR
CHUDOBA, James Bruce	51	AD
COMAN, Rodger Edward	51	AD
COXE, Robert Lloyd Jr.	53	FA
CURLEY, Mark	51	AD
DANIELS, Ricky	53	AD
DUBIA, Laurianne Fellenz	53	AG
ELLIOTT, Paul Eugene	51	AV
FONG, Terence	53	SC
FOULKES, George Brian	97	OD
GAGNE, Lise Marie	51	TC
GARRETT, Johnny Lee	97	FI
GLOWACKI, James Thaddeus	97	FA
GRISWOLD, Robert Kelly	51	FA
GROOME, Larry Warren	97	FA
HAMILTON, Michael Arnett	51	AR
HANSEN, James Stanley	51	CM
HARRIS, Carlton Erwin	53	AG
HERNANDEZ, Charles Lee	51	FA
HILEMAN, Robert Charles	51	AD



Name	FACD	BABR
HORNER, Stephen Clark	51	SC
HORNEY, Jay Alan	97	AV
HOSTETTER, Daniel Gary	97	FA
HUDSON, James Caston	97	AR
IRISH, Wilfred Ernest III	51	AR
JANOWSKI, Ronald Matthew	51	FA
JERAULD, Gary Duane	51	AV
JIMENEZ, Juan Antonio	51	AD
KELLY, Thomas Patrick	51	MI
KING, Gaylon Lynn	51	IN
KIREILIS, Althea Antoinette	97	MP
KOCHER, Robert William	51	AR
KRAUS, Karl Lewis	51	AD
LANDRY, Steven Michael	51	CM
LAYMON, William Arthur Jr.	51	OD
LESNIAK, Christopher Francis	51	IN
LEWIS, John Llewellyn	97	TC
LINDSAY, Timothy Clark	51	OD
LOVE, Terry Alan	97	MP
LUDWIG, David William	97	FA
MACKEY, Cleo Franklin Jr.	97	OD
MANGANIELLO, Anthony James	97	AD
MASTERS, Bruce Wallace	51	AR
MATTINGLY, Richard Curtis Jr.	53	FA
MCGEE, Michael Robert	53	AR
MCKEE, Jona Winfield Harris	97	QM
MCMILLIAN, Elouise	97	QM
MENYHERT, Carl Frank	51	SC
MILLER, David Paul	97	AV
MOLER, Bruce Webster	51	IN
MONRAD, Glenn Arthur	51	AV
MOONEY, Toney Conway	51	QM
MOURAS, Theodore Paul	51	MI
MURPHY, Michael John	97	AV
MYERS, Jack Walter Jr.	51	AD
NAUGHTON, James Thomas	51	OD
NICHOLS, William Irvin	51	OD
NICKERSON, Foster Gianato	51	AR
OHARA, Michael Joseph	51	FA
OSBORN, Allan Ray	51	SC
OWENS, Roy Leonard Jr.	51	OD
PARSONS, Billy Glen	97	AV
PAYNE, Gary Eugene	51	OD
PHILLIPS, William Norris	97	AV
RIDDLE, Clark Olin Jr.	51	FA
RIDDLE, Ray Jr.	51	FA
ROPER, Jackie	51	CM
ROSENBERG, Lee Randolph	97	AV
RYLES, Richard Randolph	51	AV
SHANAHAN, Thomas Richard	51	AD
SHEEHAN, Jed Allan	51	AD
SHERMAN, George Edward	51	SC
SIMS, Calvin Ray	53	AG
SLOAN, Michael Robert	97	QM
SMITH, Donald Bruce	51	IN
SMITH, Elbert Douglas	97	QM
SNIDER, Keith Farrell	51	FA
SNYDER, Susan Ann	51	MI
SPIEGEL, Michael Brice	51	AD
STEELE, William Raymond	97	AV
STEPHENS, James Dale	97	MP
STEUBER, Johnnie Lee	53	AD
STUMP, Robert Clem	51	TC
SYPOLT, Gary Neil	97	QM
THOMAS, Dwight Erric	97	OD
TOLLIFFE, Brin Arthur	53	SC
VONDRA, Charles Francis	97	OD
WALSH, Thomas Paul	51	AV
WEBSTER, Cecil Ray	51	IN
WICKIZER, Karl Alan	51	AV
WILSON, John Raleigh Jr.	51	AD
YOUNG, Bryon John	97	AD
ZIMMERMAN, Audie Dale	51	TC

MANPRINT Courses Scheduled

The following is the FY93 training schedule for the MANPRINT Action Officer and MANPRINT for Managers courses offered by the U.S. Total Army Personnel Command. For additional information, contact Jim Walsh, commercial (804) 765-4057 or DSN 539-4057.

MANPRINT ACTION OFFICER COURSE

Class No.	Dates	Location
93-002	Dec. 1–11, 1992	MICOM, Huntsville, AL
93-003	Jan. 5–15, 1993	JFK Warfare Center, Fort Bragg, NC
93-004	Jan. 26–Feb. 5, 1993	MRSA, Lexington, KY
93-005	Feb. 23–Mar. 5, 1993	Engineering School, Fort Leonard Wood, MO
93-XXX	Mar. 15–25	FA School, Fort Sill, OK
93-006	Mar. 30–Apr. 9, 1993	CECOM, Fort Monmouth, NJ
93-007	May 4–14, 1993	Signal Center, Fort Gordon, GA
93-008	Jun. 8–18, 1993	Resident, Fort Lee, VA
93-009	Jul. 13–23, 1993	ISC, Fort Huachuca, AZ
93-010	Aug. 10–20, 1993	TACOM, Warren, MI
93-011	Sep. 14–24, 1993	ADA School, Fort Bliss, TX

MANPRINT FOR MANAGERS COURSE

Class No.	Dates	Location
93-002	Nov. 18–19, 1992	AVN LOG, Fort Eustis, VA
93-003	Dec. 10–11, 1992	MICOM, Huntsville, AL
93-004	Mar. 24–25, 1993	FA School, Fort Sill, OK
93-005	Apr. 8–9, 1993	CECOM, Fort Monmouth, NJ
93-006	Apr. 21–22, 1993	Resident, Fort Lee, VA
93-007	May 13–14, 1993	Signal Center, Fort Gordon, GA
93-008	May 26–27, 1993	ADA School, Fort Bliss, TX
93-009	Jun. 30–Jul. 1, 1993	TBD
93-010	Jul. 22–23, 1993	ISC, Fort Huachuca
93-011	Aug. 19–20, 1993	TACOM, Warren, MI
93-012	Sep. 23–24, 1993	TBD

AAC MILITARY CRITICAL POSITIONS

The following is a listing of military positions approved for designation as Acquisition Corps critical as of Sept. 30, 1992:

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
	NPGS	MIL FACULTY	51A00	05
	SPEC PRGMS		51A00	06
			53C00	05
			97A00	05
W00EAA	SEC ARMY IO	MIL ASST	51A00	05
W00TAA	DEF INT AGCY	ADP PLAN/OPN	53C00	05
		C, GRND SYS BR	51A00	06
		COMP SYS MGR	53C00	05
		TEQ REQ MGR	53C00	05
W01HAA	USAG-VHFS	DEPUTY	97A00	05
W039AA	SPACE SYS	COMMANDER	51A25	06
W041AA	COLD RGN TST	COMMANDER	51A01	05
W04LAA	USA BRDEC	COMMANDER	51A21	06
W04WAA	USA WSMR	DIR ARMTE	51A01	06
W04XAA	USA YPG	COMMANDER	51A01	06
		DIR MTD	51A01	05
W04YAA	USA EPG	COMMANDER	51A25	06
W051AA	EIGHTH ARMY	CNT/IND MGMT	97A00	05
		COMMANDER	97A00	06
W055AA	AMCICP	COMMANDER	51A00	05
W056AA	AMCICP	C, STDZN DIV	51A25	05
		COMMANDER	51A00	06

CAREER DEVELOPMENT UPDATE

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
		STDZN REP	51A21	05
		STDZN REP-FR	51A00	05
		STZN REP	97A00	05
		STZN REP-IS	97A00	05
W05BAA	AR RSCH OFC	DEP DIRECTOR	51A25	05
		TEC INTGR MGR	51A00	05
W05FAA	AMCICP	COMMANDER	51A00	05
W05GAA	USA CNTR CMD	C, CNTR CTR	97A00	06
		C, CNTR DIV	97A00	05
		C, CNTR MGMT	97A00	05
W093AA	USAE PACOM	C, INTL SYS	53C00	05
W0ALAA	HQ USASOUTH	PARC	97A00	05
W0GWAA	HQ AMC	C, ACQ INTGR	51A13	06
		C, AV DIV	51A15	06
		C, MGT DIV	97A00	06
		C, OICP	51A00	06
		CHIEF	51A03	06
		CHIEF	97A00	06
		CIM STF OFCR	97A00	05
		EXEC OFCR	97A03	05
		PESO FS	51A13	05
		PESO MCM	51A00	05
		PRJ OFCR, AUTO	53C00	05
		R&D COORD	51A03	05
		SFTWRE/AUTO OFCR	53C00	05
		STF OFCR	51A00	05
		STF OFCR	51A11	05
		STF OFCR	97A92	05
		STF TLKS COORD	51A00	05
W0H9AA	HQ MICOM	ADPEOD A&I	51A14	05
		C, TSO/AND	97A00	05
		C, TSO/LOS	97A00	05
		CON/IND MGT	97A00	05
		CON/IND MGT	97A91	05
		DEP DIR ACQ CTR	97A00	06
		DEP DIR ASCO	51A91	06
		DIR WSMD	51A13	06
		DIR, SWMO	51A02	06
		FUTR MUN OFCR	51A91	05
		PAT DEPL OFCR	51A91	05
		SMRT WPNS RQD	51A02	05
		SPC PRJ COORD	51A14	05
		TECH MGR	51A91	05
W0LAAA	USA RDAISA	COMMANDER	53C00	06
W0SXAA	USA ISMA	PM ASCP	53C00	05
		PM FB IMA	53C25	05
		PM JSCP	53C00	05
		PM WHTS	51A00	05
W0U9AA	USA AVN CTR	ASST TSM TNG	51A15	05
W0V8AA	ISMA/PMAIS	PM DCASS	51A25	06
		PM DCATS	51A25	06
		PM DDN	51A25	05
		PM DSCSI	51A25	05
		PM TACCIMS	51A25	06
W0VCAA	USAG-HOOD	DIRECTOR	97A00	05
W0VLAA	HQ USAEC	SPV MIL DEV OFCR	51A21	05
W0VPAA	USA CACDA	C, CBT/CS	51A02	05
		C, DECEPTION	51A02	05
		C, MAN DIV	51A02	05
		C, RISTA	51A35	05
		C, TECH DIV	51A02	05
		VICE DIR TPIO	51A00	05
W0VXAA	NATO INTL MIL	EXEC/AVIONICS	51A00	05
		SO ARMY I/S	53C00	05
		US REP - WK	53C25	05
W0Y6AA	HQ ATCOM	DIR CNTR OPNS	97A00	06
		DIR FLD AV SYS	51A15	06
		DIR TROOP	51A92	06
		PM ATC	51A15	05
		PM COBRA	51A15	05
		PM COM/EW	51A15	05
		PM FXD WING	51A15	05
		PM MEP	51A21	06
		PM PWL	51A92	05
		PM SOLDIER	51A92	06

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
		PROC OFCR SP	97A15	05
		WSM ADE	97A92	05
		WSM PSE	51A31	05
W0Z3AA	ODCSLOG	CHIEF	53C00	06
W0ZUAA	TECH MGMT OFC	CONTRT OFCR	97A00	05
		RSCH DEV ACQ OF	51A00	05
W0ZZAA	ODCSPER	ACQ POLICY	51A00	05
		DEPUTY IMO	53C00	06
		MNPRT CHIEF	51A00	05
W10YAA	DISA	C, ADP COMP OPNS	53C00	05
		C, OPS PLNG BR	53C00	05
		C, RES MONITRNG	53C00	05
		DEP CH, PLNS/SYS	53C00	05
		EXEC OFCR (AIS)	53C00	05
W1A1AA	HQ DLA	ACQ MAT PRG/POL	97A00	05
		CNTR MGT STF OF	97A00	05
		FLT OPNS QA	97A15	05
		OPNS OFCR	97A00	05
		PRGM MGR	97A00	05
W1A7AA	DLA DCSC	C, CNTR DIV	97A00	05
		C, WPN SYS	97A00	05
		DIR CNT/PROD	97A00	06
W1A8AA	DLA DPSC	ACQ MGT STF OFCR	97A00	06
		C, COMMODITY	97A00	05
		C, D&M BR	97A00	05
W1A9AA	DLA DGSC	C, CONTR DIV	97A00	05
W1AFAA	DISA	C, CNTR SPT BR	97A00	05
W1B0AA	ASARDA	CHIEF	51A00	05
		CHIEF	51A00	06
		CHIEF	51A00	06
		CHIEF	51A00	06
		CHIEF	51A00	06
		DEP DACM	97A00	06
		DEP DIR	51A00	06
		DIRECTOR	51A00	06
		DIRECTOR	51A00	06
		DIRECTOR	51A00	06
		DIRECTOR	51A00	06
		DIRECTOR	51A14	06
		DIRECTOR	51A35	06
		EXEC MIL DEP	51A00	05
		EXEC OFCR	51A00	05
		EXEC OFCR	51A00	05
		EXEC OFCR	51A00	05
		EXEC OFCR	51A00	05
		EXEC OFCR	51A00	06
		MIL ASST ASA	51A00	05
		PROC STF OFCR	97A00	05
		PROC STF OFCR	97A00	05
		PROC STF OFCR	97A00	06
		R&D COORD	51A00	05
		R&D COORD	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A11	05
		STF OFCR	51A11	05
		STF OFCR	51A12	05
		STF OFCR	51A12	05
		STF OFCR	51A13	05
		STF OFCR	51A13	05
		STF OFCR	51A13	05
		STF OFCR	51A14	05
		STF OFCR	51A14	05
		STF OFCR	51A15	05
		STF OFCR	51A15	05
		STF OFCR	51A15	05
		STF OFCR	51A25	05
		STF OFCR	51A35	05
		STF OFCR	51A35	05
		STF OFCR	51A91	05
		STF OFCR	53C00	05

CAREER DEVELOPMENT UPDATE

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
W1B3AA	USA ELE OSD	AET/CDP STF SP	51A00	05
		ASST DEP DIR	97A00	05
		DIR, ACQ	51A00	06
		DIR, SYS OVSGHT	53C00	06
		MGR INTL COOP	51A00	06
		MGR INTL COOP	51A00	06
		MIL ASST EW CBT	51A15	06
		MIL STF ADA	51A00	06
		SPCL ASST	51A00	06
		STF OFCR	51A00	06
		STF OFCR ROT WNG	51A15	06
W1B6AA	USA ELE JCS	AUTO SYS MGR	53C00	05
		C, CORPS IMO	53C00	06
		WPNS SYS PGM EV	51A12	05
		WPNS SYS PGM EV	51A15	05
W1B7AA	COE	DEP CHIEF	97A00	05
W1BDAA	DLA DESC	DEP DIR QA	97A00	05
W1BEAA	DLA DISC	C, CNTR DIV	97A00	05
W1BLAA	DLA	C, CNTR MGMT	97A00	05
		C, CNTR MGMT	97A00	05
		C, FLT OPNS	97A15	05
		C, PRGM SPT	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A15	06
		DEP DIR CNTR	97A00	05
W1BSAA	AE NAVY ACTY	TM CH PGM DEV	51A14	05
W1BTAA	AE AF ACTY	OPS & PLNS	51A00	05
		PRG COORD DEV	51A00	05
		PRG OFFICER	51A00	05
W1BUAA	AAFES	C, OVRSEAS PROC	97A00	05
		DIR, PROC SPT	97A00	06
W1BYAA	OCLL	STF OFCR	51A00	05
W1D2AA	USA ADA SCH	ATSM-ATMD	51A14	05
W1E0AA	USAJFKSWCS	CD STF OFCR	51A18	05
W1E1AA	ALMC	DEAN, SCH ACQ	97A00	06
W1FBAA	USMA	CNTR MGT OFCR	97A00	05
W1HSAA	DLA	COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		DIR QA FLT	97A15	05
W1NBAA	SHAPE	C, HQ SPT SEC	53C00	05
W1PLAA	USATA	PM ATSS	51A00	05
		PM TEMOD	51A00	05
		PM TMDE	51A00	06
W1Q8AA	DLA	COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A15	05
W1SEAA	USAISC-PTN	C, PROJ BR	53C25	05
W1WKAA	DLA	COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		DEP DIR CNTR	97A00	05
W1WLAA	DLA	C, PRGM SPT	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A15	06
W1WWAA	DLA	C, PRGM SPT	97A15	05
		CHIEF OF STAFF	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	05
		COMMANDER	97A00	06
		COMMANDER	97A00	06
		COMMANDER	97A15	06
W1YSAA	DA STAFF	STAFF OFFICER	51A00	05
W248AA	USA ISEC	CHIEF, CEC	53C00	05
		DEP CDR	53C25	06
		DIR PID	51A25	06
W262AA	HQ LABCOM	ARMOR TECH	51A00	05
		AVN TECH	51A15	05
		C, ADV CONCEPTS	51A11	06
		C, EW VUL DIV	51A00	06
		CBT ARMS TECH	51A00	05
		COMPUTER SCI	53C00	06
		DIR CBT APPLS	51A11	05
		MATLS TECH MGR	51A00	05
		MECH ENGR	51A15	05
W27P01	PEO IEW	APM JSTARS	51A35	05
		JSTARS	51A35	06
		LNO	51A35	05
		PM ACS	51A35	05
		PM ARL SASS	51A35	05
		PM EW RSTA	51A35	06
		PM FAAD GBS	51A14	05
		PM FIREFIND	51A13	05
		PM GBCS-H	51A35	05
		PM GBCS-L	51A35	05
		PM GCID	51A12	05
		PM GRDRAIL	51A15	05
		PM NVEO	51A12	06
		PM RADAR	51A14	06
		PM SIGWAR	51A35	06
		PM STINGRAY	51A11	05
W27P02	PEO AVN	APM EH-60	51A15	05
		APM EO-L	51A15	05
		APM LNGBOW	51A15	05
		APM NEW TRN	51A15	05
		APM PRGMS KW	97A15	05
		APM PROD UH	97A15	05
		APM RADAR CM	97A15	05
		APM READNS	51A15	05
		APM RQMTS	51A15	06
		APM T&E	51A15	05
		APM T&E	51A15	05
		ASST PEO	51A15	06
		C, APACHE	51A15	05
		C, PRD FLD	51A15	05
		DPM AVIONICS	51A15	05
		JTCG/AS STF OF	51A15	05
		PM AAH	51A15	06
		PM ALSE	51A15	05
		PM ASE	97A15	06
		PM ATE ATHS	51A15	05
		PM ATE TADS	51A15	05
		PM FR CNTRL	51A15	05
		PM KW	51A15	06
		PM LNGBW	51A15	05
		PM LONGBOW	51A15	06
		PM SOA	51A15	05
		PM T800 ENG	51A15	05
		PM UTL HEL	51A15	06
		R&D COORD	51A15	05
		R&D COORD	51A15	05
W27P03	PEO CCS	C, FLD OFC ASAS	51A35	05

CAREER DEVELOPMENT UPDATE

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
		DPM AWIS	53C25	05
		INTEROP OFCR	51A25	05
		OPNS OFCR	51A25	05
		OPNS OFCR	97A25	05
		PM ADCCS	51A14	06
		PM ADI CP	51A14	05
		PM AFATDS	51A13	05
		PM AIM IDP	51A35	05
		PM ASAS	51A35	06
		PM CHS	51A25	06
		PM CN CMS	51A00	05
		PM CSSCS	53C25	06
		PM FAAD C2	51A14	05
		PM FATDS	51A13	06
		PM FSIC	51A25	05
		PM OPTADS	53C25	06
		PM PAWS	51A35	05
		PM SACCS	53C25	05
		PM SICPS	51A25	05
		PM SPO	51A35	06
		PM STACCS	51A25	05
		PRJ OFCR TEST	51A13	05
		PRJ OFCR/INTEROP	51A13	05
		SFTWRE TST MGR	53C25	05
		SNR PRJ OFCR	51A35	05
		T&E OFCR	51A25	05
		TEST OFCR	53C25	05
W27P04	PEO ARM	APM ASM TMAS	51A12	05
		APM PRG INTGR	51A13	05
		DEP PEO	51A12	06
		PEO REP	51A00	05
		PM MCD	51A91	06
		PM PALADIN	51A00	05
		PM SADARM	51A91	06
		PM TMAS	51A12	06
W27P05	PEO CS	ASST PEO FLD	97A91	05
		DEP PEO	51A91	06
		DPM LTV	51A91	05
		LNO	51A88	05
		PM ESP	51A88	05
		PM HTV	51A00	06
		PM MTV	51A00	06
W27P07	PEO TACT MSL	APM DEV MLRS	51A91	05
		APM INTG BAT	51A13	05
		APM MSLS	51A00	05
		APM PRD BAT	51A13	05
		APM R&D BAT	51A13	05
		APM R&D MGR	51A91	05
		APM WPNS SRO	51A13	05
		DEP PEO	51A00	06
		LNO	51A00	05
		PM AGMS	51A00	06
		PM ATAMS	51A00	06
		PM BAT	51A00	06
		PM BFVS TOW	51A91	05
		PM BLK II	51A00	05
		PM FSC2	51A00	05
		PM HOMS	51A00	05
		PM ITAS	51A00	05
		PM JAVELIN	51A00	06
		PM MLRS	51A00	06
		PM SADARM	51A00	05
		PM SISMO	51A00	05
		PM SMO	51A00	06
		PM SRO	51A00	06
		PM TOW	51A00	06
W27P08	PEO COMM	C, 2D FO	97A00	05
		C, CAL FO	97A25	05
		C, FLDN OFFICE	51A25	05
		C, GARS RQM	51A25	05
		C, GPS RDNS	97A00	05
		C, ITT FO	97A00	05
		C, MILSTAR	51A25	05
		DEP JTPO	51A25	05
		DEP PRJ DIR	51A25	06
		DPM JTIDS	53C25	05
		FLD OFCR	97A00	05
		FLD OFCR	97A25	05
		FLD OFCR	97A25	05
		OPNS OFCR	97A00	05
		PM ADDS	53C25	06
		PM CMS	51A25	05
		PM EPLRS	53C25	05
		PM GPS	51A25	06
		PM MILSTAR	51A00	06
		PM MSCS	51A25	06
		PM MSE	97A25	06
		PM SATCOM	51A25	06
		PM SINCGARS	97A00	06
		PM TACSAT	97A00	05
		PROD OFCR	97A25	05
		PROJ OFCR MSCS	51A25	05
		TST OFCR MSE	51A25	05
W27P09	PEO AD	APM ATA ATAM	51A14	05
		APM ATA INTG	51A15	05
		APM COMMO	51A00	05
		APM COMMO	51A00	05
		APM FLD LOS	51A14	05
		APM GTA ATAM	51A14	05
		APM SPEC PRGM	51A00	05
		ASST PEO	51A14	06
		LNO	51A00	05
		PM ATAM	51A00	06
		PM ATMD	97A00	05
		PM AVENGER	51A14	06
		PM CORPS SAM	51A00	06
		PM LOS-F	51A00	06
		PM PATRIOT	51A00	06
W27P10	PEO ASM	APM M1 BRCH	51A21	05
		APM PROD SS	97A91	05
		APM R&D SS	51A91	05
		ASST LNO	51A11	05
		ILS MGR LOG	51A12	05
		LNO	51A12	05
		LOG OFCR	51A91	05
		PM ABRAMS	51A12	06
		PM AFAS	51A13	06
		PM AGS	51A12	06
		PM ARM AFAS	51A12	05
		PM ARM AGS	51A11	05
		PM ARM BLIII	51A12	05
		PM BFV DERV	51A12	05
		PM BFVS	51A91	06
		PM BLK III	51A12	06
		PM CC BLIII	51A12	05
		PM CH FARV-A	51A91	05
		PM CHASSIS	51A11	05
		PM CM CH AFAS	51A13	05
		PM CMV	51A21	06
		PM FARV-A	51A91	06
		PM LOS-AT	51A11	06
		PM M1A1	51A11	05
		PM M1A2	51A12	05
		PM M2/M3 BFVS	97A00	05
		PM MSI	51A91	05
		PM SURV SYS	51A21	06
W27P11	PEO STAMIS	DEP PEO	53C00	06
		DPM JCALS	53C00	05
		PM AIT	53C00	05
		PM CTASC	53C00	05
		PM SAMS	53C91	05
		PM SARSS	53C92	05
		PM SIDPERS	53C00	05
		PM TACMIS	53C00	06
		PROJ OFCR	53C00	05
		SYS INTGR OF	53C00	05
W27P15	UAV	APM UAV	51A00	05
		APM UAV	51A35	05
		PM CR UAV	51A00	06
		PM SR UAV	51A00	06

CAREER DEVELOPMENT UPDATE

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
W27PAA	AAESA	C, INFO MGT	53C00	05
		C, PROP OFC	51A00	05
		MIL DEP DIR	51A00	05
		PRJ OFCR AIM	53C00	05
		RSCH DEV OFCR	51A00	06
W2GJAA	USAMC IG	PROCURE INVS	97A00	05
		TM C, PROC	97A00	05
		TM C, SYS INS	51A00	05
W2HRAA	USAE CENTAG	CHIEF	53C00	06
W2HYAA	USAE ALFSEE	ACQ PRJ OFCR	53C00	05
W2L5AA	USA INF SCH	ASST TSM ATMHVY	51A11	05
W2NTAA	USA FA SCH	C, ORG/PERS SVCS	51A13	05
W2TZAA	DEF SUP SER	COMMANDER	97A00	06
W2Y2AA	CMPT SYS SEL	OPNS OFCR	53C00	05
		OPNS OFCR	97A00	05
W303AA	USA IG	IG	51A00	05
W30MAA	USA DPG	COMMANDER	51A74	06
		DIR MTD	51A74	05
W31L01	SYS SPT TEL	C, SYS SPT/TEL	53C00	05
W31LAA	CCSA	DIRECTOR	53C00	05
W33TAA	USAISC-WP	COMMANDER	53C00	06
W36NAA	DLA	C, CNTR DIV	97A00	05
W36PAA	USA SPO	C, SD/YB	51A35	05
		CNTR MGMT OFCR	97A00	05
		DIRECTOR	51A00	06
		R&D COORD	51A35	05
		R&D COORD	53C00	05
W36WAA	OPM NUC MUN	PM NUC MUN	51A13	06
W376AA	HQ ATTC	C, FLT SYS TST	51A15	05
		C, MGT & PLNS	51A15	05
		COMMANDER	51A15	06
		DIR AQTD EDWDS	51A15	05
W37WAA	NAT DEF UN	MIL FACULTY	51A00	06
W384AA	USA RSCH ASS	CHIEF	97A00	05
		DEF SNR SCI	51A00	05
W384AA	USA RSCH ASS	CHIEF	97A00	05
		DEF SNR SCI	51A00	05
		R&D COORD	51A00	05
		R&D COORD	51A00	05
W39BAA	PGWCM	DEP DIRECTOR	51A00	05
W3BDAA	SDC-LEE	COMMANDER	53C00	06
		DIR/SYS AUTO	53C00	05
		SYS AUTO ENGR	53C00	05
		SYS AUTO ENGR	53C88	05
		SYS AUTO ENGR	53C91	05
		SYS AUTO ENGR	53C92	05
		SYS AUTO ENGR	53C92	05
W3E0AA	377 TAACOM	CNTR OFCR	97A00	05
		PARC	97A00	06
W3GCAA	DSMC	DEAN, COL OPS	51A00	06
		DIR CNTR MGT	97A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	51A00	05
		PROF SYS ACQ	53C00	05
		PROF SYS ACQ	53C00	05
		PROF SYS ACQ	97A00	05
		PROF SYS ACQ	97A00	05
		PROF SYS ACQ	97A00	05
W3GGAA	JUSMAG	C FMS/DPA	97A00	05
		DIR, INTL COOP	51A00	06
W3H8AA	USAISEC-EUR	DIR, AUTO DIR	53C00	05
W3LB01	TRANSCOM	C, C4S MGT BR	53C00	05
		C, SYS ANLY	53C00	05
		SYS AUTO OFCR	53C00	05
W3NRAA	HQ DEF MAP AG	WPN SYS SP MGR	51A00	05
W3P2AA	USA ELE SOCOM	C, OPN/T&E	51A18	06
		C, PROC MGMT	97A00	06
		CNTR/PROC OFCR	97A00	05
		DIR SORDAC	51A00	06
		SYS ACQ MGR	51A35	05

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
W3Q220	TEXCOM	C, ACQ MGT SPT	97A00	05
		C, C2 TST	51A02	05
		C, PLANS DIV	51A00	05
W3Q225	TEXCOM	C, TEST TM #1	51A00	05
W3Q2AA	OPTEC	C, ATCCS DIV	51A25	05
		C, AUTO INTELL	51A35	05
		C, AV EVAL	51A15	05
		C, CA EVAL	51A14	05
		C, COM SYS DIV	51A25	05
		C, CS EVAL DIV	51A88	05
		C, FS CAN DIV	51A13	05
		C, INF EVAL DIV	51A11	05
		C, INST DIV	51D25	05
		C, M/S SYS DIV	53C00	05
		C, TST MGT DIV	51A15	05
		DCSIM	53C25	06
		SR CMP ANL	53C00	05
		TECH DIR	53C00	05
W3VSAA	PERSCOM	C, MAT ACQ BR	51A00	05
		COL ASGN OFCR	51A00	05
W3YBAA	FORSCOM	PARC	97A00	06
		PROCURE OFCR	97A00	05
W3YTAA	HQ TRADOC	ACQ MGMT OFCR	97A00	05
		C, MOD DIV	51A00	05
		C, SYS DIV	51A00	05
		C, TAMD	51A00	05
		DIR ACQ	97A00	06
W40JAA	DEF SECR AG	SEC ASST PM	53C00	05
W44SAA	USATEMA	T&E STF OFCR	51A00	05
W457AA	STRICOM	FORCE INTGR	51A00	05
		PM ITTS	51A15	05
		PM ITTS	51A91	06
		R&D COORD	51A00	05
W46HAA	USA ELE DARPA	DEP DIR ISTO	51A00	05
		DEP DIR TTO	53C25	06
W47TAA	USA KUWAIT	DIV CHIEF	97A00	05
W4B2AA	WHS	DEF ACQ PRG	51A00	05
W4CHAA	CONG INQRY	CONG COORD	97A00	05
W4DJAA	JT ELTRWFRE	C, TECH DIV	53C00	05
W4DMAA	USAE CENTCOM	DEF IND COOP	97A00	05
W4E6AA	NTC	CNTR PROJ MGR	97A00	05
		DIRECTOR	97A00	05
W4EBAA	OFC SDBU	ASST FOR DBP	97A00	05
W4EGAA	OCE	DEP CHIEF	97A00	05
		DEP PARC	97A00	06
W4EZAA	USAIRMICS	DEP DIRECTOR	53C00	05
W4FDAA	AMCICP	COMMANDER	51A03	06
		INTL R&D COORD	51A00	05
W4FGAA	USAE CENTCOM	ACQN OFCR	97A00	05
		DIV CHIEF	53C00	06
W4FHAA	USAISSC	CHIEF	53C00	05
		CHIEF	53C00	05
		COMMANDER	53C00	06
		DIRECTOR	53C00	06
		SR SFTWR ENGR	53C00	05
W4G8AA	CECOM RDEC	C-E MM OFCR	51A25	05
		CDR MGR SOF	51A25	06
		DEP DIR APM	51A25	05
		DEP DIR SWO	51A35	05
		DEP DIR, RDEC	51A25	06
		ELECT ENGR	51A25	05
		FS PRJ OFCR	53C13	05
		PM JASORS	51A25	05
		X0/R&D COORD	51A00	05
W4GGAA	HQ TACOM	C, LOG/FLD	51A91	05
		DEP DIR	97A92	06
		DEP FLD TM	51A12	05
		DEP PROD MGT	97A91	05
		DIR/WSM	51A91	06
		PEO FLDG	51A91	05
		PM CCE	97A91	05
		PM M113	51A91	05
W4GHAA	TACOM RDEC	DIR ADV CONCPTS	51A91	06
		PM ATP3	51A11	05
		PM IRV	51A91	05

CAREER DEVELOPMENT UPDATE

UIC	UNIT NAME	DUTY TITLE	PRC	GRADE
W4GVAA	HQ CECOM	DCB	51A25	06
		DEP CNTR OPN	97A91	06
W4HPAA	ACTV SPEC PROJ	CHIEF	51A18	05
W4K8AA	USA MP SCH	SR SCTY ST PFF	51A00	05
W4K9AA	USA CM SCH	C, MAT/LOG SYS	51A74	05
W4KBAA	USA DSMA	DIRECTOR AI	53C00	06
W4LZAA	DEF MOB SYS	PROC MGT OFCR	97A00	05
W4M7AA	IMSA	OFC CHIEF	53C00	05
W4MKAA	ARDEC	C, ASCO	51A00	06
		CDR/DIR CCAC	51A00	06
		CDR/DIR FSAC	51A00	06
		DIR PROCURE	97A00	06
		SNR ACQ REP	51A91	06
W4MLAA	CRDEC	APM NBCDS	51A74	05
		PM BINARY	51A74	06
		PM NBC DEFN	51A74	06
		PM SMOKE	51A74	05
		R&D COORD	51A74	05
W4MMAA	HQ AMCCOM	CIMO PROC DIR	97A00	05
		DIR PROCURE	97A00	06
		PM FUZES	51A13	05
		PM MORTARS	51A91	05
		PM SMALL ARMS	51A00	05
		PRJ OFCR WPNS	51A12	05
W4MXAA	CMD SYS INT	C, CNTR BR	97A00	05
		C, D&E DIV	53C00	05
		C, INTEROP	51A25	05
		C, SYS ENGR	53C00	05
		C, T&E DIV	51A00	05
		DEP DIR	51A25	06
		SNR AUTO SYS	53C00	05
		SNR C/E NTWK	51A25	05
		SNR COMM ENGR	51A00	05
		SNR SYS AUTO	53C00	05
		SR C/E ENGR	51A25	05
W4N3AA	DISA CC ENG	CHIEF	97A00	05
W4N403	DCA COMM	LNO	53C00	05
W4N405	DCA COMM	LNO	53C00	05
W4NJAA	ODISC4	CHIEF	53C25	06
		DEP DIR	51A25	06
		DEP DIR	53C25	06
		DIRECTOR	53C25	06
		STAFF OFCR	51A00	05
		STAFF OFCR	51A25	05
		STAFF OFCR	53C00	05
		STAFF OFCR	53C25	05
		STAFF OFCR	53C25	05
		STAFF OFCR	53C25	05
		STAFF OFCR	53C25	05
		STAFF OFCR	53C25	05
		STAFF OFCR	53C25	05
W4POAA	USA COMM ACT	PROC MGT SPT	97A00	05
W4P8AA	AFIT	C, ADV GRP	97A00	05
W4PCAA	USAFISA	ADP OFFICER	53C00	05
W4PQAA	MTMC	PM TCACCIS	53C00	06
		PM TOPS	53C88	05
W4QSAA	USA CNT SPT	CHIEF	97A00	06
		CHIEF	97A00	06
		CHIEF	97A00	06
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
		PROCURE OFCR	97A00	05
W4QUAA	USA CSTA	COMMANDER	51A01	06
W4RTAA	SDIO	DEP TH MSL DF	51A00	06
		DIR INT & SENS	51A00	06
		DIR NATL DEF	51A00	06
		DIR PRGM MGT	51A00	06
		DIR SYS INTGR	51A00	06
		PRJ INT FRE EL	51A00	05
		PRJ INTGR TMD	51A14	05
		PROJ INTGR	51A14	05
		PROJ INTGR TMD	51A14	05
		SEM C2 ELE	51A00	05
		SEM GRD BAS	51A00	05
W4RUAA	JT TAC C3	JT C3 STF OFCR	51A00	05
W4T2AA	USAE CENTCOM	BRANCH CHIEF	53C00	05
W4T4AA	USAE EUCOM	ARM COOP MGR	97A00	05
		ARM COOP MGR	97A00	05
		ARM COOP MGR	97A00	05
		ARM COOP MGR	97A00	05
		ARM COOP MGR	97A00	05
W4T801	SDC	ASST DEPUTY	51A00	05
		C, SPACE SYS	51A91	06
		C, SYS ENG DIV	51A91	06
		CHIEF	51A00	06
		CHIEF	51A14	06
		CHIEF	51A91	05
		CNTR OFCR	97A92	05
		DEP DIR	51A91	06
		DEP OPNS	51A14	06
		DEP PM	51A13	05
		DIR HELSTF	51A00	06
		DPM GBI	51A91	05
		DPM HEDI	51A14	05
		PM	51A14	06
		PM EADTB	51A14	05
		PM GBR	51A14	06
		PM HVL	51A91	05
		PM SP PL	51A00	05
		PM STARS	51A00	05
		PROG MGR	51A00	06
		R&D COORD	51A15	05
		R&D COORD	51A91	05
		R&D COORD	51A00	05
		SPACE SYS OFCR	51A00	05
		SYS ACQ OFCR	51A00	05
W4T802	SDC	COMMANDER	51A00	05
W4T8AA	SDC	ACS OPNS	51A91	06
		C OF S	41A14	06
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	51A00	05
		STF OFCR	53A00	05
		STF OFCR RD	51A00	05
		STF OFCR RD	51A00	05
		STF OFCR RD	51A14	05
W4ULAA	PERSONCOM	AD PROC OFCR	53C00	06
		C, ADV TECH	53C00	05
		DEP CDR	53C00	06
W4URAA	ARMY RPCNTR	COMMANDER	53C00	06
W4USAA	USAISC HFMN	C, APLCN BR	53C00	05
		C, NTWRK BR	53C00	05
		DIRECTOR	53C00	06
W4UVAA	D-SAFE	COMMANDER	97A91	05
W4W8AA	USAE PACOM	ARMY SYS DEV	51A00	05
W4ZOAA	SDC-WASH	C, SYS AUTO	53C00	05
		C, SYS AUTO	53C42	05
		COMMANDER	53C00	06
W4Z2AA	SDC-HUACH	COMMANDER	53C00	06
WATL99	HQ HHC ARMY	PARC	97A00	06
WBGUAA	1 CORPS SPT	PROCURE OFCR	97A00	05
WFJ1AA	13 CORPS SPT	PROCURE OFCR	97A00	05
WG8699	5 SIG CMD	C, C4 BR	53C00	05
WOZ1AA	ODCSINT	ADP SYS MGR	53C35	05
		C, IDHS MGT	53C35	06
WQMODL	STRICOM	PROD MGR	51A02	05
		PROD MGR	51A11	05
		PROD MGR	51A12	05
		PROD MGR	51A15	05
		PROJ MGR	51A02	06
		PROJ MGR	51A91	06

Tech Breakthrough Brightens Outlook for Military Robots

A recent breakthrough in robotic technology now makes robot tactical vehicles feasible for performing high-risk battlefield missions, according to engineers at the U.S. Army Tank-Automotive Research, Development and Engineering Center (TARDEC), Warren, MI.

The advancement, which is the result of a TARDEC-funded project at California's Jet Propulsion Laboratory (JPL), makes it possible for the first time to use a VHF radio communication link that dramatically increases the distance a robot vehicle can travel, using a control technique called computer-aided remote driving, or CARD for short.

In CARD, stereo cameras aboard a robot vehicle produce still images of the scene ahead of the vehicle. These images are radioed to an operator's monitor in a remote location. There, an image processor constructs a three-dimensional display, which the operator views through special 3-D goggles.

The operator designates where he wants the robot vehicle to go by moving an electronic cursor on the display to specific points in the image. This information is then transmitted back to a computer in the robot vehicle, which interprets it and generates the appropriate control signals needed to drive the vehicle to its destination autonomously.

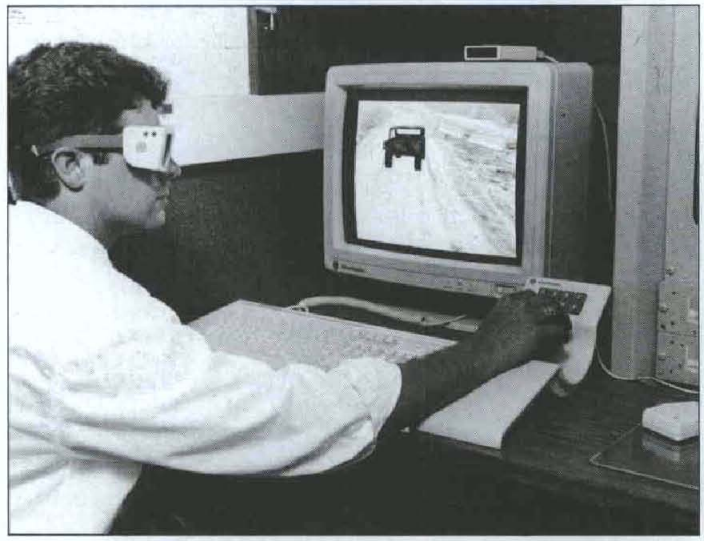
JPL developed the initial CARD system for TARDEC during the late 1980s, and it was successfully demonstrated in TARDEC's Robotic Command Center (RCC)—an experimental control vehicle that allows engineers to test new technologies for single- and multiple-vehicle control. In the demonstration, the CARD system controlled two robotized HMMWVs (High-Mobility Multipurpose Wheeled Vehicles). The HMMWVs have a computerized control system and radio and video communications equipment that allow an operator to control them and monitor their progress from a remote location.

Though the first-generation CARD system shows some promise, Gerald R. Lane, TARDEC's program manager for Advanced Vehicle Technology, said it has shortcomings. He said the most serious of these is that it uses a microwave radio link for transmission of video images between the cameras and sensors aboard the robot vehicle and the operator's control station, which severely limits its operating distance.

"Engineers originally selected the microwave link for the CARD system because it can transmit up to 20 video signals at the same time," Lane explained. "But because of the high operating frequencies, the transmitting antenna on a robot vehicle and the receiving antenna at the operator's control station must be in line of sight."

Another drawback to the original CARD system, according to Lane, is that it has no obstacle-avoidance capability.

In September 1990, TARDEC asked JPL to make several improvements to its CARD system to make it suitable for use in an Office of the Secretary of Defense (OSD) program aimed at developing tactical unmanned ground vehicle technology. One of these was to find a way to integrate it with the VHF radio link called SINCGARS (Single-Channel Ground-to-Air Radio system) used by the U.S. military. SINCGARS uses a lower operating frequency that dramatically reduces the line-of-sight problem, thereby allowing transmission of signals over hills and at greater distances.



John Griffin of TARDEC's Robotics Office operates CARD via remote control.

Other improvements requested by TARDEC included an enhanced obstacle-avoidance capability, a new high-resolution stereo display, and software that is more user-friendly.

According to Lane, JPL earlier this year completed work on an improved CARD system having most of the TARDEC-requested improvements, and demonstrated it last spring at a robotic vehicle working group meeting hosted by JPL. Later, TARDEC engineers Paul J. Lescoe and John D. Griffin used the system to control TARDEC's two HMMWV robots in an OSD demonstration held at Aberdeen Proving Ground.

Lane said the enhanced CARD system works well with the SINCGARS radio link, has a limited obstacle-avoidance capability, produces higher resolution stero images and is more user-friendly. "Getting the CARD system integrated with SINCGARS is an important breakthrough in robotics," he said. "My definition of technology breakthrough is when research is carried to the point where, with engineering applied to develop hardware, a system could be fielded, and that is where we are now with CARD."

Lane said current plans call for Robotics Office engineers to test the communication capabilities of the system by driving a HMMWV to distant locations and attempting to transmit video images to TARDEC. He said it will then go back to JPL, where efforts aimed at proving the CARD system with an improved passive obstacle-avoidance capability will continue.

Lane indicated that JPL plans to finish the project in time for a second OSD demonstration scheduled to take place at Fort Hood, TX, in 1995. He added that efforts are under way to acquire OSD funding to install the system improvements in the RCC for further research.

The preceding article was written by George Taylor, a technical writer-editor for the U.S. Army Tank-Automotive Command.

DOD Awards $7 Million for Science And Engineering Education

The Department of Defense (DOD) has announced plans to award $7 million at 31 academic institutions to support graduate students in science and engineering fields important to national defense. Subject to the successful completion of negotiations between DOD and the academic institutions, the 72 awards will provide three years of support to 83 U.S. citizens pursuing advanced degrees. The average funding per student will be $84,000, and will cover the full three years of support.

The awards are being made under the FY 1991 DOD Experimental Program to Stimulate Competitive Research (EPSCoR), a program designed to expand research opportunities in states which have traditionally received the least funding per capita in federal support for university research.

Under EPSCoR, awards are made to unversity professors in specified states who hold DOD contracts or grants, and who compete successfully for additional funding. This additional funding enables them, in turn, to award research traineeships to U.S. citizen graduate students. Each traineeship supports tuition, living expenses, and research expenses (materials, shop services, computer time, etc.) connected with the graduate student's thesis research.

University professors holding DOD research grants in Alabama, Arkansas, Idaho, Kentucky, Louisiana, Maine, Mississippi, Missouri, Montana, Nebraska, Nevada, North Dakota, Oklahoma, South Carolina, South Dakota, Vermont, West Virgina, Wyoming, and the Commonwealth of Puerto Rico were eligible to participate in this competition.

The announcement is the result of the first competition under the DOD EPSCoR. The Army Research Office, the Office of Naval Research, the Air Force Office of Scientific Research, and the Defense Advanced Research Projects Agency solicited EPSCoR proposals from university researchers currently performing DoD research, and invited all others to submit proposals for DOD research funding with EPSCoR augmentation. In response, 196 proposals were submitted requesting nearly $30 million.

New Army Smart Weapon Puts 'WAM'ie on Russian Tank

The Army's newest "smart" weapon got an A-plus when it detected, aimed, armed, fired and "killed" a moving Russian T-62 tank at Yuma Proving Ground, AZ, according to Picatinny Arsenal weapons research officials. It was the first stand-alone test of the system against a moving target. The Wide Area Mine (WAM) has been in development at the Picatinny Arsenal RDE Center since 1987.

It used its on-board acoustic and seismic sensors to hear and feel the tank approaching, and when it got within 55 meters (some 165 feet), it spun toward the target, tilted 35 degrees to its launch position and fired.

A munition was shot over the target, used infrared sensors to select an air point on the tank, then fired down, penetrating the armored vehicle at a vulnerable spot on its top. The Russian tank was moving at 15 km per hour, or about nine miles per hour, test sponsors said.

It's called a smart munition because all this was accomplished without any soldiers' or research scientists' direct help. Once emplaced and activitated, the mine acted on its own.

Picatinny engineers explain that the information put in the WAM's memory contains the keys needed to identify the sound and vibration patterns of most known combat vehicles. Using artificial intelligence, the mine's computer compares what it knows—what's contained in its memory—to what it detects—to determine if a target exists.

If the answer is yes, the system automatically locks on its target, turns toward it and fires a large hockey puck-looking munition over it. When the weapon's downward-looking infrared sensors detect engine heat, a warhead is fired at the top of the target. Since the launch-to-strike time is so fast, most moving ground targets won't be able to avoid being hit.

Although this initial test was against a ground target, future smart mines are also being designed to attack helicopters and will have multiple emplacement capability.

Actual test data, such as effective range, are still classified. According to current projections, the first WAMs should be in the hands of troops in five years.

Have You Ever Been in A Minefield?

GEN Norman Schwarskopf once responded to a reporter's question by inquiring "Have you ever been in a minefield?" At Yuma Proving Ground (YPG), a handful of explosive test operators (ETOs) can answer a definite "Yes!" to that now famous inquiry. As a matter of fact, they have gone into minefields on a daily basis. Of course, the minefields they've crossed are not of the lethal variety the general was referring to, but minefields containing test mines with inert main charges. Under the guidance of Stephen Patane and Michael Thompson, project engineers in the Materiel Test Directorate's Munitions and Weapons Division, ETOs have emplaced small minefields on YPG's Kofa Range while testing the Modular Pack Mine System (MOPMS).

ETOs from Ammo Support Branch have been working in and around these minefields, locating, identifying, and testing the mines for proper function by initiating them with a magnetic target simulator, by pulling triplines, or by disturbing them. MOPMS units containing live, high-explosive mines have also been deployed, but project engineers and ETOs resort to video cameras and a robot to evaluate the mines and to "demil" duds.

The MOPMS consists of a mine dispenser which contains 21 mines (17 anti-tank and four anti-personnel) and a radio control unit (RCU). The dispenser, which resembles a large suitcase, can be carried by two soldiers. The dispenser and the mines incorporate electronic circuits that allow the dispenser to be controlled remotely using the RCU. The RCU transmits a coded radio frequency that commands the dispenser to deploy the mines. Upon receiving the command from the RCU, the dispenser ejects the 21 mines, scattering them about a 35-meter radius semicircle. After deployment from the dispenser, the mine function can also be controlled by the RCU.

With MOPMS, a minefield can be deployed quickly and soldiers viewing the field from a remote location can initiate it with the RCU when enemy armor or troops enter the perimeter of the field. In addition to RCU initiation, the anti-tank mines can be initiated magnetically and the anti-personal mines are equipped with triplines; both types of mines are sensitive to disturbance. When the minefield is no longer needed, the field can be deactivated by a push of a button on the RCU, which detonates the mines, or by allowing them to self-destruct at pre-set times. The capability to quickly clear these minefields becomes increasingly important when one considers the massive, hazardous effort that is currently underway to clear the minefields laid in Kuwait by the Iraqi army.

The MOPMS is a member of the Family of Scatterable Mines (FASCAM), which includes mines that can be deployed by ground dispensers (including vehicle-mounted), artillery projectiles, or aircraft-mounted delivery systems. Other members of FASCAM include Volcano (helicopter or ground-launched), RAAM and ADAM (both artillery-delivered), and Gator (aircraft-delivered).

Tracks Bring New Dimension in Mobility to Army Trailers

Tracked combat vehicles are commonplace in the Army, but have you ever heard of a tracked trailer? Well, troops at Fort Leonard Wood, MO are now using one such trailer, and others like it will soon make their debut to troops of the 24th Infantry Division, Fort Stewart, GA.

Its addition to the Army's inventory is expected to greatly improve mobility over that of wheeled trailers.

The trailer will not be a newcomer to the fleet; it will be a modified version of the existing light-duty M200A1 single-axle, 4-wheeled, 2½-ton chassis trailer that carries the Army's Mine-Clearing Line Charge (MICLIC) system.

The MICLIC is a rocket-propelled line of explosives that, when launched into minefields, detonate sequentially across the area upon landing and cause nearby mines to explode, thereby clearing a path for other vehicles.

The MICLIC played an important role during Operation Desert Storm in helping to clear paths through Iraqi minefields. Troops, however, sometimes experienced problems in deploying it, because the MICLIC trailer, like all wheeled trailers used in the Persian Gulf War, frequently became immobilized in the desert sand.

"The wheeled trailers would sink into the sand, and the vehicles towing them would drag them through the sand," said Donald H. Kendall of the Project Manager Office for Trailers at the U.S. Army Tank-Automotive Command (TACOM), Warren, MI.

A search for a solution by PM Trailers revealed that Caterpillar Inc. has been making a track suspension system for use on agricultural tractors and trailers for about 10 years, and it has proven outstanding for on- and off-road use. So PM Trailers decided to evaluate it for military use.

The track differs significantly from those used in combat vehicles. Military tracks are usually either a single or double-pin design consisting of metal track shoes with rubber pads that ride around dual sets of road wheels. Made either of steel or aluminum, the wheels have a flat rolling surface consisting of a heavy layer of rubber. As the track revolves around the wheels, track guides (short prongs located in the middle of the track that extend between each dual-wheel set) keep the track properly centered.

The Caterpillar track is a steel-reinforced rubber belt that uses dual sets of pneumatic tires as road wheels and rubber guide blocks that ride between the tires to keep it centered. "The difference between this track design and anything in the past," Kendall said, "is that it is identical to a steel-belted radial tire like you have on a car. It's one solid rubber belt with tread on it, so you can drive it on any kind of surface.

"You can drive it down a highway at 55 miles per hour," he continued, "because there is no exposed steel to chew up the highway surface. Or, if you want to leave the highway and go cross country, you can hook it to a tank and go right into the field. You don't have to change tires, tracks or anything."

Two M200A1 MICLIC tracked suspension system trailers were tested for survivability, tracking ability, mobility and trafficability at Yuma Proving Ground. In addition, two tracked trailers—one carrying a 60-kilowatt generator, and the other an M149 Water Buffalo—were tested and evaluated against a wheeled trailer carrying a MICLIC.

"The tracked trailers performed extremely well," Kendall said. "The more we tested the system, the more it proved itself and its capabilities. We were unable to get either one of them stuck in the sand. We even tried to tip them over by

M113 towing tracked trailer with MICLIC.

driving through deep ditches with an M113 armored personnel carrier and couldn't do it."

Kendall said that following the Yuma tests, TACOM late last year awarded Caterpillar a contract for track suspension system kits, which will be used to convert 250 M200A1 trailers at Tobyhanna Army Depot. He also said efforts are under way at TACOM and Caterpillar to develop a medium-duty kit for use on trailers weighing up to 10 tons. When asked if the Army has plans to retrofit all existing trailers in the fleet, Kendall said, "I don't know about retrofitting all existing trailers. But in the future I do see the day when we will have trailers that will be designed from scratch as tracked trailers."

The preceding article was written by George Taylor, a technical writer-editor for the U.S. Army Tank-Automotive Command. He has a bachelor's degree in journalism and a master's degree in communications from Michigan State University.

U.S. Army Photo by Stacy Gomez

Wide Area Mine Cold Testing Conducted at Picatinny Arsenal

Shown in the above photo, Staff Sgt. Michael J. Ferrell (right), of the New Equipment Training and Maintenance Operation Procedures Office, Picatinny Arsenal, NJ, is determining if the Army's new portable mine can be accurately set under arctic conditions. Observing is Test Director Keith Gunn (left), an engineering psychologist who is part of a 10-person detachment permanently assigned to Picatinny from the U.S. Army Human Engineering Laboratory, Aberdeen, MD. Ferrell was one of four soldiers and four civilians who tested how well the Wide Area Mine could be armed under both temperate and arctic climates. All participants wore battle dress and NBC overgarments in the cold chamber, which was set for -25 degrees Fahrenheit, and none stayed in the chamber longer than 30 minutes. Each went in once over a one-week period. While in the chamber they had to set the mine in both the manual and remote modes. Wired thermometers inside their gloves monitored their hand temperature for safety purposes. They also had to perform the same procedures under temperate conditions wearing standard Army issue (battle dress uniform). All had previous training prior to the test start. According to Gunn, the results were satisfactory. The Wide Area Mine program is managed by the project manager for mines, countermine and demolitions at Picatinny.

SPEAKING OUT

How Can the Army Improve the Efficiency of Its Acquisition Process?

Joseph R. Varady
Director for Procurement Policy
Office of the Deputy Assistant Secretary of the Army (Procurement)

There are a number of things that the Army can and is doing to improve the efficiency of the acquisition process. One of the things that is being done, but needs to be pursued with great diligence, is to relieve the procurement system, government procurement personnel, and contractors of the unproductive and non-cost effective burdens that have accumulated over the years.

When the Defense FAR Supplement was being completely rewritten, every dollar threshold and requirement for an approval were reviewed to make sure they were at the proper level to optimize economy and efficiency in the procurement process. We are now doing the same type of review for the Army FAR Supplement. The same thing needs to be done for the FAR itself, but that task has not yet started.

For many months, the ASA(RDA), his staff, and AMC have been working very hard in spreading a message—each member of the Army acquisition community has a duty to challenge functional requirements imposed on every aspect of an acquisition.

"Functional requirements" are those multitude of plans, provisions, tests, reports and other data items, and specifications and standards that we, the government, impose on a procurement. Several months ago, a team of very senior Army and AMC acquisition staff (known as the Roadshow) visited every major Army acquisition center. The message they were carrying was that the Army does have to change the way we do business, and that we have considerable power and authority to do so. Roadshow II is being readied; it will concentrate on teaching functional personnel at the major acquisition centers how to streamline acquisitions by removing requirements that are not truly essential or cost effective.

Many of these functional requirements are based on statute or higher-level regulations. However, many are not so based and we need to overcome our "do it by rote and take no risks" attitude and start hacking away at those requirements that are not essential and cost-effective.

Even when requirements are based on statutes or higher level regulations, we in the acquisition community generally still have considerable latitude on how and when the requirements are applied. We need to use that latitude. We can save the Army money by not buying contractual effort that adds little or no value to our main purpose—equipping the soldier.

LTC Raymond Pawlicki
Product Manager—Paladin
Office of the Program Executive Officer, Armaments
Picatinny Arsenal, NJ

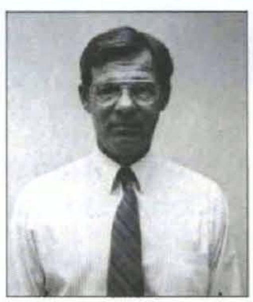
Photo
not
available

Fully implementing Total Quality Management (TQM) is the best way to improve our efficiency. Through TQM we can better educate, train and reward our people, improve communications, streamline organizations, produce higher quality weapon systems in less time and save money doing it. This may sound too good to be true. The catch is that it's a heck of a lot easier talking about TQM than it is to implement it. It takes a lot of time and energy on the part of senior leadership to make TQM work in an organization.

The formation of the Army Acquisition Corps will help the Army in implementing TQM. Army Acquisition Corps education opportunities, such as the six-week Materiel Acquisition Management Course at Fort Lee or the Program Manager Course at the Defense Systems Management College, enhance team building and communications between communities. For the acquisition process to be successful, the PM needs good communications with the program executive officer, materiel developer, matrix staff, the user, the operational tester, the independent evaluator, the contractors and the Army staff. The indepth knowledge of the acquisition process gained from formal education and onsite TQM training will allow better communication between communities. Through effective team building the Army replaced the "not invented here" road block with the "we invented it here" team solution. This will help stabilize requirements and funding levels.

The greatest efficiencies can be achieved when empowered teams are formed at all levels—from the concurrent engineering teams of design, logistics and industrial engineers to the process action teams of welders and assembly workers on the shop floor all the way through program management teams of the Army staff, OSD and Congress.

Full implementation of TQM will require a dedicated effort, but the efficiencies are tremendous.



Dale R. Fradley
Acting Deputy Director
Army Acquisition Executive Support Agency

Improving efficiency of the acquisition process seems to have been the theme song of the 1980s. We had the Carlucci initiatives, O&S cost reduction, acquisition streamlining, capstone PM concept, matrix management, Defense Enterprise Programs, PEO concept, TQM, Packard Commission, and the Defense Management Report. Obviously the process needed improvement. Have the efforts of the 80s rendered us acquisition efficient? Improved, yes, but more can be done.

I believe the greatest gains in efficiency have come from narrowing the realm of influence and shortening the chain of command for program decisions. Decisions are made faster, and then changed or modified less often. The result is greater program stability which equates to less costly systems delivered sooner.

I would like to see the 90s theme become flexibility in allowing individual PMs to make still more of their own business decisions. Get rid of the "cookie cutter" approach to acquisition management caused by precedent, local rules, and regulation and, with the exception of federal regulation, allow PMs maximum authority in executing their programs. The key to this is education and training and careful career development of Army acquisitioneers at all management levels. I believe the best ideas on improving the efficiency of the acquisition process will flow up the chain of command provided we have an educated, experienced work force.

SPEAKING OUT

Dr. Paul J. School
Chief, Human Engineering Laboratory Detachment
Fort Belvoir, VA

More deck chairs would not have significantly improved survival of Titanic passengers. Likewise, band aid type repairs will not achieve acquisition improvement. We need thoroughgoing change to do business with business in ways they understand and accept.

Current Army acquisition practice adulterates the buyer-seller relationship reducing efficiency.

Many contractors avoid government business. Those folks want work, and we need them, but our acquisition methods have turned them off.

One businessman threw a voluminous RFP in a waste basket angrily exclaiming, "I don't sell paper. I sell computers. I'm not going to cope with paper." Another said, "We do not want government business. They impose requirements that get in the way and do not improve the product."

So, neither the Army nor the private sector finds our acquisition process acceptable. Correction must narrow the gap between our acquisition methods and those of industry. We must change to become consistent with the private sector.

We must move from dictating contractor actions toward more flexible work-with relationships that nourish and influence mutual understanding of common purpose. In that regard, incentives placed in a phased acquisition process (with options at each phase) should become the primary means of gaining performance.

Briefly, we must:

- stop arms-length, third-party dealing;
- delete extensive/costly paper product requirements;
- shift the emphasis of bench level people from monitoring (reading contractor paper) to on-the-spot control;
- write concise, unambiguous RFPs and contracts that contain clear reinforcements for performance;
- remove non-productive process by questioning need;
- cut decision time drastically;
- shift small purchases to end item users;
- make small purchases akin to buying dishwashers from Sears;
- provide efficient means to terminate unacceptable performance rapidly;
- cut contract preparation time drastically; and
- stop driving the acquisition process with negative "what if" fantasies.

Those elements require that we deal with suppliers as people rather than dealing organization to organization. I recognize that much of this is atypical of Army practice. Many will say, "We can't do that because of DAR and FAR requirements." If that is the problem, then begin with changing the DAR and FAR.

I used the methods described for two decades in the private sector and attest to their effectiveness. Doing business as industry does business is effective. Let's try that.

Gary Hagan
Professor of Systems Acquisition Management
Defense Systems Management College
Fort Belvoir, VA

The contracting process exists to facilitate the acquisition of products and services within the Army. If you're an acquisition professional, your experience will probably have run directly counter to the sentiments expressed in the above statement. What's the problem? In a nutshell, the contracting process has become so bureaucratic, complex, sclerotic, and intimidating to the average program management type that the first reaction of someone assigned a task to get something under contract is to frantically begin a command wide search for any existing contract whose scope could even remotely be perceived as applying to the task at hand. Laziness? Actually, after having worked with the procedures in three different Army commands, my assessment would simply be that the person is not masochistically inclined. That person knows that if the task cannot be appended to an existing contract, he/she is in for an excruciating menu of coordination meetings, reviews, re-reviews and concomitant revisions of his "contract package" all designed to achieve "perfect" documents. It shouldn't be that tough—and it DOESN'T have to be. WHAT TO DO? A fundamental change in culture is necessary and it has to come from the top. Industry typically gets tasks under contract in anywhere from ⅓ to ½ the time the Army takes because it's a priority with their top management—time REALLY is money for them. Consequently, the contracting task GETS DONE—PERIOD. Let's apply the same urgency (and concomitant authority to act) in the Army. Set broad standards such as major contracts (greater than say $75 million) can take no longer than four months to conclude—that's RFP preparation, advertisement, source selection, "the works." Smaller contracts would have similarly scaled time periods so, for example, a $2 million study contract could be awarded within two weeks of the need. I know—it's radical—so was flying in heavier than air machines when first proposed. One good, albeit small, idea has been the thought of empowering PEOs as Heads of Contracting Authority (HCA)—it's being tried in the Air Force. Let's get really radical—unless specifically precluded by law—grant the PEOs the authority to do what they have to do contracting-wise to acquire the products and services they're responsible for. It's time we got our priorities straightened out—the contracting process is a means to an end—not an end in itself. You wouldn't know that looking at today's contracting approach in the Army.

CONFERENCES

Battery Technology Seminar Announced

The 10th International Seminar on Primary and Secondary Battery Technology and Application will be held March 1-4, 1993 at the Ocean Resort and Conference Center in Deerfield Beach, FL. The event will be sponsored by Dr. S.P. Wolsky, Ansum Enterprises Inc. and Dr. N. Marinic, Battery Engineering Inc. All important aspects of battery research, development, manufacturing and application will be covered, with particular emphasis on new technologies and recent developments in the lithium and rechargeable battery fields. The seminar will provide a comprehensive view of the total primary and secondary battery activity covering both those well established and others still in the R&D or developmental stage. For more information, contact Dr. S.P. Wolsky, Ansum Enterprises Inc., 1900 Cocoanut Road, Boca Raton, FL 33432, (407)391-3544, Fax (407)750-1367.

Forster Becomes ASA (RDA) Military Deputy

LTG William H. Forster, former commanding general, U.S. Army Operational Test and Evaluation Command, has been selected as military deputy to the assistant secretary of the Army (research, development and acquisition), and director of acquisition career management, replacing LTG August M. Cianciolo, who has retired.

Backed by more than 27 years of active commissioned service, Forster holds a B.S. degree in chemistry from the University of Alabama and a Ph.D. in nuclear chemistry from the University of California. His military education includes completion of the Air Defense Artillery Officer Basic and Advanced Courses, the Armed Forces Staff College, the Navy Test Pilot School and the Air War College.

Prior to his Operational Test and Evaluation Command assignment, he served as the director of requirements (combat) in the Office of the Deputy Chief of Staff for Operations and Plans. Earlier, he had served as chief of aviation systems, Weapons Systems Directorate, Office of the Deputy Chief of Staff for Research, Development and Acquisition. More importantly, in the acquisition arena, Forster served as the project manager, Army Helicopter Improvement Program (AHIP); program manager for the Advanced Attack Helicopter (APACHE) Program; and later as the program executive officer for combat aviation in St. Louis, MO. As PM-AHIP, the then COL Forster, took the OH-58D Program from design review to initial production. As PM-APACHE, Forster guided the AH-64 Attack Helicopter Program successfully through IOC and the fielding of seven complete Attack Helicopter Battalions. As a PEO, Forster effectively utilized the combined assets of his entire organization to initiate, support, and complete the Army's development, testing, fielding, and new equipment training of the Armed OH-58D (now Kiowa Warrior) in less than 100 days (shortly thereafter, in early 1988, an Armed OH-58D of Task Force 118 completed its first successful combat mission in support of Navy operations in SWA). Forster's varied career assignments also include commanding the 10th Combat Aviation Battalion, and serving two tours in the Republic of Vietnam, commanding both aviation and air defense artillery units.

Forster's awards and decorations include the Distinguished Service Medal, the Legion of Merit with Oak Leaf Cluster, the Distinguished Flying Cross, the Bronze Star Medal with Oak Leaf Cluster, the Meritorious Service Medal with Oak Leaf Cluster, 16 Air Medals, and the Army Commendation Medal. He also wears the Senior Aviator Badge, and received the Secretary of Defense Superior Management Award as project manager for the Army Helicopter Improvement Program.

General Officer Assignment Changes

The following are some recent general officer assignment changes:

• LTG Arthur E. Williams has been named chief of engineers and commanding general, U.S. Army Corps of Engineers, Washington, DC. He had previously served as the director of civil works, Office of the Chief of Engineers, U.S. Army, Washington, DC.

• LTG Peter A. Kind was recently assigned as director of information systems for command, control, communications and computers (DISC4), Office of the Secretary of the Army, Washington, DC. He previously served as the commanding general, U.S. Army Information Systems Command, Fort Huachuca, AZ.

• LTG Donald M. Lionetti has been named commanding general, U.S. Army Space and Strategic Defense Command, Arlington, VA. Prior to this appointment he served as deputy commanding general and chief of staff, U.S. Army Training and Doctrine Command, Fort Monroe, VA.

• LTG Leo J. Pigaty has been assigned as deputy commanding general, U.S. Army Materiel Command (AMC), Alexandria, VA. He previously served since March as special assistant to the commanding general, AMC.

• MG Fred A. Gorden has assumed duties as assistant deputy chief of staff for personnel, Department of the Army. He served previously as commanding general of the 25th Infantry Division, Hawaii.

Chen Takes Over as GPALS PEO

MG William S. Chen, former commanding general, U.S. Army Missile Command, Redstone Arsenal, AL, has assumed new duties as program executive officer (PEO), Global Protection Against Limited Strikes (GPALS).

Backed by more than 30 years of active military service, Chen served earlier tours in the Office of the Assistant Secretary of the Army (RDA), first as director of program oversight and later as assistant deputy for systems management.

Chen holds a B.S.E. degree in engineering mathematics and an M.S.E. degree in aeronautical and astronautical engineering, both from the University of Michigan, and an M.B.A. in business administration from Auburn University. He is also a graduate of the Air Defense Artillery School Basic Course, the Ordnance Officer Advanced Course, Air Command and Staff College, Defense Systems Management College, and the Industrial College of the Armed Forces.

Chen is the recipient of many decorations and badges, including the Distinguished Service Medal, Legion of Merit, Bronze Star Medal, and Meritorious Service Medal with Five Oak Leaf Clusters.

New Project Managers Receive Charters

Earlier this year, BG John M. Watkins Jr., commanding general of the Information Systems Management Activity (AIS/ISMA), presented COL James T. Doyle the charter as project manager for Defense Communications and Army Transmission Systems (PM DCTS), and COL Dennis M. Moen the charter as project manager for Defense communications and Army Switched Systems (PM DCASS). "Focus on satisfying customers and they'll keep coming back" said Watkins as he presented the charters to the two new PMs.

Noting that the change of charter signified an orderly transition of authority and responsibility, Watkins said, "The program (Army Information Systems) couldn't be in better shape."

Also, Watkins lauded the outgoing PM DCATS, COL Donald Brown, and the outgoing PM DCASS, COL John Hartman, for leaving their respective PM shops in such great shape, citing work they did for the commanders-in-chief of the U.S. Southern Command and the U.S. Central Command in Operations Just Cause and Desert Storm, as well as projects to provide an information transport and simulation system at White Sands Missile Range and a modern E-Mail system at the Pentagon.

U.S. Postal Service

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Harvey L Bleicher
HARVEY L. BLEICHER, Editor-in-Chief, Army RD&A Bulletin

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AWARDS

Award Recipients Named

Listed by agency, the following Army Acquisition Corps personnel are recent recipients of key awards. **Strategic Defense Command:** MAJ Mark M. Vaughn, Meritorious Service Medal (MSM); LTC Stephen G. Kee, MSM. **Army Acquisition Executive Support Agency:** LTC Lawrence G. Arrol, Program Executive Office—Intelligence and Electronic Warfare (PEO-IEW), Legion of Merit (LOM); COL Peter P. Belch, PEO-IEW, LOM; CW4 Walter T. Hammack, PEO-IEW, LOM; LTC Paul V. Wolfgramm, PEO-IEW, LOM; COL Samuel L. Deloach, PEO—Aviation (PEO-AV), LOM; LTC Chester L. Rees Jr., PEO-AV, LOM; LTC Steven B. Toone, PEO-AV, LOM; LTC William R. Hertel, PEO—Armaments (PEO-AR), LOM; COL John M. Harnisch, PEO—Tactical Missiles (PEO-TM), LOM; LTC Walter L. Johnson, PEO—Armored Systems Modernization, (PEO-ASM), LOM; LTC Nelson P. Johnson, PEO-IEW, LOM; LTC Bruce M. Korda, PEO-ASM, LOM; LTC Duane E. Webb, PEO-IEW, MSM; COL Larry D. Holcomb, PEO-AV, LOM; MAJ Brian A. Wright, PEO-AR, MSM; MAJ Charles M. Barnett, PEO-TM, MSM; LTC Philip O. White, PEO-TM, MSM; MAJ Robert D. Buckstad, PEO-TM, MSM; MAJ Samuel A. Holloway, PEO-ASM, MSM; MAJ Russell J. Hrdy, PEO-ASM, MSM; MAJ Thomas J. Moriarty, PEO-ASM, MSM; MAJ Robert A. Otlowski, PEO-ASM, MSM; MAJ James P. Sanders, MSM; MAJ James W. Wimberly, PEO-ASM, MSM; and LTC Thomas D. Hardy, Project Management Office, Unmanned Aerial Vehicles, MSM.

LETTERS

Dear Sir:

Upon reading your May–June 1992 issue, I was pleased to find many of my friends' names in the 'Major Promotion Results' section of Career Development Update.

Unfortunately, a name seems to have been left out. Mine. As a proud member of the AAC and recent 'selectee' for major, I submit my name for inclusion to your list. I sure would hate to get written off so early in a fledgling acquisition career.

By the way, keep up the good work. *Army RD&A Bulletin* is a class act and readable cover to cover.

Sincerely,
Paul B. Dinardo

FA	BR	YG
51	IN	81

Army RD&A Bulletin Responds:

Our apologies for the oversight and a belated congratulations!

BOOK REVIEWS

Government Printing Office Releases Publications

The following books are available from the U.S. Government Printing Office:

Ecuador—A Country Study
Edition: Revised 1991
Stock Number: 008-020-01270-0
Synopsis: The country studies deal with a particular foreign country, describing and analyzing its political, economic, social, and national security systems and institutions, and examining the interrelationships of those systems and the way they are shaped by cultural factors.

Alert Operations and the Strategic Air Command 1957–1991
Edition: 1991
Stock Number: 008-070-00668-5
Synopsis: During its first 10 years, the Strategic Air Command conducted operations from sanctuaries, most of them located within the United States. The Soviet Union's acquisition of thermonuclear weapons combined with a systematic build up of its long-range bomber force and development of intercontinental ballistic missiles in the mid-1950s profoundly altered this situation.

Foreign Relations of the United States, 1955-1957, Volume 12, Near East Region; Iran; Iraq
Edition: 1991
Stock Number: 044-000-02302-4
Synopsis: This volume, originally compiled between 1977 and 1980, presents documentation illuminating the most important U.S. government decisions and policies toward the Near East as a region and toward Iran and Iraq. The regional compilation focuses on major U.S. diplomatic, politico-military, and economic policies, particularly relating to possible U.S. involvement in the Baghdad Pact organization and the formulation and execution of the Eisenhower Doctrine.

Budget of the United States Government - Fiscal Year 1993
Edition: 1992
Stock Number: 041-001-00366-5 ISBN 0-16-036041-2
Synopsis: A year ago, the budget was published in a context of major uncertainty. Iraq's invasion of Kuwait had destablized the Middle East. That caused obvious problems for the American economy, which was already experiencing sluggish growth. The allied military counter-offensive had begun. But the outcome was not yet clear. Understandably, the mood was somber. In the intervening year, the international situation improved dramatically. Kuwait was liberated. A proud and grateful nation welcomed its returning troops with near-euphoric celebration.

Individuals who would like more information on any of these books can contact Mr. Thompson, U.S. Government Printing Office, Dept. SSMC, Washington, D.C. 20401; Telephone (202)512-2413.

FROM THE ARMY ACQUISITION EXECUTIVE

The changing world situation, our reduced defense budgets, and the associated changes in our approach to modernization create a new environment for defense acquisition. In my last article, I outlined the importance of a proactive government role in managing the downsizing of the defense industry.

With this issue, I would like to turn to three methods—all within our legal authority—that we can and should use to protect core industrial capabilities.

1. Stretch Out Production

In some cases, our procurement plans may have been changed in a way that creates breaks in production. Without specific action on our part, the industrial base for a particular piece of equipment could be forced to shutdown and restart—a costly and potentially inefficient process. In some instances, especially when we are sure that we will need to resume production later, it may be in the government's interest to stretch out ongoing production to bridge the gap. For obvious reasons, these stretch outs are also in the interest of the companies involved. Given the mutual interest in filling production gaps, it seems reasonable that the inevitable increases in unit costs that accompany a production stretch out should be shared by the government and contractors. In return for the clear industrial benefits of stretched production, the companies should be willing to accept lesser profit margins and the government should recognize the economic benefits of avoiding shutdown and startup costs.

The Army has used this technique in the procurement of the Bradley Fighting Vehicle. When the five year requirement for Bradleys was reduced from 3,000 to 1,200 several years ago, we were forced to terminate a five year multiyear procurement of 600 Bradley vehicles per year. Rather than deliver the 1,200 required vehicles over two years, we stretched that production over three and a half years, thereby filling much of the production gap that would have existed between the end of the scheduled production and the beginning of production of several Bradley variants several years later. The government and industry negotiated a price for the vehicles that recognized the mutual benefit to both parties.

2. Support Foreign Military Sales (FMS)

FMS is a particularly important element of the domestic defense industrial base, because FMS business has become large in comparison to production of military hardware for our own use. In Fiscal Year 1992, for example, the Army will buy only about $7 billion worth of hardware for its own use, while our industry will produce more than $14 billion of Army systems for FMS and direct foreign sales.

Aside from the dollar significance of FMS, these foreign sales are significant for a number of other reasons. They can be used to bridge production gaps that might be created with uneven domestic production. By increasing the volume of production, FMS improves the efficiency of overall production, thereby decreasing the unit costs of those equipments produced for domestic use. Having our equipment in the hands of our allies has military and foreign policy benefits as well. Coalition forces will be more effective in future contingency operations if they can achieve interoperability and commonality of components and spares by using the same equipment. Finally, having our equipment in allied countries increases our presence in those countries and enhances our influence.

Many countries recognize the importance of FMS and actively support the export of defense equipment. The United Kingdom government has established an office in their embassy here that works exclusively to market to the United States government defense products produced by British companies. A number of countries have nationalized major portions of their defense industries and actively support exports of their products. Still others, including Brazil and China, produce defense products primarily for export.

We recognize the need for restraint in the export of defense technology, and no one would seriously argue for unconstrained FMS. However, with our own defense consumption decreasing and with competition for shrinking global defense markets increasing, we (and our domestic defense industry) may find ourselves at a significant competitive disadvantage if we do not use the latitude permitted under existing law and policy.

First, we can and should agree that FMS to friendly allies should be pursued as a matter of military, foreign, and industrial policy. Obviously, such a policy would be implemented only within the framework of safeguards and review processes to insure that all sales would truly be in the national interest. Having established such a policy, there is much we can do to facilitate this process. We can use the Special Defense Acquisition Fund (SDAF) to help promote FMS, we can make people and equipment available to allied countries to demonstrate our equipment, and we can sell assets out of U.S. inventory that would be replaced with new production items. We are pursuing these and other initiatives now; and we are working on a more explicit statement of policy to sharpen our efforts.

Congress has been ambivalent on FMS. On the one hand, Congress supports industrial base initiatives. On the other hand, for a number of reasons, Congress has resisted a number of efforts to sell military equipment to friendly allies. We need to work with Congress to resolve the inconsistencies in their approach to FMS and to emphasize the connection between FMS and the industrial base.

3. Support Industry Consolidation Efforts

The U.S. defense industry has already taken a number of steps to align itself with the new defense acquisition environment by pursuing mergers, acquisitions, and other consolidation efforts. We need to do everything we can to facilitate these efforts when they make sense. We are prepared to help such companies obtain government approval of their consolidation efforts when it's in the best interest of the government to do so.

Existing law places significant constraints on the ability of companies to consolidate. The Sherman Act makes it unlawful to create monopolies under certain conditions. The Clayton Act prohibits mergers and acquisitions whose effects may be anticompetitive. The Federal Trade Commission (FTC) Act similarly promotes competition. Finally, the Hart-Scott-Rodino (HSR) Act establishes notification and review procedures for mergers and acquisitions, and establishes severe penalties for failure to comply with those procedures. Both the FTC and Department of Justice play a role in these reviews.

The Department of Defense (DOD) does not have any single office assigned responsibility for reviewing proposed mergers and acquisitions, for formulating a DOD position on proposed actions, or for helping defense companies work through the review process in other agencies. We have, on an ad hoc basis, made calls to other agencies in support of these consolidations. For example, the Army contacted the Chairman of the FTC to support the consolidations of two ammunition manufacturers, Alliant Techsystems and Olin.

We need to continue to support these consolidations where they make sense, and we should consider formalizing our role in the process by assigning specific responsibility both with the Office of the Secretary of Defense (OSD) and each of the Services.

We must work with industry to manage programs and limited resources as wisely as possible. There are other methods to protect core industrial capabilities that I will cover in my next article.

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