R,D&A ARMY

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ABOUT THE COVER:

The role of the U.S. Army's out-of-country Research and Development Standardization Offices in achieving Rationalization, Standardization and Interoperability (RSI) between the armies of the United States and its NATO allies is featured in this issue of the magazine, with heraldry and flags of participating countries depicted on the front and back covers.

FEATURES

DEPARTMENTS

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Purpose: To improve informal communication among all segments of the Army scientific community and other government R,D&A agencies; to further understanding of Army R,D&A progress, problem areas and program planning, to stimulate more closely integrated and coordinated effort among Army R,D&A activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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FOREWORD

The trend of world events over the past five years, culminating with the calloused, blatant Soviet invasion of Afghanistan, has given a new sense of urgency to U.S. military preparedness.

Even prior to Afghanistan, there had been over the past thirty years a deliberate and formal effort by U.S. leaders to enhance our own as well as NATO's preparedness through greater international cooperation. The umbrella under which the various mechanisms of this enhanced cooperation are now placed has been termed "RSI"—for rationalization, standardization, and interoperability.

What this means in the ultimate and simplest terms, is that NATO forces should be a closely knit organization with as much commonality of doctrine and hardware as possible, and in the absence of commonality of total systems, to have maximum interoperability and interchangeability of systems, of major parts or portions of their weapons, supplies, and equipment. The same philosophy extends, to a lesser degree, to other non-NATO U.S. allies.

It would be ideal, theoretically, if all U.S. allies' armies used the same radios, the same rifles and machineguns, tanks, etc. Barring this, at least there should be the ability for each nation's forces to have standardized understanding of terminology, of doctrine, and the ability to replenish stocks of consumable items and spare parts from each other's supply stocks.

There have been some significant advances over the past five years in furtherance of these goals. The Army has adopted the Roland air defense system—a European developed system and one being adopted by other NATO armies. This represents a step in standardization at the system level. Significant progress has been made in artillery ammunition standardization so as to allow one nation's artillery tubes to fire another's ammunition—a significant step in "interoperability." There are currently under consideration or implementation a number of other programs in these areas.

There has been in existence since 1948, a formal U.S. Army policy agreement that has sought enhanced standardization of doctrine and materiel between the U.S. Army and those of Britain, Canada, and Australia. The degree of progress here has been less than dramatic. Now, with the emphasis on RSI being directed from Presidential level, the Army's out-of-country R&D and Standardization offices have taken on a fresh importance, and the U.S. offices in these countries have been redesignated Research, Development, and Standardization Offices, and additionally the former branch office in Bonn of the London office has been upgraded and given separate status.

It is to provide a clear understanding of the role and activities of these offices, how members of the RDA community can help them, and in turn be helped, that this issue of the *Army RDA Magazine* is devoted.

U.S. Army Overseas Activities In Support of Research, Development & Standardization

By Bryant Dunetz

Within the lifetime of some still living Americans, the U.S. has been involved in four major wars or shooting involvements: World Wars I and II, Korea, and Vietnam. There are two common threads in all of these—there was some form of military coalition; and second, the U.S. had done little, if anything, to prepare in advance for such coalition warfare.

In the past, conditions were such that the weaknesses of unplanned coalition warfare were not critical. But today's conditions are vastly different, and the U.S. has begun to act accordingly, to plan for and to utilize the combined resources of the U.S. and its allies, particularly those to NATO, to the maximum advantage.

The team of galloping, rampant inflation and the rocketing cost of complex modern weapons has been a major factor in forcing the U.S., as well as its NATO and other allies, to realize none can go-it-alone equipment-wise, so to speak.

There are added factors too, that have given impetus to real concrete attempts by the U.S. to attain greater and closer international military cooperation. Certainly one is the realization that in the face of a potential aggressor as powerful and massive as the Soviets, the need for utmost preplanned interoperability in the broadest sense, of NATO's military forces, will be vital—even critical.

In the final phases of World War I, the U.S. Army operated as an independent American Army under a loose allied high command structure headed by French Marshall Foch. Strategic planning was worked out cooperatively at this level. But cooperation at the lower echelons—the tactical levels, left much to chance and for need in improvement.

Much of the training of American officers and NCOs was done by the French and the British, which resulted in the infusion of some of their doctrine into American small unit tactics. But Pershing, the American commander, constantly fought to balance this infusion by retaining the aggressive U.S. individuality.

For example, in the attack American infantrymen used their Springfield '03s and British Enfields relentlessly, by doctrinal design, whereas the French and British tended to regard their rifles primarily as carrying devices for their bayonets, as a close-in weapon. There are numerous written citings which comment that French and British infantry were not even trained to operate the bolt or use the sights on their rifles.

Battlefield tactical communication and thus cooperation between adjacent American and allied units was extremely weak. The principal method relied upon was by liaison officers at the regimental and higher level. American after-action accounts are sprinkled with instances where frustrated U.S. commanders were unable to communicate with non-U.S. units on their flanks, to exploit opportunities or protect open vulnerable flanks. The success or failure of the allies in World War I did not teeter on the fulcrum of maximum interoperability, but there are documentable cases where battlefield successes might have been attained more rapidly with this capability.

With the ending of the War to End All Wars, and the ensuing years of isolationism and anti-militarism, the U.S. took no interest—indeed deliberately divorced itself, from any idea of pre-planned military cooperation with another nation.

When World War II came, and U.S. forces found themselves engaged in ground combat, with non-U.S. units on its flanks, the situation was but little different from 1918. Tactical doctrine was certainly not as close at any level as it had been in 1918. Commonality of equipment and interoperability were incidental accidents derived from the need by the British and French to buy some U.S. items of equipment—principally tanks and aircraft. There were certainly many instances where great battlefield advantages might have been attained had there been greater commonality and interoperability between U.S. and non-U.S. units.

The lesson was there to be learned, more obvious than before. And, as it appeared in the post-war years that there would be a continuing need for large armed forces to offset and deter the greedy nervous paw of Soviet Communism, the beginnings of what we now refer to as RSI were taking form in the minds of a few men.

Immediate post World War II U.S. Army involvement in any way with friendly nations, in terms of planning for or cooperating in research, development, acquisition, and standardization to the collective mutual benefit was derived virtually by accident, not by design. Even among the Western European nations themselves there was no absence of such activity.

The U.S. Army's initial involvement in such formal international cooperative activities, entailing planning for the future rather than meeting an immediate war-created need, began with the establishment of the American-British-Canadian standardization agreement of 1947. Implementation of this agreement required the establishment by the U.S. Army, of resident offices in those two foreign countries—the first such peacetime offices of that type in U.S. military history. Since that time coverage has been extended to Germany and Australia.

The next major step in the augmentation and growth of U.S. Army out-of-country imvolvement in military preparedness planning, came with the establishment of NATO in 1949. The ensuing expansion of U.S. Army full time participation in the various committees and groups of that body—the CNAD/NAAG, the MAS, the AGARD, etc., has resulted in the stationing of both military and civilian Army personnel in direct support of cooperative research, development, acquisition, and standardization in NATO headquarters.

Simultaneous with these significant steps came the Korean War. This provided one positive factor toward the enhancement of the U.S. attitude toward greater RSI efforts. The U.S., not desiring to fight a unilateral war under the banner of the United Nations, had to accept small size non-U.S. units into the military mix, if indeed it was to be a U.S. action rather than purely U.S. This in turn forces these non-U.S. units to be integrated into the U.S. tactical battlefield structure, usually on the division level.

Operating in such close harmony, speaking in the same terminology, over radios that netted, and being able to draw, in most cases, from the same supply bases, proved the advantages of such a concept. And yet the dignity, the national pride and integrity of units of either party were in no way jeopardized.

GEN John R. Guthrie, DARCOM commander, cites two cases in Korea.

One incident involved the 27th Commonwealth Brigade, operating under the command of the U.S. IX Corps. Canadian, British, and Australian infantry battalions were involved in a blocking action in the Kapyong Valley on 23 April 1951. A U.S. tank battalion and New Zealand field arillery supported them. The outstanding success of the action resulted in the award of several Presidential Unit Citations.

A second example of such magnificant inter-allied cooperation involved the British 29th Independent Brigade, under U.S. 3d Infantry Division control, close to the Imjin River on that date. The cooperative action between this brigade, its U.S. division headquarters, and its U.S. artillery and air fire support resulted in additional Presidential citations attesting to the workability and advantages of interoperability and standardization.

Since Korea and Japan for the most part continue to use standard U.S. equipment, similar offices to those established in other parts of the world have not been necessary. Data exchange and cooperative research and development are coordinated through the Military Assistance Group and the Offices of Defense Cooperation. In Korea coalition forces are a way of life and interoperability has never been questioned.

It must be noted, however, that growing independence and economic pressures to compete with the large military industrial cartels of the world will naturally lead to new equipment being developed that is not necessarily standardized with that of the U.S., and as a result, over the long term could begin to erode the high degree of standardization and interoperability we enjoy today.

One of the earliest attempts to achieve advanced commonality in planning for a new weapon between the U.S. and any allied or friendly power resulted from our NATO membership and this was the attempt to standardize a rifle and cartridge. This planning began in the early 1950s and gave an early insight into the problems attendant to such attempts. While no common rifle emerged, a major accomplishment ensued in the adoption of a standard cartridge—the 7.62mm NATO round.

Concurrently, there was a growing amount of contact and information exchange, in a variety of areas, between the U.S. and the British and Canadians—under the auspices of the formal ABC agreement later expanded in 1962 to ABCA to incorporate Australia. These efforts accompanied and were complementary to those being undertaken as part of the growing military maturity of NATO.

By 1959 one finds the SHAPE Land/Air Warfare Technical Center had been established, that the Sixth Tripartite Operations Research Conference had been held in Ottawa, and that the U.S. Army member of the Army Board of NATO's MAS was on the working group determining military characteristics of infantry weapons for the 1965-75 time frame.

It was noted in the annual historical report for FY 1959 of the Office, Chief of Research and Development (OCRD), DA, that there had been an increase in the flow of R&D information under the ABC program, and that there was a very close working relationship with Canada.

But, said that report, "One of the major problems in the standardization program, however, continues to be the 'not invented here' attitude. There is still a reluctance on the part of many of the research and development personnel of all three countries to accept the results of the others' work. Continued emphasis on the need to conserve the common resources and effort of the three countries must be made to eliminate this reluctance."

There had come into being in 1954 a Mutual Weapons Development Program (MWDP) but this same report noted that "there's no simple means of effecting multinational agreements between the United States and two or more NATO countries. This so far has limited the program to bilateral agreements. . . ."

This burgeoning expansion by the U.S. Army, for the first time, brought about the realization then, that full time resident staffs or liaison offices would be required. This had led to the creation in 1948, of the U.S. Army Standardization Group—U.K. It had a 3-fold mission of monitoring in the U.K. the ABC Army Standardization Program, monitoring in Europe the MWDP projects assigned to the Army, and to provide representation in the Army Board of MAS, NATO.

The 1960 OCRD report counted seven major international programs that were structured about either the ABC agreement or in support of NATO, and in the following year it was noted that there was considerable growth in interest in international R&D due in part to the awakening of U.S. Army awareness of things to be gained as well as by "prodding from the new (Kennedy) administration."

The biggest prod given this course of action since the idea's inception probably must be credited to then Secretary of Defense McNamara, and from 1961 onward there was obvious increased activity. Much of this activity, however, was in the field of data exchange and early attempts to attain common weapon characteristics. But there was little progress in terms of actual cooperative R&D, development sharing, etc. The Army exception was the U.S.—German Main Battle Tank-70 attempt.

In recent times the significant revitalization of the NATO Alliance derives from President Carter's commitment and implementation of the NATO Long Term Defense Program.

History then, provides us the "Lessons Learned"—a profile of the world today in terms of political unrest, potential conflict, competing internal and external demands for resources, thus providing a perception of the threat to our well being and prosperity. Our actions towards that threat in terms of improved preparedness, the need for standardized and interoperable equipment, the need for collaborative research and development, and the need to be mindful of what other great allied and friendly nations can offer us, will provide the history to be recorded in the future. The procedures and organization exist to improve our military capability through cooperation. Let us get on then with developing the necessary relationships and programs that will provide the effective coalition needed to respond to any future emergency.

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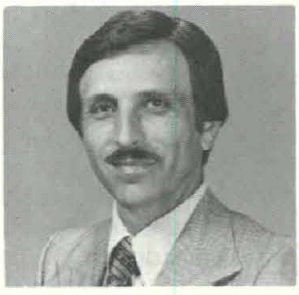
Commercial Phone: 062-65-3943 (14-16 hours difference with Washington, DC)



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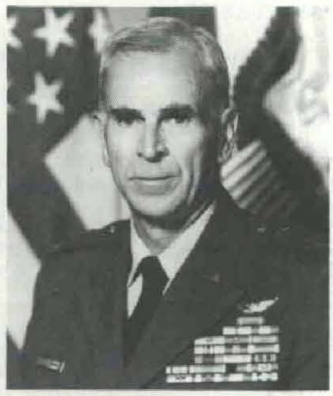
RESPONSES by GEN John W. Vessey Jr., Vice Chief of Staff, U.S. Army

"Interoperability is our goal in the near term, with standardization a longer term ideal."



Q. GEN Vessey, this issue of *Army Research, Development, and Acquisition Magazine* will feature the role of the Army's out-of-country R & D standardization offices. As the magazine staff understands your role, you are *the* Army focal point for NATO matters, as well as the Army official responsible for the ABCA matters. How do you see your role in these tasks?

A. Well, you are partially correct in stating that I am the Army focal point for NATO matters. That is a shared responsibility, wherein the VCSA has been designated as the Army Staff focal point for NATO matters, and the Under Secretary of the Army has been designated as the Army Secretariat focal point for NATO matters. Dr. Spiro and I share a great deal of concern about the ability of the U.S. Army to operate effectively in conjunction with our allies, both in NATO, ABCA, and other areas of the world.

My role as focal point for NATO, ABCA, and other international matters has both policy and operational aspects. I am responsible for the establishment of policy concerning NATO, ABCA, and other international matters. In support of RSI, we have established an Army Regulation—AR 34-2—to promulgate central policy and guide the work of the whole Army in this area. To assist me in this task, we have established the DA International Rationalization Office (DAIRO) which has the responsibility for monitoring our international programs efforts and recommending either new policies or changes in existing policies. From the operational side, I need to ensure that other senior Army leaders understand the importance which the Secretary, Under Secretary, Chief of Staff, and I attach to the attainment of an effective defense capability with our allies. The multitude of actions the Army Staff handles must support that commitment.

One thing I would like to stress here at the outset is that we do not view standardization and interoperability as simply NATO problems. They are concepts which are applicable in some manner to all friendly and allied countries. It is essential that we not be trapped into focusing only on a single region, to the detriment of our capability to respond to a wide range of global contingencies. Our historical role has only rarely relied on unilateral action, and our preferences have been and remain assisting our friends and allies in achieving their goals, to include defense of their freedoms and territory. We must make all our alliances operate more efficiently and effectively over a wide range of options and threats if we are to maintain an effective deterrent and, if necessary, defense capability.

Q. While standardization and interoperability have been recent thrusts in the NATO regime, did your experiences in Korea give you any insight into problems one might encounter in coalition operations in regard to these two areas?

A. First of all, let me say that standardization is not a recent thrust within NATO. The necessity for standardization has been recognized since early in the history of NATO. Through the early years of the alliance, the Truman Doctrine and the devastation of the European industrial base provided for de facto standardization through the massive influx of U.S. arms and equipment. With the recovery of several of the European countries by the mid-1950s, U.S. policy changed. Rather than relying solely on grant aid or direct sales, the U.S. announced a policy under which the U.S. would provide designs and technical assistance to permit the production in Europe of newer, sophisticated weapons of American design—much as coproduction does today. As well, in 1957 NATO began an unfortunately short-lived attempt to define NATO Basic Military Requirements, standards to which all countries would design and build. We are attempting to achieve similar ends through our current efforts to establish the NATO Armaments Planning Review/Periodic Armaments Planning System (NAPR/PAPS). The key to success in this regard is engaging participation by NATO allies early in cooperative development programs.

From the non-NATO perspective, my experiences as commander of the ROK/U.S. Combined Forces Command in Korea had me deeply involved in the challenges of coalition warfare. Here, too, we had to deal with a myriad of problems which ranged all the way from rationalization of doctrine and tactics, through the language problem, communications interoperability, common logistics support, cost sharing, and responsibilities to both National Command Authorities, all the way to mess arrangements in a combined headquarters for people whose gastronomic preferences ranged from kimchi to cottage cheese salad. Because the U.S. and the Republic of Korea are the only two nations principally involved in the defense of Korea, we were able to move more quickly than NATO in solving some of our coalition warfare problems. I believe our experience in some of these areas in Korea—many notably successful—have application to NATO.

Q. Do you see any particularly unique problems in its implementation in the non-NATO area? Areas such as our allies and friends in South America, the Middle East, and in Asia?

A. When we look at our efforts to achieve a wider

level of standardization and interoperability within NATO and ABCA, it is very convenient that we begin from a common foundation—the need to forge a viable common deterrent and a concept for collective defense against a highly visible threat, a threat that has been bringing increasing pressure to bear upon our European allies. This has had, over the past three years, a rather invigorating effect upon the alliance, providing impetus to sorely needed readiness and modernization programs such as the Long-Term Defense Program. In Korea, as well, we are faced with a clear operational imperative for standardization and interoperability.

When we consider our international programs experience and postulate its further expansion, it becomes clear the only consistent factor in international programs is that they are all unique. Even within NATO, where we start from an ideologically consistent base, there are different political, military, social, and economic factors to be taken into account as one moves from country to country. These same factors recur worldwide in different contexts and with varying degrees of severity. We need to remain fully cognizant of the fact that, like the U.S., the countries with whom we are dealing are sovereign nations. Most of them maintain individual armaments industries for national reasons, and have firmly developed national doctrines governing tactical and hardware development. They, like the United States, also have friends and allies to whom they have traditionally supplied arms and aid, relationships which they view as critical to their own national interests.

In the international programs endeavors of the U.S. Army, we need to recognize and respect the relationships which other countries maintain and view as vital to their own national security interests. We know, of course, that they—as we—may be driven to decisions which are not entirely military in nature, but political or economic. The U.S. Army's efforts in standardization and interoperability should mirror the commitment of the U.S. Government to assisting our allies in achieving their security goals, not directing them.

Q. The terms standardization and interoperability are used quite frequently today, but there seems to be some differences in interpretation as to whether one or the other should come first, or both attempted concurrently. Some say that standardization of doctrine is needed first, and this will automatically bring about materiel standardization. What are your views on this?

A. In discussing RSI, we need to remember that standardization and interoperability are complementary issues. The "triad" of arms cooperation initiatives—reciprocal procurement memorandums of understanding, coproduction, and "families of weapons"—attempt to provide the U.S. and our allies many of the benefits of unilateral development and production while giving greater efficiency and reducing unnecessary duplication of effort. Nonetheless, it is my opinion that, for successful long-term alliance RSI programs and initiatives, we must proceed from agreed base points—and those, as I've previously mentioned, are doctrine, tactics, procedures, and requirements. Our bilateral staff talks program is oriented toward forging these base points.

These beginnings, though, are long-term projects which, if properly managed throughout the development cycle, should result in significant increases in the levels of standardization and interoperability within NATO. Standardization and interoperability will not "automatically" appear, regardless of how well we define our initial requirements. Our experiences with the Multiple Launch Rocket System (MLRS) have shown that the PM must take an active, aggressive role in furthering standardization and interoperability within his system if it is to be successful. In my role as the chairman of the Army Systems Acquisition Review Council, I will be carefully reviewing the steps that have been taken to ensure that we are achieving necessary levels of interoperability, as a minimum.

At the same time, we have shortfalls in fielded system interoperability, areas which we should attempt to fully rectify through product improvements and other technical solutions. USAREUR and Eighth Army, Korea, both have ongoing programs to attempt to achieve greater operational interoperability with that equipment which is currently fielded; the Army's research, development, and acquisition community must fully support that effort. Interoperability is our goal in the near term, with standardization a longer term ideal.

From my perspective as Vice Chief, the gut issues are those which permit greatly improved operational flexibility, which allow the commander the freedom to employ all the forces at his disposal quickly and effectively. These vital issues are not the glamorous issues of whole-system standardization, but the simpler issues that fall within systems: The ability to interchange essential expendables—food, fuel, ammunition, high-volume spares, the ability to interconnect communications systems, and the ability to exchange understandable data in the intelligence, operations, and logistic fields. End item standardization is of unquestionable benefit, but we cannot afford to overlook those fundamental items which make impressive contributions to combined force effectiveness.

There is no easy answer to the "standardization versus interoperability" question. Simply stated, the potential commonality of each system must be objectively analyzed, and the minimum essential requirements for standardization or interoperability clearly stated. We must strive for the maximum possible degree of commonality—if that is full standardization, so much the better. Nonetheless, striving for full standardization and ending

. . . the only consistent factor in international programs is that they are all unique."

. . . from the developmental standpoint, the creation of the RDJTF [Rapid Deployment Joint Task Force] should have little effect on our overall efforts."

up with standardization of field-replaceable components—as we have with Roland, or with the capability to interchange fuel and ammunition, still represents an important, worthwile step in the right direction.

Q. We are all aware of the serious problem of the rising costs of new systems, and its impact on the Army's ability to buy new systems—even the most urgently needed ones. Do you, in your capacity as chairman of the ASARC, see the possibility in the future of more emphasis being placed on alternate acquisition strategies such as international acquisition and/or cooperative development programs, even though such options have U.S. socio-economic impacts?

A. International cooperation is already receiving a great deal of attention in the systems acquisition process. The acquisition process must achieve the best balance between life cycle costs and system effectiveness, but must also maximize cooperation with our allies. The ASARC, in reviewing each major program at the designated milestones in the acquisition cycle, considers a wide range of factors. Standardization and interoperability are significant considerations and receive a thorough review in the ASARC's deliberations. Foreign systems that might satisfy the mission need are included in the cost and operational effectiveness analyses. The PM's efforts to encourage codevelopment and/or coproduction are reviewed in detail. International cooperation in Army programs already runs the gamut from purchase of foreign system (M240 machinegun), through reverse technology transfer (Roland), to codevelopment (MLRS). International cooperation will continue to be tailored to fit each program as appropriate.

As we move forward with our ongoing modernization and R & D efforts, we need to be prepared to offer the improvements which we develop to our allies, and we must be candid and open with ourselves in recognizing the items which they have developed which can make a positive contribution to our own capabilities. One of the problems in international cooperation is meeting the necessary social, political, and economic requirements of participating countries, including our own. From the U.S. Army's point of view, we need to ensure that we maintain an adequate mobilization base for wartime production requirements, while at the same time helping our allies achieve sufficient modernization and force improvements. The United States has long functioned as the "arsenal of democracy," an important role which we continue to play, if in somewhat modified fashion.

Many of the problems which we find in international cooperative ventures, both with our NATO and other worldwide allies, can be very simply summed up: money, jobs, and national pride. We need to continue to seek ways of increasing international cooperation—alternative acquisition strategies, if you wish—which will still allow participating countries to meet their social and economic responsibilities. The problems which we sometimes encounter in obtaining Congressional support for international programs mirror the problems which our allies often encounter with their own executive and legislative branches.

Q. GEN Vessey, do you foresee the creation of the Rapid Deployment Force as having any impact on the RSI program?

A. One thing the creation of the Rapid Deployment Joint Task Force has done is enhance our awareness of the necessity for inter-Service as well as international interoperability. One of our bigger problems is sustaining the force once it arrives in a deployment area. Lift constraints make it important for the logistical "tall" to be simplified. This implies the need for a tri-Service force capable of using the same operational expendables to the maximum extent possible: ammunition, fuel, spares, and other consumables. To date, we have not done as well as we would like in this area.

Our efforts to assist friends and allies in those areas to which the RDJTF might be deployed directly complement our standardization and interoperability efforts. As these nations accept products which are in our inventory, our ability to work effectively with them is enhanced. Greater combined effectiveness is a side benefit of our efforts to ensure that they maintain an adequate defense capability.

Looking at RSI from the developmental standpoint, the creation of the RDJTF should have little effect on our overall efforts. We can pursue standardization and interoperability effectively only if we concentrate on a single major goal. Our goal has been defined by the single most demanding contingency which we face—the potential defense of Western Europe in conjunction with our NATO allies. In lesser contingencies, though, we also envision that it will be part of a collective effort with our allies—with the concurrent need for standardization and interoperability at the operational level. We would welcome the subscription of our other allies to those standards which we define for NATO, but our ability to compromise our NATO efforts to achieve greater levels of standardization or interoperability with them is limited.

Ballistic Liners Improve M113 Survivability Rate

A major advance in improving the survivability of the M113 family of armored personnel carriers in combat environments is emerging as a result of the U.S. Army Materials and Mechanics Research Center's (AMMRC) program to develop ballistic liners for ground vehicles. This achievement was recently reported by Dr. Joseph J. Prifti and Mr. Eugenio DeLuca of AMMRC's Process Development Division, Metals and Ceramics Laboratory.

The empirical investigation, employing classical R&D armor materials technology, has successfully addressed the Army's goals for increased personnel protection-survivability. This was achieved by maximizing the ability of combat systems to withstand attack from weapons with conventional antitank munitions (chemical and kinetic energy) to nuclear weapons and biological agents.

The M113 and other lightly armored aluminum hulled vehicles (ITV, M109 SPA, etc.) are capable of engaging conventional .30 caliber small arms fire. They can also defeat the great majority of fragments from HE shells. However, these vehicles have been shown to be highly vulnerable to higher order battlefield weapons. This was documented by destroyed/damaged vehicles during the Vietnam War and Israeli conflicts.

Armor penetrations cause much more than the direct effects of a shaped charge jet or kinetic energy projectile. Spall fragments, vaporific (pressure, heat, luminosity), and tertiary (toxic gases) effects also occur. This is especially true for HEAT penetrations of aluminum armor which result in more personnel incapacitation and lethality than penetrations of steel armor.

Because of the need to minimize these effects, two efforts were simultaneously initiated in 1975. They involved AMMRC's armor projects and a draft TRADOC LOA. The LOA evolved into current advanced development program for lining combat ground vehicles.

A comprehensive data package generated by AMMRC with participation of government and industry has confirmed the superior effectiveness of ballistic liner materials in suppressing spall fragments. The materials are also effective with behind-the-armor effects when impacted/penetrated by a typical battlefield multi-threat mix including HEAT rounds, AP projectiles, and fragmenting munitions.

Spall suppression materials ranged from ballistic Kevlar 29/49 to conventional glass reinforced plastic. More than 100 HEAT ballistic tests were conducted, employing 3.2-in BRL precision charges, 1.52-in M42 grenades, and 5-in TOW warheads.

The tests initially screened liner ballistic materials. Development of optimal liner candidates in contact and spaced configurations and evaluations of bare M113 aluminum armor were also an objective of the tests.

The most dramatic enhancement in personnel protection resulted in laminated Kevlar 29/49 within a phenolic/polyvinyl butyral resin system. This effectively stops all of the large number of high velocity-widely dispersed fragments from the aluminum armor.

It was also determined that an optimum combination of liner weight and air space was required to maximize performance. Kevlar, a Dupont trade name, an ultra high modulus-high tensile strength aramid fiber, emerged as the primary armor material to defeat fragment threats.

For the optimal liner system a complete mass, velocity, and spatial distribution characterization of residual spall fragments was performed versus the 3.2-in HEAT device representative of the Soviet RPG-2/7 rounds (infantry deployed and fired from the Soviet BMP-1 IFV mounted with a 72mm smooth bore gun) and versus the 1.52-in HEAT round representative of overhead threats.

In addition, full ballistic evaluations including resistance to penetration in terms of V_{50} limits, residual mass and velocity determinations versus small arms (.30 and .50 caliber projectiles), automatic cannon (23mm AP and 30mm GAU-8 heavy density ammunition), and munition fragments have provided additional data to substantiate the effectiveness of Kevlar liners in ballistically augmenting aluminum armor.

Preliminary experimental and computer code analyses have also demonstrated the beneficial neutron attenuation effects of Kevlar liners.

Currently, vulnerability calculations and survivability assessments are being generated via computerized models versus an array of modern battlefield scenarios.

FMC Corp. is under AMMRC contract to construct and install optimal Kevlar liners within M113 ballistic hulls. FMC will conduct sophisticated overpressure, temperature/fire, and toxicity tests to validate the effectiveness of liners in reducing vaporifics. FMC will also have liners in operational M113 vehicles and test them with a proper compliment of vehicle personnel.

U.S.-U.K. Study New Contaminant Detection Concepts

Two American researchers and a British physicist have joined forces at the Army Armament R&D Command's Chemical Systems Laboratory (CSL) to devise new concepts for monitoring and detecting chemical contaminants.

The joint British-American research trio is composed of Dr. Charles "Steve" Harden, a chemist at CSL; Dr. David A. Blyth, senior science officer at the United Kingdom's Chemical Defence Establishment at Porton, and Mr. John A. Parsons, a CSL engineering technician.

As early as 1974, the researchers said they recognized the value of joint investigations into contamination and monitoring concepts, and at the CSL the team has developed a mobile "Ionic Cluster Mass Spectrometer" for field use to identify atmospheric contaminants that have been picked up by detectors.

The system is a self-contained unit complete with its own power generator mounted in a one-ton van for on-site identification of pollutant responses.

Harden indicated the joint research efforts continue in the detection and identification system to provide a greater insight into response characteristics and to provide an improved basis for future developments of ionization detectors.

Blyth, who is credited with development of a British chemical agent detector, and Harden, a federal chemical researcher for more than 12 years, have both served as their respective country's representative to The Technical Cooperation Program, an international research exchange organization.

HQ DARCOM
Office of International Research, Development and Standardization

By COL Howard Glock

"There were, of course, still weaknesses. Two of the most serious lay, as always, in the overall numerical superiority of the forces deployed against the West, and in the low level of standardization in the equipment of its own forces . . ."
GEN Sir John Hackett
The Third World War: August 1985

The projection of history by GEN Sir John Hackett is ominous. Although hypothetical, this perception of the low level of standardization in the equipment of NATO forces as a weakness in 1985 does arouse genuine concern as to whether this prediction foreshadows reality.

The thought itself provides impetus to the early, effective achievement of our national goals for NATO rationalization, standardization, and interoperability (RSI). Our aim is, and must continue to be, to foster the highest practical level of standardization and interoperability of equipment and procedures within our alliance with NATO nations, or any other friendly nation.

The need for standardization and interoperability of military equipment within alliances has long been recognized and began in earnest with the birth of the NATO Alliance.

International standardization activities began at HQ DARCOM with the activation of the Army Materiel Command in August 1962, and these activities have evolved and grown over the intervening years. They have received additional impetus from the recent Presidential, Congressional, and DOD emphasis on achievement of RSI within the NATO alliance.

The predecessor to the current IRDS Office was initially a division in the AMC Mutual Security Office which became the International Logistics Directorate in 1967. This predecessor office was transferred to the Research, Development and Engineering Directorate in 1970, and the current separate office structure emerged on 1 July 1975 with the combining of the AMC organization with elements of the International Division of the Office of the Deputy Chief of Staff for Research, Development, and Acquisition (ODCSRDA), HQDA.

As part of this reorganization, the office received responsibility for staff supervision over the U.S. Army Standardization Groups in the United Kingdom, Canada, and Australia. On 18 March 1980, the term "standardization" was added to the title, thence known as DARCOM IRDS Office.

In addition to this background, it is important to also know who we are.

COL HOWARD G. GLOCK is chief of the Office of International Research, Development and Standardization, HQ DARCOM. He has previously served in the Office of the Deputy Chief of Staff for Research, Development and Acquisition, HQDA, and as the Army systems coordinator for the XM1 Tank. He is a 1956 graduate of the U.S. Military Academy and holds an MS degree from Georgia Tech.

Within HQ DARCOM, the IRDS Office is a materiel development activity, reporting through the Assistant Deputy for IRDS to the Deputy Commander for Materiel Development. However, materiel readiness and security assistance requirements are an everyday occurrence.

The professional staff includes military R&D coordinators and civilian engineers and international program specialists. The overseas U.S. Army Research, Development and Standardization (RDS) Groups are a vital adjunct to our operation. With offices in five countries and prospects for expansion to France, contact with the defense industrial powers of the Free World is facilitated. These offices not only serve DARCOM but all defense organizations requiring contact with the ministries on any R&D matters.

Our office provides administrative support and coordination with all CONUS activities as required. These offices have played a unique role as ambassadors of good will and experts in the field of research, development and acquisition.

The most striking facet of what we do in the IRDS Office derives from the diversity of effort. There are many different programs of varying complexity and scope involving both NATO and non-NATO allies as well as other friendly nations. As a matter of fact, mastering the acronyms to these programs is in itself a challenge!

Our programs are grouped as international standardization programs, cooperative R&D programs, professional personnel and data exchange, bilateral staff talks, and RSI.

International standardization programs focus on the standardization of principles, practices, procedures, processes, and operations related to R&D, production, support, maintenance, and operations of allied armies. Program elements include the NATO Military Agency for Standardization (MAS), American-British-Canadian-Australian Armies Standardization, Air Standardization Coordinating Committee, ABCA Naval Standardization, The Technical Cooperation Program, and NATO Advisory Group on Aerospace Research and Development.

As the DA proponent, the DARCOM IRDS Office manages the DOD/Army/DARCOM participation in various working groups, panels, committees, and working parties established under these programs.

We conduct coordination for development and approval of the DOD/Army position on ratification and implementation of international agreements, such as NATO STANAGS, ABCA QSTAGS, ASCC Air Standards, and ABCA Navy Standards. Other tasks include approving loans of Army materiel, maintaining records of agreements, and serving in designated positions such as Deputy Washington Standardization Officer for the ABCA Program.

Cooperative R&D programs include international cooperative R&D agreements and the U.S./Canada defense development sharing program. Our tasks include identifying, drafting, negotiating and staffing memo-

randa of understanding with allies for various cooperative R&D projects. For the latter program, we monitor ongoing projects, review potential requirements for coordination, negotiate agreements, and obtain approval of agreements.

Professional personnel and data exchange programs feature exchange of professional engineers and scientists and R&D information with allies and friendly nations on a bilateral basis. Their purpose is to enhance R&D capabilities through infusion of R&D information and upgrading research expertise.

In the data exchange area, programs include the Mutual Weapons Development Data Exchange Program for European and Middle East countries and the Defense Development Exchange Program for Asian countries. The International Professional (Scientists/Engineers) Exchange Program covers the personnel exchange aspects.

The DARCOM IRDS Office, as the proponent for these programs, exercises staff supervision over the process of developing, approving, implementing, and terminating data exchange agreements and the placement of foreign engineers and scientists in U.S. Army activities.

Bilateral staff talks between the U.S. Army and the Armies of Germany, France, and the United Kingdom represent bilateral initiatives to accomplish solid gains in RSI. The primary U.S. Army responsibility for these talks is vested in TRADOC, and DARCOM provides support on related materiel aspects.

The talks feature formal phases of cooperation, which include harmonization of concepts, definition of requirements, force/economic effectiveness evaluation, and cooperative materiel development.

Staff talks are intended to result in development of joint concept papers, agreements on future priorities, agreements on candidates for both codevelopment and coproduction, and mutual acceptance of non-major items. Meetings and conferences provide for discussion of items of mutual interest.

The DARCOM IRDS Office monitors all agencies (U.S. and foreign) involved in materiel development programs related to the staff talks. Coordination is accomplished with all DARCOM laboratories, arsenals and subordinate commands on topics for presentation at the staff talks. We are also responsible for conducting special staff talks with the German Army concerning development and production of non-major items.

Within DARCOM, RSI is viewed as an omnibus approach to pursue greater compatibility of U.S. and allied equipment and their ability to operate together. The thrust of RSI is to generate cooperative initiatives with NATO nations through integration of foreign acquisition considerations in the U.S. Army materiel acquisition process.

We are responsible for developing and implementing DARCOM command guidance and higher headquarters policy guidance on RSI. Other tasks in this area include coordination of RSI plans, identifying interoperability initiatives, and sponsoring DARCOM RSI conferences.

Having looked briefly at what we do, it is appropriate to review some concrete achievements.

Bilateral Staff Talks are now moving beyond "how to fight" to the question of "with what to fight." Among the many major and non-major systems and programs under discussion are MLRS, TACFIRE/ADLER interoperability, ammunition interoperability, and establishments of joint test standards.

Through application of the 941 standardization agreements already signed (486 STANAGS, 204 QSTAGS, 251 ASCC Air Standards), we are moving to improved interoperability and greater standardization in the mid and long-term.

There are 216 data exchange agreements in being with 16 countries, and in addition to programs with Germany and Korea, two new International Professional Exchange Programs have been established and others are being considered with 6 other countries.

Major cooperative programs include the U.S. Roland and the MLRS. Initiatives are underway on the IFV and Copperhead. Overall, there are 21 cooperative R&D MOUs in existence with five separate countries, and significant strides have been made to verify and execute agreements to assure ammunition and tank track interoperability among NATO nations.

Another important aspect of our international work is its high-level visibility and the virtual day-to-day involvement of DOD and Army officials in the decision-making process related to all types of international cooperative endeavors. It is essential that we maintain communication and coordination with DA/OSD elements to obtain policy guidance and information on proposals up for decisions.

At HQDA, coordination is accomplished with the ODCSRDA International Office and System Coordinators and the ODCSOPS International Rationalization Office. At the Army Secretariat level, coordination is maintained with the Office of the Assistant Secretary of the Army (Research, Development and Acquisition) and the Office of the General Counsel.

Within OSD, contacts are frequently made with the Offices of the Deputy Under Secretary of Defense for Research and Engineering (International Programs and Technology), the Deputy Assistant Secretary of Defense (European and NATO Affairs), and the Deputy Assistant Secretary of Defense (International Economic and Technology Affairs).

I have attempted to impart an appreciation of what international operations are all about at HQ DARCOM. In my view, these operations are among the most dynamic and interesting of the many activities within the headquarters. The work is demanding and challenging and requires a full measure of effort to achieve successful results. The DARCOM IRDS Office is meeting this challenge and will continue to do so and in conjunction with our overseas elements carries out a worldwide mission.

ATTENTION Authors

Do you have an article you would like to submit for possible publication in the *Army RDA Magazine*? If so, we would like to hear from you. Consideration will be given to all articles, based on importance of the subject, factual content, timeliness, and relevance to our magazine. The following are general guidelines for submissions:

- *Length.* Articles should be about 2,500 to 3,000 words. Shorter or longer articles are acceptable, depending on what is required to adequately tell the story.
- *Photos.* Include any photographs or illustrations which complement the article. Black or white or color are acceptable. We cannot promise to use all photos or illustrations and they are normally not returned unless requested.
- *Biographical Sketch.* Include a short biographical sketch and photo of the author/s.
- *Clearance.* Article must be cleared by author's security/OPSEC Office prior to submission.

Articles should be addressed to: HQ DARCOM, ATTN: DRCDE-LN, 5001 Eisenhower Avenue, Alexandria, VA 22333. Telephone: Autovon 284-9587, Commercial 202-274-9587.

U.S. Army Research, Development & Standardization Group—U.K.

By COL Stanley E. Holtom

The U.S. Army's office in London that is today known as the U.S. Army Research, Development, and Standardization Group-United Kingdom traces its origins from two sources.

First, in 1948 a U.S. Army Standardization Group-U.K. in London was created "to continue the close cooperation between the U.S. and U.K. Armies which was begun during WWII."

Then, seven years later, LTG James Gavin, at that time Chief of Army R&D, approved the establishment of the U.S. Army R&D Group (Europe). A year after that, on 21 May 1956, the U.S. Army R&D Group, was activated in Frankfurt, Germany. The purpose of both of these was to capitalize on existing European know-how and to assist latent talent in the research area through grant type assistance.

Establishment of the R&D Group (Europe) set the stage for introduction of an Army research program funded at about $100,000 for the first year. Within two years, funding had grown to $1 million.

This R&D Group, which complemented existing Air Force and Navy research activities in Europe, screened and evaluated research proposals from Western European universities, research institutes, and industrial organizations associated with U.S. Army interests.

An Army research committee in Washington, DC, evaluated each proposal under the guidance of the Chief of Army R&D. Approval of such proposals resulted in funding to support the research effort.

The R&D Group formed the basis of what is now the scientific element of the U.S. Army Research, Development and Standardization Group-U.K. Referred to as the European Research Office (ERO), it remained in Frankfurt until 1970, when it was relocated to London.

This scientific activity, originally staffed with three professionals, increased its staff to a peak of 12 scientists in 1960. During the past 10 years these scientists have been involved in programs relating to chemistry, materials, electronics, physics, mathematics, information sciences, aeronautics and engineering. Additionally, representatives from the Office, Chief of Engineers and the Army Research Institute for the Behavioral and Social Sciences are also present and responsible for environmental and behavioral sciences respectively.

LTC James M. Dorrance
Communications/Electronics Standardization Representative

LTC Charles E. Gardner
Engineer Standardization Representative

LTC James L. Massey
Weapons Munitions Standardization Representative

LTC Ronald E. Mayhew
Armor/Aviation/Mobility Standardization Representative

It is interesting to note that Dr. George Wyman, who was reassigned to his present position in 1977 as the manager of the Chemistry program, was the scientist originally assigned to this organization when it was established in 1956.

Although the level of funding has remained relatively constant over the years, the emphasis of the program has changed from research support to one

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Dr. Bernard Steverding
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Dr. George M. Wyman
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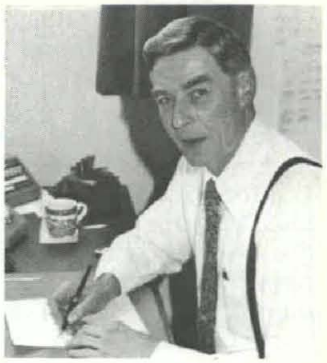
Chemistry Branch



Dr. Sigfried H. Lehnigk
Chief, Physics/
Mathematics Branch

of scientific liaison. Major organizational changes followed the ERO move to London. After reporting to the Army Chief of R&D for almost two decades, in 1975 the office, was placed under the Army Materiel Command—now DARCOM, and merged with the U.S. Army Standardization Group-U.K. to form the U.S. Army Research and Standardization Group-Europe and more recently redesignated the U.S. Army Research, Development and Standardization Group—United Kingdom.

Today, the current U.S. Army Research Development, and Standardization Group-U.K. is staffed with eight scientists and four military standardization representatives. This combination of U.S. military and civilian personnel, together with administrative staff, comprises the total organizational strenth of 24 personnel, by far the largest U.S. Army unit of its kind.

The Group operates as a field operating agency of DARCOM, and reports to the Deputy CG for Materiel Development through the Assistant Deputy for International Research, Development and Standardization.

The dual functional responsibilities of the Group—standardization and research—necessitates direct contact with the International R&D community of HQ DARCOM and the Army Research Office respectively.

This dual interface, also dictates close liaison with a number of other elements throughout the Army community, such as the DA staff, Army commands, schools, labs, and project/item managers.

Liaison is maintained with the State Department through the American Embassy in London, in order to exchange information which may impact upon U.S. programs. This ensures that a U.K. position is currently identified and understood within the U.S. government. For example, current information on such significant programs as the Infantry Fighting Vehicle and the Multiple Launched Rocket System is provided to the American Embassy for necessary incorporation into position papers.

How do these broad missions of research, development and standardization, translate into daily assignments for the staff? On the standardization side, a major task is the participation in various meetings, such as the ABCA (America, Britain,

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Dr. Arthur Drucker
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LTC Donald R. Reinhard
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Electronics Branch

Warren E. Grabau
Chief Environmental
Science Office

George M. Sokol
Chief, Information
Science Branch

Canada, Australia) Quadripartite Working Groups, selected international forums and NATO panels.

Quadripartite Working Groups (QWGs), are established to deal with specific areas. These are normally composed of representatives of the four Armies and meet approximately every 18 months, in one of the four ABCA countries in rotation. The aim is to assist in the national development of requirements documents. This is achieved by developing concept papers and Quadripartite Standardization Agreements (QSTAGs) on desirable military characteristics of future equipment.

Additionally, the QWGs develop standard procedures to facilitate interoperability through concept papers and QSTAGs. They promote materiel standardization by identifying equipment suitable for standardization, and developing QSTAGs for the design and production of equipment.

Information exchange on projects on the Standardization Lists and national activities relating to future equipment and procedures also takes place. Finally, the QWGs insure that previous standardization achievements are current by review of existing concept papers and QSTAGs.

Similarly, the Group participates in significant discussions, conferences and staff talks between the U.S. and U.K. Armies on matters pertaining to the standardization mission. On a semi-annual basis, staff members attend the NATO Army Armaments Groups meetings in Brussels to evaluate opportunities for arms cooperation in the entire NATO arena.

A major goal of the Standardization Group is to enhance interoperability. Ambassador Komer stated when he defined RSI that the first task was to assure interoperability of ammunition. As late as 1978, to accomplish this goal, it was required that each country conduct safety certification tests on the ammunition, the fuzes and the propellant.

Within a year, common test procedures were written and accepted by the U.S. and U.K. Since the

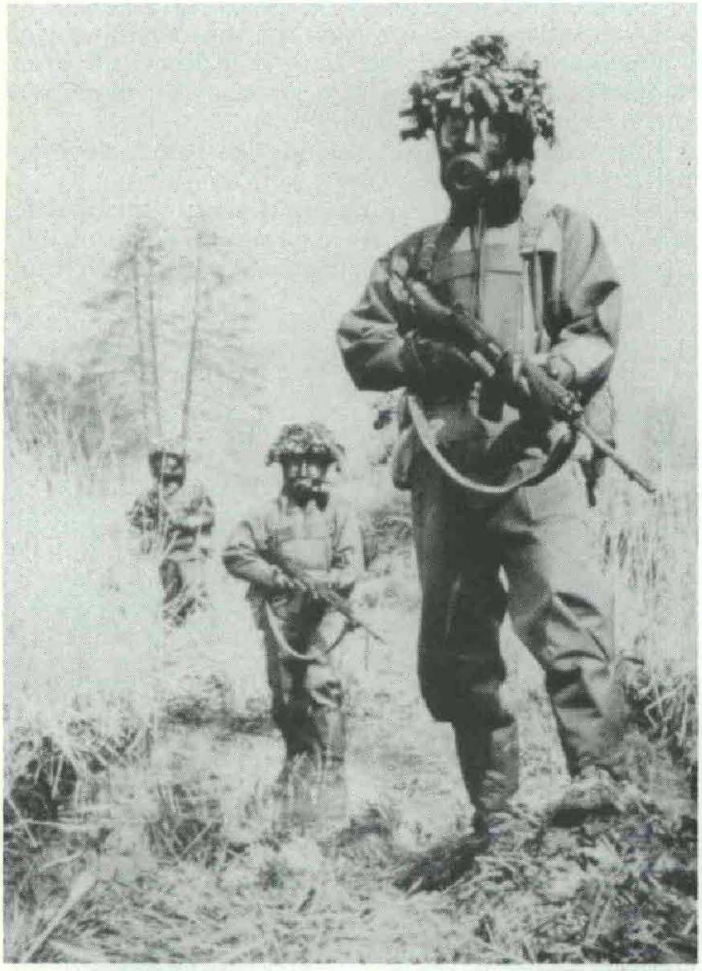


Fig. 1. NBC Protective Suit No. 1, Mk 3, is a two-piece (smock with hood and trousers) overgarment which, in conjunction with a respirator, protective gloves and overboots, provides full protection against chemical agents. It is suitable for continuous wear under combat conditions and, in many situations, is virtually self-decontaminating by virtue of the rapid rate of evaporation of liquids from its outer surface. The materials are flame retardant and the suit provides substantial protection against nuclear thermal radiation.

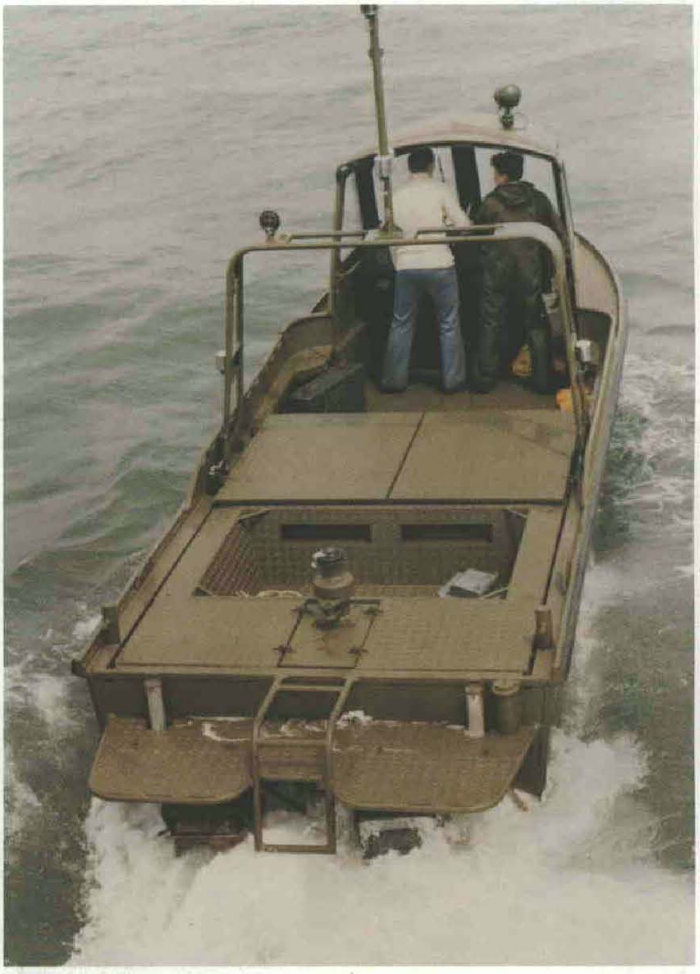


Fig. 2. Combat Support Boat (CSB) is a powerful and versatile craft whose major role is to support both bridging and amphibious operations. It is also designed to be used as a general purpose workboat in support of diving operations, maritime construction projects, inland water patrols and as a platform for demolition tasks. The CSB can operate at high thrust in shallow waters, and to this end is fitted with twin water jets that provide rapid response and maneuverability over mooring ropes and weed-clogged water.

U.K. was the monitoring body for Germany and Italy, this common procedure has evolved into a pattern for NATO testing.

Though these new procedures have not eliminated all redundant testing, significant duplication has been eliminated. Monitorship of acceptance testing is a mission of the Standardization Group.

Turning to the development side, one of the major endeavors of the Group is to provide interface between the U.S. and the research establishments in the U.K. major establishments in which the U.S. Army has interest include the Chemical Defence Establishment (CDE); Military Vehicles and Engineering Establishment (MVEE); Royal Signals and Radar Establishment (RSRE); Propellants, Explosive and Rocket Motor Establishment (PERME); and the Royal Armament Research and Development Establishment (RARDE).

As an example of this interface, U.S./U.K. cooperation involving CDE has resulted in standardization of the L8A1 Smoke Grenade and a launcher system for fighting vehicles, the NBC Protective Suit and Overboot for individual protection, and the chemical training equipment SPAL (Simulator, Projectile, Airburst, Liquid) for training troops with stimulated liquid agents. Current cooperation includes exchange of information on multi-spectral screens, collective protection, and agent detectors or alarms.

MVEE was formed on 1 April 1979 by the amalgamation of two establishments, the Fighting Vehicles R&D Establishment, Chertsey, with range in Kirkcudbright, Scotland, and the Military Engineering Experimental Establishment, Christchurch. It is responsible for research, design and development of tracked and wheeled vehicles and trailers for the Armed Services and other government departments, and engineer equipment for the Royal Engineers.

Cooperative U.S./U.K. efforts with MVEE, assisted by USARDSG-U.K., include combat vehicle engines, transmissions, track, armor, tactical bridging and support equipment, and countermine equipment.

RSRE was formed by the consolidation of the Signals Research and Development Establishment (Christchurch), the Services Electronics Research Laboratory (Baldock), and the Royal Radar Establishment (Great Malvern). This agency undertakes electronic research across the field and develops communications, radar, optical and infra-red equipment and systems and systems for U.K. military services.

Interoperability of U.S.-U.K. equipment is a major area for cooperation and has included tests on combat net radios, digital data devices, laser target markers, and numerous interface equipments. Current areas for cooperation include FLIR equipments; sensors and surveillance systems.

PERME has worked closely with the U.S. in the study of insensitive explosives for use by the armies of the 1980s. The primary DARCOM agency involved is the U.S. Army Armament R&D Command's Large Caliber Laboratory.

The agency responsible for the assessment and development of conventional weapons systems is RARDE, and its mission encompasses guns, mortars, rockets, ammunition, mines, pyrotechnics, detonators, igniters and general explosives technology. Its mission further includes artillery fire control computers, optical sights, night vision and battlefield surveillance devices, laser range finders, and mine detectors. Major programs between RARDE and the U.S. are the 105mm tank gun and ammunition, artillery ammunition interface, the 81mm mortar, and the scatterable mines.

A less glamorous task performed by the London office but one that is vital and requires considerable time and effort is support of U.S. personnel visiting the U.K. The Group has been assigned responsibility for the administration of visits by Army personnel to the U.K.

These visits include ABCA meetings, U.S.-U.K. bilateral discussions, international meetings in the U.K., and visits to provide U.S./U.K. coordination on R&D projects. A single visit may entail support for as many as 20 persons.

In 1979, the Group arranged for the visits of approximately 500 U.S. Government personnel to the U.K. In each case this required country and Ministry of Defence security clearances and assisting with in-country travel. Though regulations require 30 days notice for travel to the U.K., the Group has been able to accomplish this task with as little as 24 hours notice.

Cooperation on R&D projects normally involves visits of U.S. Government personnel to both U.K. MOD R&D establishments and industry. There has been much interest in the U.K. production capacity since the U.S. requirement for any item produced in the U.K. normally requires a tremendous expansion of production capacity.

A major factor in the excellent record of successful visits by the many hundreds of visitors to the office facilities over the years, has been the loyal service, ability, and dedication to the job of the office's U.K. employees.

Typical, but unique in point of service, is Miss Doris C. Kemp, now secretary to the commander, who joined the original standardization office staff in 1948, and has remained on, in unbroken service. Her ability and "institutional memory" is of inestimable value to the office operation.

Arranging and processing loans of U.K. equipment to the U.S. Army is another vital task performed by the London Group. The Basic ABCA Agreement provides the mechanism for borrowing equipment from one country for evaluation by another. Over the years this process has proved successful in enhancing standardization potential.

Notable examples of this exchange are the U.K. smoke dispenser and grenade for the armored vehicles and the 105mm tank gun which was introduced into the U.S. with the M60 series of tanks. This gun remains the main gun armament for U.S. tanks.

Today, the "standardization loan" is used for two purposes: testing for interoperability and evaluation of equipment. A recent item to be loaned is the

U.K. Combat Support Boat. Two boats are being tested at MERADCOM; two additional boats have been provided to allow acceleration of user testing. (*Editor's note: A separate article on the Combat Support Boat will appear in the Sept-Oct 1980 issue.*)

Testing for interoperability is normally confined to ammunition. Under the current Memorandum of Understanding on 155mm artillery ammunition, the U.K./Italian L15 High Explosive round is being evaluated for performance in the M198 Howitzer.

Similarly, the U.K. is testing the U.S. M549 Rocket Assisted Projectile in the Trilateral FH70. Other items under loan are the 81mm mortar which was loaned to the U.S. Army and Marine Corps and the Forward Observer Trainer which was evaluated at Fort Sill.

Maintaining an awareness of ongoing U.K. R&D projects certainly ranks high in the mission area of the Group. Periodic visits to U.K. R&D establishments aid this process. An example of active participation of the Standardization Group involves the U.K. Main Battle Tank 80 (MBT80) program.

In August 1978, the U.K. announced plans for development of a new battle tank. Prior to the public announcement, meetings were conducted concerning U.K. interest in the U.S. XMl turbine power pack.

In October 1978, representatives of the U.K. MBT80 Project Management Office visited the Project Manager XMl to discuss the turbine system and to study the magnitude of problems associated with new tank development. The following May the U.K. MBT80 PM again visited the XMl office, at which time the PM stressed the necessity for continued U.S. and U.K. interchange visits to assist in joint understanding of tank development.

In July 1979, the U.K. Government announced the decision to put a Rolls-Royce diesel engine in the MBT80. In December, XMl representatives visited the U.K. to discuss cooperation with the MBT-80. Areas of mutual interest include track, test equipment and fire suppression.

An area of recent high level interest is that of cooperative R&D. The London Group has a continuing mission to identify potential programs for cooperative R&D between U.K. and U.S. One major program recently identified for cooperative development is the U.S. XM2 IFV. Initial U.K. interest in the U.S. MICV came in 1977. In the spring/summer of 1978, U.K. and U.S. Project Managers exchanged visits and conducted detailed discussions concerning U.K. interest in the U.S. fighting vehicle program.

The U.K. is now reviewing alternatives for a decision as to the best method available for obtaining a family of tracked vehicles. U.K. concepts include an infantry carrier, artillery and infantry command post, artillery observation, mortar, recovery, repair, and engineer.

If a suitable derivative of the XM2 were chosen by the U.K. a major milestone would be reached toward standardization/interoperability of the fighting vehicle family.

One of the more interesting aspects of the RSI program has been the quadrilateral development of the Multiple Launched Rocket Systems (MLRS). This program, begun in 1976 as a U.S development, has expanded into an international program. Early in 1977, the Project Manager briefed the program and correspondence and meetings became the normal business.

Interest was also expressed by the Federal Republic of Germany. This resulted in a modified requirements document adding the development of an antitank submunition utilizing the German developed AT II minelet. Finally, France entered the program and a Quadrilateral Memorandum of Understanding (MOU) was negotiated.

During development of the MOU, the U.K. staffed a requirements document and the supporting trade-off analysis. These two actions were completed and approved in May 1979. During this period the Standardization Group was involved in the coordination of U.S. and U.K. positions. On 14 July 1979, the four powers signed the MOU to develop and produce the system.

Turning now to the other side of the Group, the scientific staff of the USARDSG-U.K., devotes most of its time to direct contact with European scientists in universities, industrial firms and research laboratories. Most of this activity takes place in Western Europe but effort is expended in the Middle East as well.

Although the scientific staff is dedicated primarily to insuring that Army scientists in the U.S. are aware of scientific work which may contribute to the Army's research program, their function is not one of information gathering. Rather, the function is to encourage information exchange between U.S. scientists and those in Western Europe and the Middle East.

Members of the scientific staff are seasoned veterans of the Army's scientific establishment. They carry with them knowledge of what is needed in the Army's research program. As they serve their tours in Europe—usually three to five years in duration—they build an information bank.

In the simplest cases, scientific staff representatives send back reports on their findings and recommendations on how we might best take advantage of European scientific work. Often, European scientists have published in English though not necessarily in American publications. Copies of their publications are distributed to U.S. laboratories to supplement scientific staff reports.

Reports frequently stimulate active interest of scientists in U.S. Army labs and an exchange of correspondence follows. The cognizant scientific representative may well, at this point, suggest that the European scientist visit the U.S., for which some financial support is available.

These trips often involve seminars and discussions at several Army laboratories, and where possible, a trip is timed to coincide with a major conference in the U.S. at which the European scientist can present a paper.

A scientific staff supported trip by a European scientist can be a most economical method of mak-

ing U.S. scientists aware of relevant European research. Army scientists can be exposed to the information at a cost far less than that involved in sending a group to Europe. Concurrently, European scientists benefit from the valuable insights into American science.

Another method used by the scientific staff to stimulate information exchange is financial support of international scientific and technical meetings in Europe. In return for funding support, the Army receives copies of the conference proceedings, free conference admission for Army scientists, and acknowledgement of U.S. support.

Staff members have found that attendance at these conferences is an excellent way to evaluate research status and to establish contact with outstanding scientists.

Sponsorship by the scientific staff is limited to international conferences conducted in English, but often important work is reported in other languages. Since many staff members have proficiency in one or more foreign languages, attendance at conferences provides a broader visibility than that provided strictly by conference support.

A third major method used to interact with European science is participation in European research. A ERO budget of $1 million per year is available for research contracts to European and Middle East universities and research laboratories.

Though the scientific staff does not advertise, European scientists are aware that funds are available for the support of research projects. However, unless the scientist's work is regarded as worthy and relevant to the Army they are not encouraged to submit proposals.

Proposals which pass the critical screening by the scientific staff are forwarded to the Army Research Office for evaluation of both scientific merit and Army relevance. This process resembles the evaluation process used for university research considered for Army support.

The decision to award a research contract is made by the scientific staff based on results of a strict referee evaluation. When a contract is awarded, it may permit the principal investigator on a research project (usually a full professor of established reputation) to add a doctoral fellow to the project.

Research performed in Europe, under contract, is unclassified and U.S. Army participation is openly acknowledged. The contract includes the requirement for periodic technical reports which are distributed to U.S. Army scientists.

Furthermore, direct communication is encouraged between European scientists and the U.S. Army laboratory people. Although the USARDSG-U.K. is the U.S. Army agency authorized to contract for research in Europe, the scientific staff always strives to facilitate direct contact.

On many occasions the proposals submitted from Europe have offered such direct support to ongoing research that the Army laboratories have incorporated them into their own programs. In such cases the Army laboratory will provide the funds, and the London office will contract for and monitor the work. Funding in this category is about $3/4 million per year.

Scope of activities in the research program during FY79 was as follows:

FY 79 PROGRAM

Number	*Activity*	*Expenditure ($)*
108	Visits	65,239
50	Conferences	93,131
132	Grants/Contracts	1,520.957

These activities encompassed 17 countries throughout Europe and the Middle East with research activities in the U.K., Israel, Germany and France receiving the majority of the support.

Transmittal of information to U.S. Government and Army agencies is a matter of significant magnitude. However, through means of periodic Standardization and Scientific summaries, wide dissemination takes place.

The office publishes annually, two documents which are of great service to the RDA/RSI communities. The first is the "Annual Standardization Report." It is a short narrative and photographic compendium of U.K. items of materiel under development, along with a cross-referencing of any U.S. Army requirement, and the status of the program.

The second publication is the "Research Activities Report," published semi-annually. Information of use to RDA personnel in the U.S. includes a listing of status of proposals. Additionally, there is a summary of ongoing research contracts and grants. These summaries are listed by scientific discipline. For European as well as U.S. use, there is a listing of the technical research contact points in the U.S.

This then is the story of this unique organization whose mission, roles and responsibilities are varied and diverse but which provides the U.S. Army with a window on the research and standardization activities on the European side of the Atlantic. To accomplish this, complete cooperation and understanding must prevail in all dealings with U.S. agencies and with foreign activities. Accordingly, these are the characteristics upon which the operation of the organization is based. Experience has proven that not only does the mission demand it but also the location requires it—for nothing less will insure that an effective program is maintained.

COL STANLEY E. HOLTOM is commander of the U.S. Army Research, Development and Standardization Group—U.K. He previously served as director for Program Management, Security Assistance Center, HQ U.S. Army Materiel Development and Readiness Command. He holds an MSC degree from George Washington University and is a distinguished graduate of the Industrial College of the Armed Forces.

Role of: USARDSG Germany

By COL Joseph E. Brown

USARDSG Germany—From left, COL Joseph E. Brown, LTC Bill Dankers, Sita Freeman, LTC John Weisto.

The ingenuity and technical skill of the German nation is well known and respected. Its national strength and role in today's NATO Partnership is vital to that alliance.

Historically, the Germans have developed excellent weapon systems that are rugged, simple, and reliable, and they have been among the world's leaders in applying technology.

Today, a free and highly industrialized West Germany is a key partner in the NATO alliance. Its well equipped ground forces comprise the largest single part of the European NATO members' contribution.

In recognition of Germany's technological capability to contribute to standardized NATO equipment, the U.S. Army Research, Development and Standardization Group—Germany (USARDSG-GE) has been augmented redesignated and given an expanded mission.

The Group, located in Bonn in the picturesque Rhine River valley, is a DARCOM agency that exists to facilitate the accomplishment of cooperative research and development programs between the Federal Republic of Germany and the U.S. Army leading to interoperable or standardized equipment.

Although the office represents the Department of the Army and Department of Defense staffs when requested, primary U.S. customers are DARCOM Headquarters and subordinate laboratories, proving grounds and project/program managers and their staffs.

On the German side, the office interacts with the Army Staff and the Armaments Division of the Federal Ministry of Defense, Bonn, the General Army Office in Cologne and the Federal Office for Military Technology and Procurement (BWB) in Koblenz (see *Army RD&A Magazine* Mar-Apr 79) as well as German industry under contract to the Ministry of Defense.

Any U.S. Army representative wishing to explore cooperative research and development opportunities in Germany is encouraged to contact this office early in the development cycle.

By now the reader may be asking who we are, what we do and what have we accomplished. The USARDSG-GE is a subordinate command of DARCOM reporting to the Deputy CG for the Materiel Development, through the Assistant Deputy for International Research, Development and Standardization.

The office is located in the U.S. Embassy in Bonn as a matter of administrative convenience, and because the Group provides the U.S. Ambassador and his staff valuable insights on an important aspect of U.S.-German relations—Army cooperative research and development programs.

When calling our office, the first cheerful voice one generally hears is that of Sita Freeman, our personable administrative assistant. Sita came to us recently from

the Air Force with an American and European public affairs background. She tackles each request with a "can-do" attitude that is so necessary in an office requiring international cooperation. Callers can be assured that she will either take care of the request herself or contact one of our three military R&D specialists.

LTC Bill Dankers, an infantry officer from Missoula, MT, currently is the lead action officer for matters pertaining to C^3, aviation systems, electronics, wheeled and tracked vehicles, test methodology and management of the office.

LTC John Weisto, a quartermaster officer from Milwaukee, WI, is responsible for missile systems, artillery and air defense, C/B systems, engineer equipment and systems, and quartermaster equipment and clothing.

As the commander of the Group, I try to maintain an overall perspective by preparing periodic assessments, participating in German/American Staff Talks, Non-Major Items Meetings, and meetings involving NATO and U.S. Army Europe (USAREUR) as appropriate.

In addition the areas of ATGW, small arms, automatic gun systems, artillery, and ammunition fall under my supervision. Each member of the Group keeps the others informed so that timely actions can be taken during the absence of the primary action officer. So much for who we are!

What do we do? Our principle function is to determine the needs of our U.S. and German customers and then to serve as the catalyst to see that those needs are met.

This responsibility requires that we assess possibilities for cooperation and initiate the RSI process by introducing the subject into ongoing staff talks or suggesting to officials of both countries possible data exchange through existing or new DEAs, or even establishment of an MOU.

Because of the time and language differences it is often difficult for stateside R&D personnel to communicate with German counterparts. A major part of our activity is to relay information by phone, message, letters or personal visits to insure that the message is received and *understood.*

All of the members of the office speak German which is vital in communicating and developing rapport in spite of the fact that many German officials speak excellent English. It is in the "understanding" area that we find ourselves most helpful by explaining the background of a particular action.

The office attempts to contact each U.S. team that visits Germany and to provide any assistance that we can. This also enables us to keep abreast of the latest status of a particular project.

One of the major challenges we face is to stay up to date with the details of diverse and rapidly changing Army R&D programs. Visitors are therefore, encouraged to stop by the Embassy to assist members of this office, the Defense Attache's Office and the Office of Defense Cooperation in their efforts to stay current and represent their programs effectively.

At the same time the office can provide visitors background information on the German R&D climate and points of contact that facilitate a subsequent meeting of the minds.

As a word of caution, in conjunction with trips to Europe, it is extremely important that visitors wishing to speak with German officials or visit German facilities, submit a Request for Country Clearance to the Defense Attache's Office (USDAO Bonn) so as to arrive here at least 30 days before the visit. This request must be staffed with the German Ministry of Defense and failure to allow sufficient time can result in the clearance being denied. Approval for the visit may also be delayed when the Request for Clearance message neglects to state the name and specific location of the activities to be visited (Ministry of Defense and firms), along with the names of all points of contract. When possible, telephone numbers should be included. Additionally, the name and telephone number of the U.S. POC should be listed.

Regarding hotel accommodations, these can often be difficult to find, particularly during the spring and summer months when many people are on vacation and numerous conventions are planned throughout the country. One further word of caution—if a hotel room is reserved and the visitor fails to turn up, he shouldn't be surprised if he is billed for the first night's cost of the room anyway. It's German law!

What have been our accomplishments? During the past several years we have seen the development of closer ties between the R&D communities of the two nations. Communication channels have been improved through the vehicle of the German/American Staff Talks, Non-Major Item discussions, and the increased exchange of liaison officers.

The U.S./German Army Staff Talks, which began in October 1975, have as their purpose the development of joint tactical concepts, achieving tactical interoperability, deriving mutual weapons system requirements, and increasing standardization and interoperability of materiel.

Meetings take place semi-annu-

The 10-ton M.A.N. German Army Truck is a competitive candidate for possible adoption as the U.S. Army truck.

ally, and are headed on the U.S. side by the Commander, TRADOC, with DARCOM represented by the Deputy Commander for Materiel Development, and the Assistant Deputy for International Research, Development and Standardization. On the German side the Vice Chief of the Army staff heads their delegation.

The staff talks provide a means to harmonize concepts, define requirements through the development of military equipment characteristics documents, and evaluate the benefits through war gaming. Standardization opportunities are assessed in the categories of materiel, training, and logistics. Concepts pertaining to U.S./GE divisions through the 1990s are currently under review.

In support of these concepts major programs involving cooperative efforts in air defense and artillery systems are coming to fruition. Roland, MLRS, Stinger, and Patriot are all systems where significant progress is being made toward standardization.

Interoperability efforts are showing great progress as typified by ammunition interoperability programs, as well as those between MSE, TOS and SIGMA and their German counterparts-SCRA, HEROS, and ADLER. The U.S. and Germany have recently exchanged liaison officers to facilitate TOS/HEROS cooperation. SIGMA/ADLER interoperability discussions appear to be going well.

In the area of close combat the U.S. adoption of the 120mm gun for the Abrams Tank was a significant milestone facilitating rationalization of ammunition assets.

Under the "family of weapons" concept, the approval by the National Armaments Directors in March 1980 of the MOU to exchange information sufficient to determine program package feasibility for the third generation ATGW was most encouraging. If the first phase is successful, the French, Germans, and the British would be responsible for the development of a long-range vehicle mounted ATGW while the U.S. would develop a man portable medium-range system.

Departing from major systems, a most positive development has been the Non Major Items discussions. In this program the U.S. and Germany are exchanging information on a number of important items of equipment even though these items are not individually expensive enough to require management as a major system or project.

Each country reviews its need for the equipment on hand or in development by the other. Where a common need exists, either a Military Equipment Characteristics Document is proposed, which would lead to a cooperative development program, or one side simply buys the items from the other.

Examples of equipment cooperation being managed under the program include TOW night sights, chemical warning devices and artillery projectiles. Systematic reviews of chemical and engineer equipment have been conducted and eventually all equipment will have been reviewed.

Readers being aware of existing needs and candidate equipment from the German Army are encouraged to contact us with this information.

A third major activity involves Data Exchange Agreements (DEAs). Under this program, agreement is reached to exchange technical information on a particular subject. There are currently over 50 such agreements active, some of which date back as far as 1960. Typical of the information exchanged here, are DEAs on defense against low flying aircraft, energy conversion devices, camouflage, etc.

Under the program, technical project officers in both Germany and the U.S. are designated. Information requests are channelled through the technical project officer to the correct recipient in the other country and the response goes back through the technical project officer.

For example, a scientist in a DARCOM lab, working under a DEA, who might wish to learn the status of work in a given area being done by the Germans, would send his request to the U.S. technical project officer.

The request is then forwarded to the USARDSG-GE, either through the U.S. project officer direct, if time permits, or in urgent cases by merely providing the project officer with a copy. Our group then forwards the request to the German technical project officer.

Readers desiring information from Germany should determine if it can be managed through an existing DEA by contacting Mr. Wayne Silbert, HQ DARCOM (DRCIRD), Autovon 284-8367, or by contacting this office.

Members of the Research, Development and Standardization Group-Germany take pride in having made significant contributions to the cooperative research and development programs described here, and we look forward enthusiastically to the challenges of the future.

We are dedicated to using the combined military and professional expertise of the team to assist our customers—both German and American—in the execution of their programs to the end that the scarce economic resources of both countries can be used to yield the greatest possible military effectiveness.

COL JOSEPH E. BROWN is commander, Army Research, Development and Standardization Group—Germany. He completed the Industrial College of the Armed Forces in 1979 and holds a BS degree in chemistry from Georgia Tech, an MS degree in physics from Iowa State and an MS degree in operations research from New York University. He served from 1976–78 as Department of the Army system coordinator for Antitank Weapons.

RTL, AVRADA Report on FY79 Achievements

Technical and managerial achievements of the U.S. Army Aviation R&D Command's Research and Technology Laboratories (RTL) and Avionics R&D Activity (AVRADA) are contained in a recently published FY79 Annual Posture Report.

RTL and AVRADA, located at Ames Research Center, Moffett Field, CA, and Fort Monmouth, NJ, respectively, are the AVRADCOM laboratories responsible for Army air mobility R&D efforts. During FY79 they operated under a continuing climate of austerity. Some of the FY79 achievements of these labs were:

Tilt Rotor Research Aircraft. A full 100 percent conversion from helicopter to high speed aircraft mode was accomplished. Initial conversion was achieved by tilting the 25-foot diameter rotors and engine to 45, 20, 15, 10, 5 and zero degrees. No noticeable vibrations were reported and handling was similar to fixed wing craft.

Another significant action in the Tilt Rotor Program was the signing of an agreement between the Army, the Navy and NASA which provides for Navy participation in the project. Navy funds will permit this program to be accelerated with minimum risk.

Rotor System Research Aircraft. The RSRA configured as a full compound helicopter, completed contractor development flights at the Wallops Flight Center and was delivered to the government. A flight envelope development followed and was conducted by an Army/NASA team.

Flying quality structures and systems evaluation tests were also conducted. The aircraft began operational checkout flights and the second RSRA was delivered by Sikorsky in September of 1979.

Advancing Blade Concept. Following completion of pure helicopter flight tests, the aircraft was modified with two turbojets and delivered to Sikorsky's Flight Test Development Center. Flight test evaluations to 160 knots were performed during 5.1 flying hours by an Army pilot, a NASA pilot and two Navy pilots.

Rotor Systems Integration Simulator. During FY79 two Request for Proposals were issued. One is for fabrication of a four-degree-of-freedom motion system to be used with NASA's Vertical Motion Simulator. The other RFP is for design studies of a versatile rotorcraft simulator cab and wide field of view visual display.

Advanced Technology Demonstrator Engine. Gas generator testing was initiated during this period. This testing incorporated full authority electronic fuel controls which allowed a great deal of flexibility in starting sequences and fuel schedules. Engines have also been fabricated and assembled for full engine testing.

Integrated Avionics Control System. AVRADA flight tested the first digital avionic system which featured the latest state-of-the-art in multiplex data bases, microprocessors, and modern control displays. This system underwent full scale engineering development in a competitive design-to-cost program.

Very Lightweight Air Traffic Management Equipment. The objective of this program is to develop a family of lightweight, austere ground interrogators using modern technology. This system has been installed at Kitzingen Army Airfield and was used by air traffic controllers in general advisories and in emergencies.

Airborne Data Transfer System. During FY79 the system definition/architecture for the program was developed. This system will be designed to transmit and receive tactical data to improve reliability in a Nap-of-the-Earth operational environment.

Some of the noteworthy management items listed in the FY79 posture report are as follows:

RTL's Propulsion Laboratory was reorganized. The Army Aeronautical Research Group, the Joint Aeronautical Research Group, and the Technical Support Group were abolished and three new divisions were established.

A Data Exchange Agreement entitled "Helicopter Crashworthiness" was signed by the U.S. and France. A "Helicopter Structures: Composites and Crashworthiness" agreement was signed by the U.S. and forwarded to West Germany for signature.

An engineering development contract was awarded for the Target Acquisition, Designation, and Aerial Reconnaissance System. RTL managed, tested, and supported dozens of exploratory, advanced and engineering development activities leading to this achievement.

AVRADA participated in the decision-making process that resulted in the redirection of the procurement of VHF-AM aircraft radios from option quantities of AN/ARC-115A radios to the new Air Force procured AN/ARC-186(V). This was important because it resulted in cost and weight savings.

The Attitude Heading Reference System technical parameter assessment program represents a significant management innovation because it will result in the award of three contracts. Each contractor will provide his candidate system to satisfy the Army's technical parameters.

An extensive dialog between the DARCOM, TRADOC, FORSCOM, LEA and DLA communities also resulted in an AVRADA-hosted meeting to establish the framework for a Reliability Improvement Warranty policy for aircraft electronics.

50 Top Military RDT&E Contractors for FY79

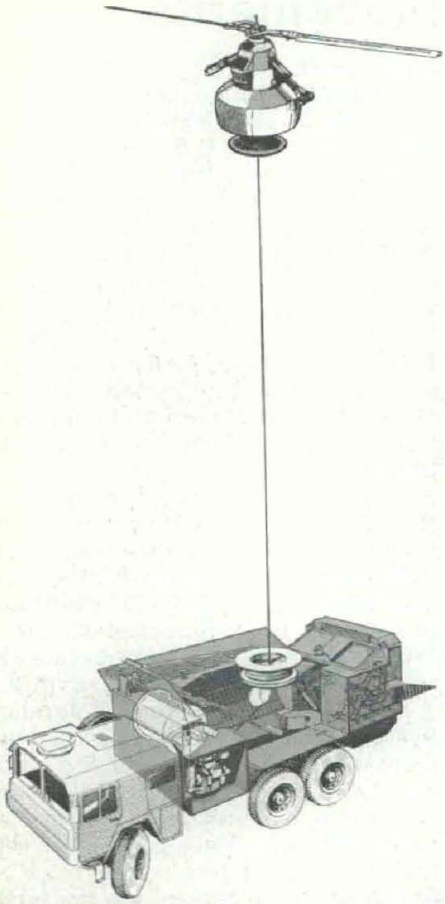
The following is a list, in descending order, of the top 50 contractors receiving the largest dollar volume of military prime contract awards for research, development, test and evaluation during Fiscal Year 1979. Included in this ranking are U.S. business firms, educational and nonprofit institutions, foreign contractors, and U.S. Government agencies.

RDT&E contractors with the largest value of awards were engaged in RDT&E of missile and space systems, electronic and communications equipment, and aircraft programs. In Fiscal Year 1979, $6,271 million or 73.4 percent of all awards exceeding $10,000 was for work in these areas. Top 50 contractors for FY79 were:

(1) McDonnell Douglas Corp., (2) Boeing Co., (3) General Dynamics Corp., (4) Hughes Aircraft Co., (5) General Electric Co., (6) Rockwell International Corp., (7) Raytheon Corp., (8) Martin Marietta Corp., (9) TRW Inc., (10) Lockheed Missiles & Space Co. Inc., (11) United Technologies Corp., (12) International Business Machine Co., (13) Johns Hopkins University, (14) Westinghouse Electric Corp., (15) Summa Corp., (16) Massachusetts Institute of Technology, (17) Aerospace Corp., (18) ARO Inc., (19) RCA Corp., (20) Honeywell Inc., (21) Mitre Corp., (22) Vought Corp., (23) Chrysler Corp., (24) GTE Sylvania Inc., (25) Charles Stark Draper Labs Inc., and

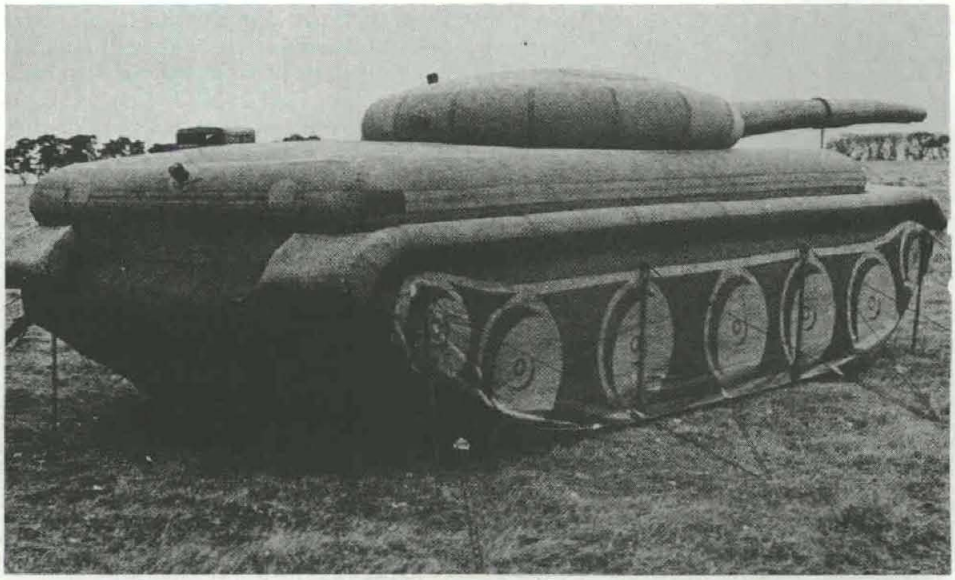
(26) Northrop Corp., (27) Ford Aerospace & Communications, (28) International Telephone and Telegraph Corp., (29) Texas Instruments Inc., (30) Sperry Rand Corp., (31) Grumman Aerospace Corp., (32) Aerojet General Corp., (33) FMC Corp., (34) Motorola Inc., (35) AVCO Corp., (36) Automation Industries Inc., (37) ROHR Industries Inc., (38) Science Applications Inc., (39) Williams Research Corp., (40) Lockheed Corp., (41) ESL Inc., (42) Harris Corp., (43) Singer Co., (44) Western Electric Co., (45) Thiokol Corp., (46) Litton Systems Inc., (47) BDM Corp., (48) Global Associates, (49) Emerson Electric Co., (50) Teledyne Industries Inc.

Foreign Items Of Possible Interest To the U.S. Army



ARGUS battlefield surveillance system combines German Kiebitz operational system with French Orphee radar. The DO 34 Kiebitz Battlefield Surveillance Platform, shown above, is a rotor powered, tethered vehicle that provides a stationary elevated platform for various sensors for use in surveillance, electronic warfare, early detection of low-flying aircraft, data transmission or acquisition of seaborne targets.

GERMAN Panzerfaust 3 is a shoulder-held antitank weapon, whose explosive projectile, when loaded, is external to the launch tube. An essential characteristic of this weapon is its ability to be fired from a closed room.

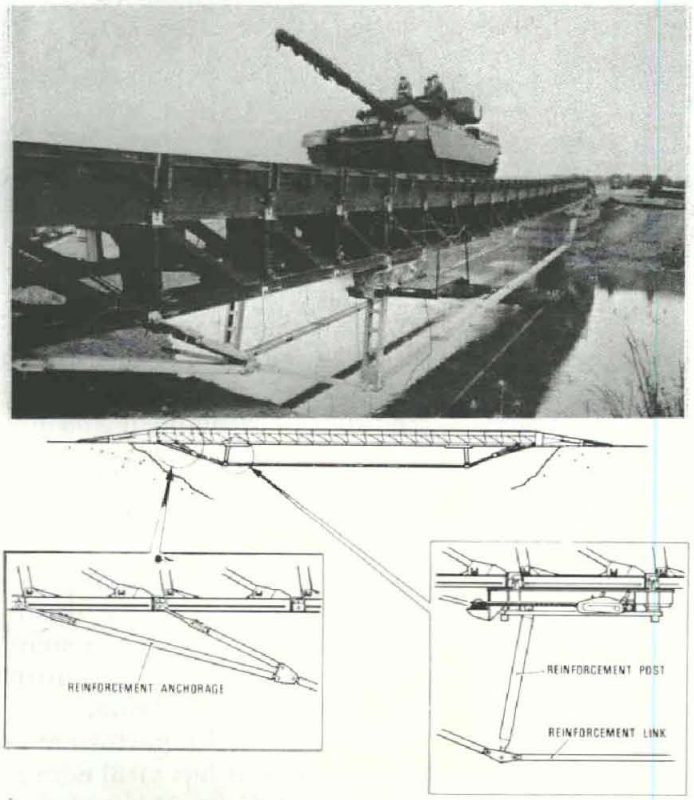


INFLATABLE DUMMY TARGETS, developed for UK forces to enhance recognition training, permit quick erection in the field with use of limited manpower. Any type vehicle can be duplicated as a dummy target.

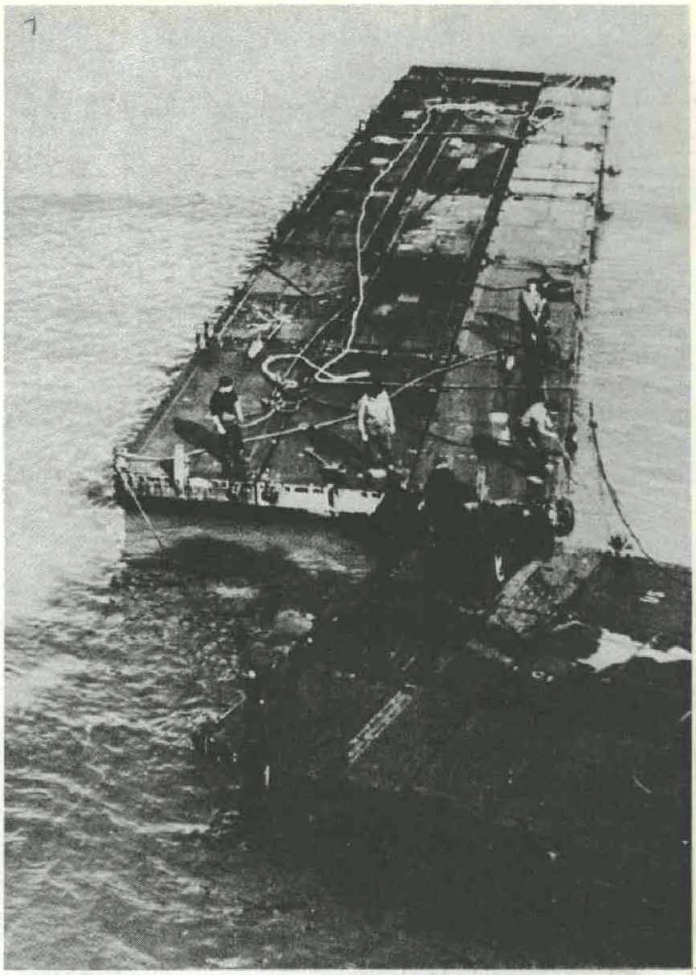
MAH FI horizontal action mine was adopted by the French Army in 1968. The UK has adopted a modified version that can be placed along roads or trails to sense targets and fire an effective warhead.

GRIZZLEY & COUGAR armored amphibious wheeled vehicles have been adopted by the Canadian Forces. The vehicles are manufactured by General Motors Diesel Division in London, Ontario.

GIANT VIPER, now on standardization loan to the U.S. Army under the International Materiel Evaluation Program, is designed to blast a passage for vehicles through a minefield up to 200 yards. The trailer is towed by a tank, APC or the British Combat Engineer Tractor.



MEXEFLOTE PONTOON SYSTEM is based on use of three steel pontoons—bow, center and stern, which can be connected end to end and side to side to form rafts, causeways, jetties and floating platforms of desired shapes. MEXEFLOTE is a development of the Military Vehicles and Engineering Establishment at Christchurch, England. Exploration rights have been granted to Fairey Engineering Ltd, Stockport.



UNITED KINGDOM Link Reinforcement Set (LRS) for the Medium Girder Bridge (MGB) permits construction of standard double-story bridges to carry Class 60 loads over gaps in excess of 100 feet, in additional 6-foot increments to a maximum of 160 feet. During a demonstration, one NCO and 32 men constructed a 160-foot MGB with the LRS in 86 minutes.

A Helicopter Wire Strike Protection System, mounted on an OH-58 has been tested by Canada and the U.S. to meet requirements to provide a margin of safety for pilots operating at low levels.

Our RDS Office in Canada

By COL James F. Bleecker

Any article on the U.S. Army Research, Development and Standardization Group-Canada must begin with some comment on Canada itself, a vast country with the world's largest natural coastline, a population and GNP about one-tenth of the United States, and a fine military heritage.

The Canadian soldier has a proud history of battle accomplishments. Canada's regular forces are small in comparison to the United States, but they are highly professional and are backed by a dedicated reserve force (the Militia).

Canada has requirements to field and support military forces at home and abroad, in a wide variety of environments, in performing their mission of defending national sovereignty, being a partner in the defense of North America, participating in NATO, and contributing to UN peacekeeping forces.

These requirements often give rise to their own special types of equipment and materiel. However, Canada is a dedicated partner in the overall goal of standardization and interoperability, as well as cooperative efforts in the R&D area.

The origin of the U.S. Army Research, Development and Standardization Group-Canada, like the ABCA program, goes back to the close cooperation between the allies during World War II, when liaison officers were exchanged between Canada and the U.S. After the war, it was decided that the close cooperation should be continued.

U.S. Army Standardization Group-Canada. Seated: COL James F. Bleecker, senior standardization representative. Left to right: LTC Leo A. Kramer, standardization representative; Douglas B. Killeen, assistant; Lloyd M. K. Campbell, administrative officer; Viola Pilon, secretary; Wendy Broneder, secretary.

In 1948 then, U.S. Army personnel in Canada were designated "Standardization Representatives" and were assigned to the "U.S. Army Interchange Group."

The "Plan to Effect Standardization" was replaced by a "Basic Standardization Concept" in 1950, and later by the "Basic Standardization Agreement" in 1954. When Australia joined the program in 1964 it became known as the ABCA program. This group of standardization representatives in Canada were officially designated "The U.S. Army Standardization Group, Canada" in 1953.

The mission assigned to the Group then, is today essentially the same, with one exception. That mission, simply stated, is to provide U.S. Army representatives in Canada for coordinating the ABCA program.

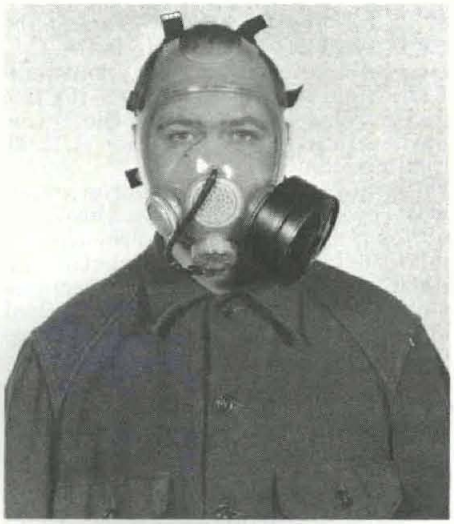
In order to accomplish this mission, the Group must maintain an awareness of Canadian and U.S. Army requirements and research and development actions so that they may promote exchange of information between the two countries, cooperative development, and standardization of equipment, tactics and doctrine.

This requires the performance of unglamourous but vital administrative functions such as processing standardization loans of equipment and processing requirements for visits by U.S. personnel to Canada for ABCA and research and development activities.

The Group does have one unique mission in that it is charged with coordination of the U.S.-Canadian Development Sharing Program (DDSP), this is a bilateral U.S.-Canada program which had its beginning in 1954, following a decision by the Canadian Government that it was no longer practical to undertake the development of major military hardware to meet purely Canadian military requirements. It followed a series of agreements between the two countries in the field of economic cooperation.

The DDSP affords Canada a fair opportunity to share in the development and production of U.S. weapons and equipment. That is, Canadian industry is given a chance to develop and produce weapons and equipment to meet U.S. military requirements. In return for this opportunity, the Canadian Government is willing to assume up to 75 percent of the total development cost, with cost sharing of 50 percent being the norm.

The DDSP is administered in the U.S. by the Department of Defense (DARCOM for the U.S. Army), but in Canada it is the responsibility of a department separate from the Department of National Defence—the Department of Industry, Trade and Commerce (DITC). This department is in some respects similar to the U.S. Department of Commerce as it is charged with industry and commerce development, export development and international trade relations. But it also has major responsibilities in defence production, research and development, and international marketing of defence items, as well as commercial items.



XM30 PROTECTIVE MASK is being developed jointly by the U.S., which is developing the face piece, and Canada developing the canister. The mask features a clear face piece that allows greater visibility than current masks and, if adopted, will replace the M17A1, M24, M25A1 and M9A1 masks.

The DDSP program is managed by the Defence Programs Branch of DITC, specifically the U.S. Marketing Division. This requires the Group to maintain liaison with two departments of the Canadian Government which makes it unique among the Research, Development and Standardization Groups.

The policy and procedures for conduct of the DDSP program are contained in AR 70-66. Basically, a developing agency identifies a project to be provided for nomination, evaluates the project against the nomination criteria contained in AR 70-66 and holds discussions with DITC representatives (Canadian Trade Commissioners located throughout the U.S.) to ascertain Canadian interest and technical capability to do the required development. If agreed upon at that level a draft project agreement is jointly prepared and staffed for final approval by the U.S. Army and the Canadian Government.

To carry out their mission, the Group was originally authorized 15 officers, one non-commissioned officer and one civilian chauffeur. A small element consisting of the senior standardization representative, a combat development representative, an administrative officer and the chauffeur were located in the Army Headquarters.

A group of technical service officers (including a medical service colonel), and standardization representatives, represented the various technical services and were physically located with their corresponding Canadian technical service counterparts.

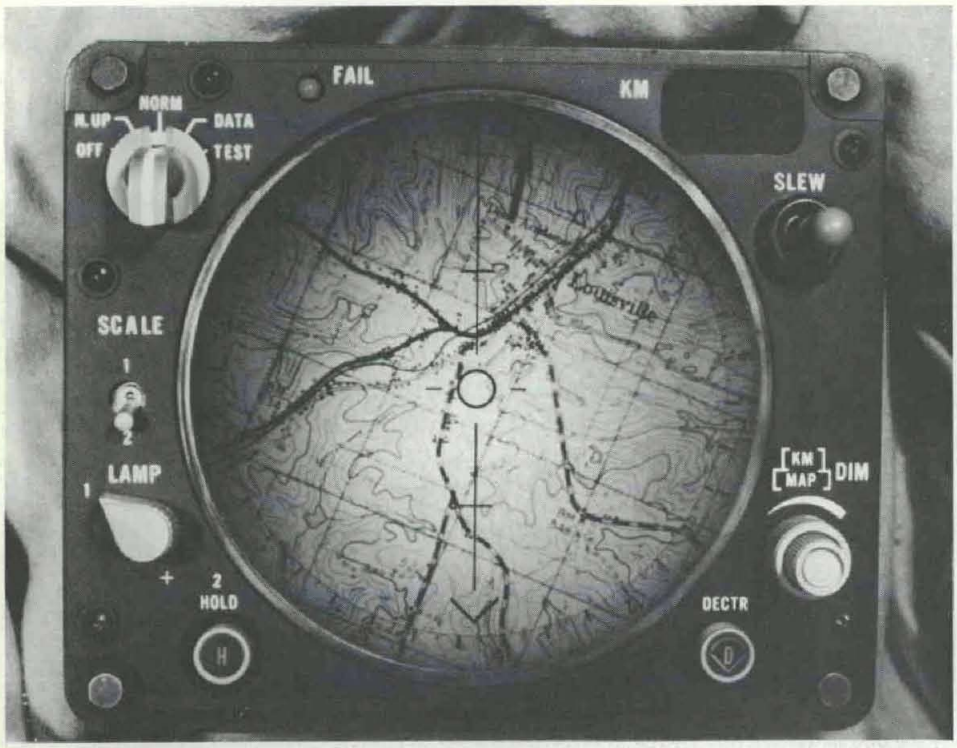
With the signing of the Memorandum of Agreement for DDSP, one standardization representative was assigned as a full time liaison with the Department of Industry, Trade and Commerce and was physically located with that organization. All the standardization representatives were supported administratively by the Canadians, and the Group reported to the Chief of Research and Development, Department of the Army.

Through the years, the size of the Group has gradually been reduced. The current organization consists of two standardization representatives, one colonel and a lieutenant colonel, a Canadian civilian administrative officer, and a chauffeur.

With the unification of the Canadian Armed Forces, the Group is now headquartered with the Department of National Defence. However the main interface is with the Land element of the headquarters. Secretarial support is provided by the Canadian Forces.

The Group's first assistant, Mr.

PLASTIC FUEL CAN, a candidate of the U.S./Canadian Development Sharing Program, is designed to fit standard bracketing of military vehicles. If adopted, this 20 liter can will replace the standard 5 gallon metal can.



PROJECTED MAP DISPLAY (PMD) gives a pictoral display of a helicopter's position and progress directly related to terrain or airway structures. The system has applicability to helicopter operations in forward areas, and there is a possibility of procurement for use with AAH and ASH.

Douglas B. Killeen, who joined in 1952, is still serving. Douglas, a native of Ottawa and an ardent Ottawa Roughrider football fan, recalls well the first sedan provided—a 1951 Chevy painted olive drab, with large white identification numbers and carrying diplomatic license plates—a feature that caused much attention. At the request of the U.S. Ambassador, later sedans were unmarked.

Doug can describe each car, and its idiosyncracies as well as the ten senior standardization representatives he has served with.

COL JAMES F. BLEECKER is the commander/senior standardization representative, U.S. Army Research, Development and Standardization Group–Canada. He is a graduate of the U.S. Military Academy where he was commissioned in the Field Artillery. He holds a master's degree in mechanical engineering from the University of Southern California. He has served in a variety of command and staff assignments in both the continental United States and overseas.

Soicher Begins Army Fellowship in Israel

Dr. Haim Soicher, an employee at the U.S. Army Communications R&D Command's Center for Communications Systems, recently began a one-year Secretary of the Army Research and Study Fellowship in the Department of Electrical Engineering, Tenion-Israel Institute of Technology, Haifa, Israel.

His research study is entitled "Propagation Effects on Low Elevation Signals Along Earth/Space Paths." Military and civilian interest in propagation aspects along earth/space links arises from reliability aspects where circuit performance is limited by natural phenomena, and from interference aspects (propagation mode interference).

Propagation limitations apply to communications, navigation and surveillance space systems. The most severe propagation limitations appear at low elevations. This is mainly due to increased path length within the various propagation media and due to the grazing angles experienced by a signal which is incident on the various media strata.

Dr. Soicher, who has been with CORADCOM and previously with ECOM, since 1960, is engaged in radio wave propagation research. He received a BS degree in physics from Brooklyn College, a master's and PhD degree in physics from New York University, NY, and a master's in business administration from Fairleigh Dickinson University.

He serves as U.S. Army member and national coordinator of the Electromagnetic Wave Propagation Panel, Advisory Group on Aerospace R&D (AGARD), NATO. He is the U.S. Army member of the International Radio Consultative Committee (CCIR), and an elected member of the International Radio Science Union (URSI), Commission G.

Dr. Soicher's 15th authored paper was recently published in the *Journal of Geophysical Research*. He has made 33 presentations at meetings of national and international professional societies and groups, the last of which was at the Army Science Conference, West Point, in June.

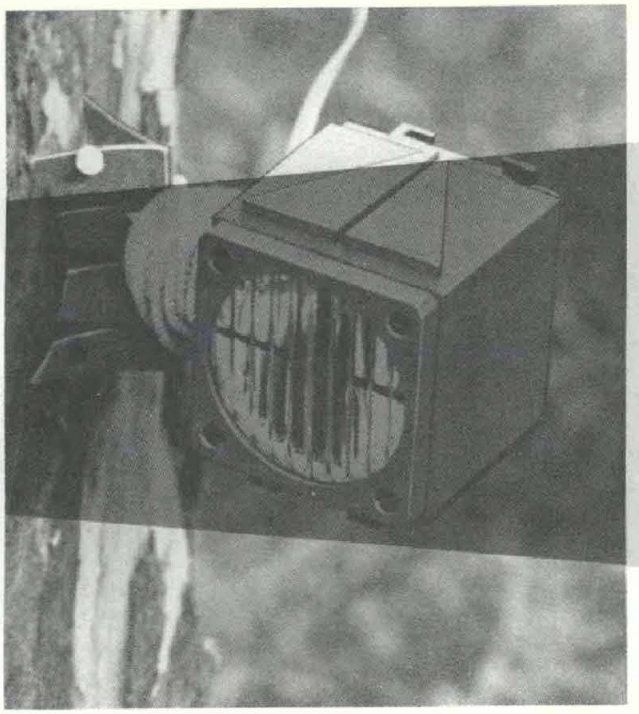
Remington Arms Gets 'High Quality' Award

Under Secretary of Defense (Acquisition Policy) Dale Church recently presented the Contractor Assessment Program Quality Excellence Flag to Mr. E. Houtin, corporate vice president of Remington Arms, during a ceremony at Lake City Army Ammunition Plant, MO.

The Contractor Assessment Program Award recognizes contractors and their employees who have continuously, over an extended period of time, demonstrated that they are high performance producers of quality products.

Church emphasized that not all contractors can qualify for this award, only those who have a documented capacity for producing high quality material. He added that the DOD expects winners of the award to continue their level of performance in order to continue in the program.

Commander of the U.S. Army Armament Material Readiness Command MG William E. Eicher gave the DOD Plaque Award to Mr. E. Kinerk, Remington Arms Plant Manager of the Lake City Army Ammunition Plant. He said that during the past seven years, the ballistic production testing acceptance rate has exceeded 99 percent.



Research, Development & Standardization "Down Under"

By LTC B. P. Manderville Jr. & SFC Dan Carlson

Portable Ambush Light (PAL), developed in Australia for use by infantry troops, provides illumination of enemy without giving away your own location. Australia has invited standardization comments from ABCA armies on this equipment item, which will enter production phase in the near future.

The largest U.S. Army unit stationed in Australia is the U.S. Army Research, Development and Standardization Group—Australia, with an authorized and manned strength of one lieutenant colonel and one noncommissioned officer. Those assigned to the group find their jobs challenging, interesting, and rewarding because of both the involvement in virtually every aspect of the Australian Army and the achievement of physical results in the form of hardware, cooperative programs and successful operations in the field.

Australia, despite its small population of just over 14 million, and a Regular Army of but some 32,000 personnel, is a solid ally of the U.S., and there *is* a mutual advantage in our cooperation and exchange of information in research, development and standardization, as will be pointed out in later paragraphs. Fostering cooperation and information exchange is the purpose of the USARDSG-Australia.

The origin of the Group can be traced to June 1963, when COL Vallard C. Smith arrived in Canberra to establish the office and begin the work of representing the U.S. Army in the research, development and standardization fields. As has been the case with most Army strength authorizations, there have been fluctuations over the past 17 years, varying in this Group's case from a high of 3 officers and 1 NCO to its present strength. In 1965 the office was officially designated as the U.S. Army Standardization Group—Australia, a name that was retained until January 1980, when it was redesignated to its current title in keeping with the renewed emphasis on RSI.

One might well ask "What does Australia have to offer the U.S., in light of its relatively small army and industrial capacity?" Many people think of Australia as a land of kangaroos, sheep, and koalas, with vast expanses of arid lands and not too many people, to fill a country the size of the U.S.' lower 48 states. This impression is true to some degree, and added to it are extreme heat (up to 48° C), high sunlight levels, an extensive tropical zone with severe wet season mobility problems, a coastline completely surrounding this massive island country, long distances and lack of transportation and other infrastructure in the central and northern areas.

However, a visitor to Australia's East Coast finds considerably different conditions. In the strip from Brisbane to Melbourne we find a relatively temperate climate, with adequate rainfall, good infrastructure and large

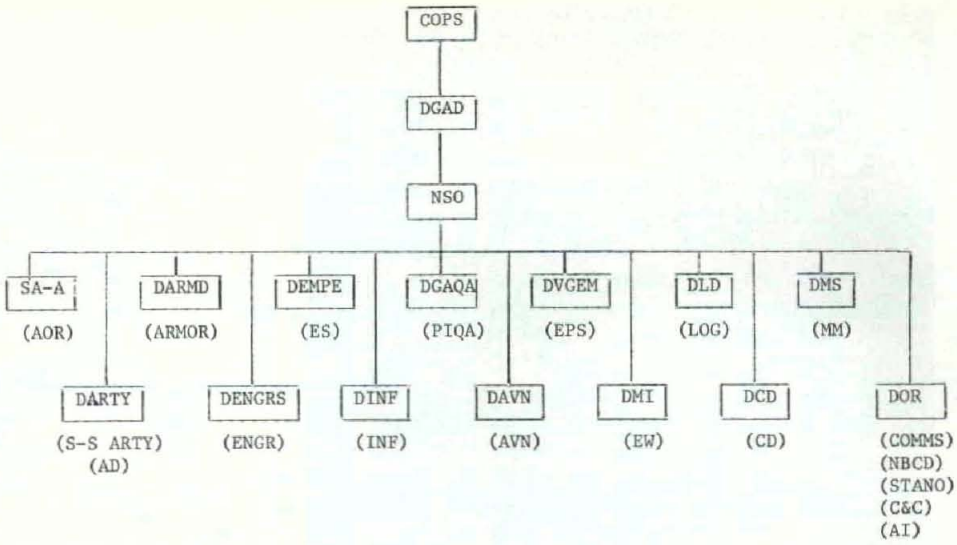
metropolitan areas. There is even a ski area in the Snowy Mountains, about one hour's drive from Canberra. Not surprisingly, some 9 million people live in this strip.

These factors drive Australian Army developments in directions that are somewhat different than those for Europe and North America. For example, surveillance equipment that will work in the moderate temperatures of Germany might perform very badly in the bright, hot, heat shimmer plagued arid wastelands of central and western Australia. For obvious reasons then, Australia prefers to "suck it and see" when it comes to buying or developing new equipment.

The environment also affects force structure and doctrine. Much effort goes into developing light forces that are capable of deployment and operation anywhere in the country. Under current reorganization plans, the Regular Army's 1st Infantry Division will be divided into a light infantry task force (as an Operational Deployment Force) which is to retain skills in tropical warfare, a standard infantry task force concentrating on open warfare, and a third task force that will develop skills in mobile operations; priority emphasis will be placed on the first.

Under these circumstances, we could reasonably expect Australia to make significant contributions to equipment and doctrine for forces operating in relatively low intensity combat in tropical or arid areas. In the equipment area, for example, they have developed a patrol ambush light that can be emplaced in front of an infantry position to illuminate enemy troops without giving away your own location. This was developed to overcome the disadvantage of using conventional flare type illumination. Other items we have seen are booby trap switches, a grapnel line and a jungle shower kit—all of which cater to small units operating in adverse environments.

In major equipment, Australia will continue to purchase most of its weapon systems from other countries, although there is a discernible swing towards home development and production where Australian industry can be interested. Examples of this trend are the near to mid term acquisition of the new single channel radio family RAVEN and a medium truck replacement. The goal is to produce most or all of these equipments in Australia. However, significant efforts are being made to assure maximum interoperability.



Australian ABCA Staffing Channels. Points of Contact for Quadripartite Working Groups (QWG) are staff officers located in Army Office Headquarters directorates. Individual QWG titles are noted in parentheses below directorates to which responsible staff officers are assigned.

For the long term, post 1990, Australia is examining its options to replace the M113 fleet. Once again, the goal is to develop and produce an Australian vehicle to meet requirements. Currently, the capability of Australia's industrial base to produce an armored vehicle doesn't exist, although given an adequate volume of production to interest them, there do not appear to be insurmountable technical obstacles in the way of Australian industry being able to produce the goods.

Examples of government capability are an indigenous small arms production capability, ammunition factories, generator design and production, cannon tube manufacture, individual clothing and equipment design and manufacture, and production of various components or adaptor kits for major items such as those for converting an M113 to a 75mm cannon armed fire support vehicle.

The U.S., in recent months, has taken advantage of Australia's generator design and manufacture capability. In one instance, we considered the generator designed to support the Rapier system for use by the U.S. Army. In another instance, we borrowed a 28v 100 amp brushless alternator to evaluate its potential usefulness in vehicles.

Australian capabilities are limited, especially when compared to the U.S., but they do have something to contribute on a wide range of materiel and non-materiel subjects. Our job in the Standardization Group is to align these capabilities with U.S. needs and to promote cooperation, primarily by means of the quadripartite agreement of 1964 among the American, British, Canadian and Australian (ABCA) Armies. New Zealand is associated with the ABCA Program through the Australian Army, and while not a full participant has access to all benefits.

The Australian Army Staff has direct control of the ABCA Program in Australia and the Chief of Operations is responsible for Australia's participation. His right

hand man for the Program, the Director General Army Development (DGAD), controls day-to-day administration through the National Standardization Officer (NSO). Collocation of the Standardization Representatives from the U.S., U.K., Canada and New Zealand, adjacent to the offices of the DGAD and NSO, is extremely helpful in carrying out support of the ABCA Standardization Program.

The officers who serve as points of contact for Quadripartite Working Groups are drawn from the Army Staff and all are conveniently located in Army Office, part of the Department of Defence, in Canberra. This arrangement provides thoroughly staffed Army positions and eases day-to-day communication on ABCA matters not only within the Australian forces but also between Australia and the Standardization Representatives.

The Australian Army emphasizes the ABCA Program, recognizing the value inherent in access to participating nations' research and development, requirements and ideas. While largely dependent on the other countries for ideas and development of materiel, Australia volunteers for a considerable share of drafting new concepts. Combat development is heavily emphasized, especially for brigade and smaller unit operations in tropical, particularly jungle, environments and lower intensity combat.

Australia hosted the TEAL XXI meeting in October 1978, and provided new stimulus for the concept of interoperability. Additionally, six QWGs met in Australia from January 1978 through May 1979, and participants agreed that the meetings were extremely well supported and efficiently staffed. During the period June 1980–April 1981, Australia will host another six QWG meetings, to include the inaugural of QWG/Automation Interoperability, for which they provide the Standing Chairman. The Senior Standardization Representative participates in all Australian hosted QWG meetings and assists the U.S. delegation before, during and after the meetings.

Australia has received considerable benefit from the standardization loan program, which allows ABCA armies to borrow equipment items from participating armies for purposes of test and evaluation. The Standardization Group monitors tests of U.S. equipment which is loaned to Australia, accounts for the equipment, and provides feedback to U.S. organizations on test results. Major U.S. standardization loans to Australia have included the M60 tank, the M113 armored personnel carrier, and the M198 and M204 howitzers. As direct results of this program, the M113 has been standard in the Australian Army for a number of years, and in May 1980 the Australian government announced that the M198, 155mm howitzer would become part of the Army's inventory.

In the daily activities of the Standardization Group, primary emphasis is on the ABCA Program, but the Senior Standardization Representative also monitors The Technical Cooperation Program (TTCP) and Air Standardization Coordinating Committee program, and conducts information exchanges with Australian defence scientists and engineers on individual programs with potential for cooperative R & D.

The Group is an important link between the U.S. and Australian armies. We provide a liaison point and communications channel between TRADOC/DARCOM/the Army Staff and Australia on a regular basis, with occasional correspondence to FORSCOM units. Although the office is not used by the Office of the Secretary of Defense, it could aid in the TTCP program as a liaison/communications link.

A significant part of the liaison job is representing U.S. defense organizations in contacts with Australian officials when requested. We also provide administrative support for visitors to Australia, such as coordinating itineraries and arranging for accomodations.

Certainly one of the most interesting tasks of the Senior Standardization Representative is identifying areas with potential for cooperative R & D, through close coordination with the Australian defence R & D people. The activity involved stimulates the flow of information on new requirements/developments between Australia and the U.S. We enjoy close rapport with a number of Australian scientific and engineering organizations, especially the Defence Science and Technology Organization (DSTO). With its headquarters located in Canberra, DSTO is responsible for all Australian defence research and development, and directs the activities of all defence laboratories. The Standardization Group coordinates with DSTO on all R & D matters.

Benefits have accrued from the exchange of information between U.S. scientists and Australian personnel employed at the Materials Research Laboratories (MRL). Active participation in TTCP programs is building MRL's reputation for comprehenisve studies in broad areas of organic and inorganic materials research at their Melbourne facility. MRL also has small but high quality efforts in lasers, NBC protection, camouflage and smoke. MRL becomes involved in virtually all Australian Army equipment acquisition.

The Aeronautical Research Laboratory (ARL), also located in Melbourne, is involved in all aspects of research in aircraft structures, propulsion and flight. The laboratory is an active participant in TTCP.

The Engineering Development Establishment (EDE), another Melbourne laboratory, is responsible for equipment evaluation, modification of equipment for Australian conditions and development of special items such as generators. This organization was formerly known as the Army Design Establishment, and it still retains the ground forces flavor, especially in the area of individual weapons.

Close ties are maintained with the Defence Research Centre—

Salisbury (DRC-S). Located in Adelaide, DRC-S has extensive research capabilities in electronics, communications, electronic warfare, systems analysis, propellants, marine developments, optics, radar and missiles. Much of their capability was built up during the halcyon days at Woomera, resulting in an active, forward-looking lab complex. They too are involved in a wide range of TTCP technical panels and subgroups.

The Defence Director Trials (DTRIALS), in Canberra, is the defence element responsible for control of test facilities and conduct of service equipment trials throughout the country. We become involved with DTRIALS whenever a U.S. agency is interested in testing equipment in Australia. One of their particularly unique facilities is the Joint Tropical Trials Research Establishment (JTTRE) located in Northern Queensland. The JTTRE provides the hot/wet, saline, warm/wet and hot/dry (tablelands) conditions needed for testing everything from boots to tanks.

The Standardization Group also cooperates with Australian Air Force and Navy staff offices, the U.S. Embassy, and U.S. Army exchange personnel who serve in a variety of Australian units, headquarters and schools.

In short, the Standardization Group is in contact with the entire spectrum of Army oriented research, development and standardization throughout the Australian Department of Defence, and has access to non-Army programs underway in Australian laboratories. As such, we are a unique organization in Australia for the U.S. Department of Defense, since the other services have no permanent research and development liaison personnel located in Australia other than attaches and exchange personnel assigned to specific projects.

We should point out that there are special communication requirements in dealing with Australia, due to problems caused by the distance involved. U.S. DOD personnel desiring to communicate with Australian organizations on R & D matters should always consider using the Standardization Group as a communications channel. Because of our position and contacts, we often can answer questions or expedite the flow of information by identifying who should be involved and by contacting individuals or organizations directly.

One particularly valuable service we offer is expediting mail between the U.S. and Australia. Mail which is not addressed through the APO system can be delayed as much as three months, unless sent international air mail. The Standardization Group can relay any mail from U.S. defense agencies to the proper recipient with an average total transit time of 10–15 days, most of which is in the postal system. A letter of transmittal isn't necessary, only a clear indication of the final recipient.

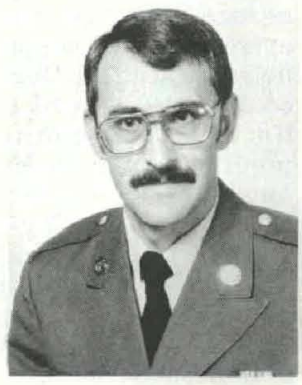
If time is critical, messages provide the most rapid answers to requests. Our message address is: CDRUSARDSG CANBERRA AUSTRALIA.

Visitors should attempt to give 30 days advance notification of visit. The Defense Attache Canberra should also receive notification of visit and security clearance information, either as a direct message or as an information addressee on a message to the Standardization Group.

Summing it up, the current 2-man group of LTC B. P. Manderville and SFC D. Carlson provides a convenient link between Australian and U.S. organizations interested in sharing resources and promoting cooperation. This "Down Under" organization is willing and able to assist U.S. defense agencies with problems of communications, acquiring information or advising on who does what to whom. Assistance is a letter, message or phone call away.

Australia is an important ally with the capability and willingness to contribute to our mutual defense. Her participation in the various quadripartite organizations is essential to maintaining a window on the mainstream of defense developments, but she is a contributor as well as a receiver of benefits. It is up to the rest of us to make use of Australia's unique position and capabilities.

LTC BERNARD P. MANDERVILLE JR. has been commander, U.S. Army Research, Development and Standardization Group-Australia, since August 1978. He was commissioned in Ordnance as a 1959 distinguished military graduate of Rensselaer Polytechnic Institute, and has held several R & D assignments. He holds bachelor's and master's degrees in aeronautical engineering, is a 1975 C & GSC graduate and a July 1980 graduate of the Army War College corresponding studies program.



SFC DANNY G. CARLSON is administrative NCO, U.S. Army Research, Development and Standardization Group-Australia. He has attended Moorhead State College and Concordia College, and has completed the Advanced NCOES, Fort Benjamin Harrison, IN. He served previously as Administrative NCO/Assistant Supervisor, Distribution Section, OJCS/DAS, Pentagon, Washington, DC.

Composite Blades May Aid Aircraft Crew Survival

A major tree strike by a helicopter usually results in a catastropic accident. However, there is evidence that improved composite rotor blades increase chances for crew survival and reduce aircraft damage. The evidence occurred recently following an unplanned demonstration.

The U.S. Army Troop Support and Aviation Materiel Readiness Command reported that an attack helicopter crew was briefed on its mission, the aircraft was inspected, fueled and readied for flight. The take off was routine and the flight crew maneuvered into position for the simulated antiarmor mission.

During the target acquisition phase while the AH-1S Cobra was performing an Out-of-Ground Effect (OGE) hovering maneuver, the tail rotor struck and cut the top 10 feet out of a 60-foot pine tree. The loss of tail rotor control forced the flight crew to land the helicopter immediately.

An autorotation was initiated and as the Cobra descended to the ground, the main rotor blades came into contact with a 60-foot pine tree. The blades severed four sections of the tree ranging from 7 inches to 9.5 inches in diameter.

Despite these repeated tree strikes, the transmission was not displaced and the main rotor blades remained attached to the damaged Cobra. The helicopter continued to the ground in an upright position.

This model helicopter is equipped with a Canopy Removal System (CRS), a self contained pyrotechnic device which cuts the windows and doors free from the helicopter, thereby giving the crew a quick egress in an emergency. Since the helicopter landed in an upright position, there was no need to activate the system. The crew initiated proper emergency procedures and a normal egress was accomplished.

A visual examination of the helicopter by qualified maintenance personnel indicated there was no apparent damage to any root hardware of either blade, rotor hub, mast or rotating flight controls. The helicopter involved in this accident was an AH-1S ECAS equipped with the improved main rotor blades which are made of composite materials and are manufactured by Kaman Aerospace Corp.

What was the damage to the main rotor blades? Well, the impact with the trees occurred in the outer two feet of the blades. On one blade the leading edge erosion guard received a spanwise slit of 20 inches from blade station 235 to 255.

Some underlying areas of the frangible leading edge filler were broken with related damage to the spar under the filler. A kink existed in the spar, including the brass weight, at blade station 250. Shape and direction of the kink indicated that the blade was at nearly full collective pitch at time of impact.

The remainder of the blade damage indicated high edgewise bending, with compressive failure of the trailing edge spline, and diagonal buckles in the skin. However, there was little spar damage inboard of blade station 220.

The afterbody was extensively damaged due to contact with the tree. As a result, sections of the core and approximately eight feet of the trailing edge spline were missing or torn loose on both blades.

The stainless steel tip cap was still attached, but slightly loosened on the blade. On the other blade, damage was similar in appearance except that the brass spar weight did not appear to be bent, nor was the stainless steel tip cap loose. Incidentally, the brass weight weighs 54.85 pounds.

It is noteworthy that although both blades received repeated severe structural impacts, they remained essentially intact, and connected to the helicopter. Since all components remained intact, the flight crew was not injured.

Major tree strikes of this magnitude generally tend to rip the transmission from its mounts due to the centrifugal force. When this occurs the following blade dips forward striking the cockpit. These two events would generally cause fatalities.

The most outstanding survivability aspect of this event is that the crew returned to flight status three days after the accident.

14 'Gunners' Used in New Test Bed Analysis

The first test of a U.S. Army Armament R&D Command's fire control test bed was successfully conducted recently at Picatinny Arsenal, Dover, NJ. A total of 14 military "gunners" were used to provide validity to the test.

The test objective was to measure and analyze improvements in gunner manual tracking accuracy with a direct view (periscope) as opposed to an indirect view (TV) of the target. In the field test, an M60A1 test bed tank was maneuvered at different speeds with crewmen experiencing accelerations up to plus or minus 0.2 Gs while approaching a fixed target from 1,040 meters.

Data from these tests will be analyzed on gunner tracking accuracy, line-of-sight rate (the rate at which the sight moves in tracking a target), sight and weapon stabilization performance, vehicle-gunner disturbance environments, and the relative value of direct versus indirect tracking.

In order to train gunners and obtain a data base, preliminary stationary tests were performed using a simulated moving target projected on a screen. The target motion on the screen was programed to simulate the tank-to-target line-of-sight rates and maneuvering parameters which the gunners would experience in the field.

The program began in late 1978 to pull together all necessary hardware and services required to modify the M60A1 tank into a fire control test bed configuration. Off-site presented scheduling problems which inhibited timely completion of tests.

The program was engineered and directed by the Control and Stabilization Team (led by project engineers, Messrs. Jospeh Pacchia and Raymond Popko and assisted by Mr. Ron Johnson) of ARRADCOM's Fire Control and Small Caliber Weapon Systems Laboratory.

All of the tank equipment and test instrumentation were integrated in-house, including a gun trunnion position sensor, a tachometer, for measuring tank track speeds, a TV camera looking through the stabilized sight, a 5-inch TV monitor positioned in front of the gunner, an electronic reticle (sighting cross hairs) generator, and accelerometers used to measure tank disturbances and changes of direction.

Plans call for the test bed to be used to aid development of other combat vehicle fire control devices, including those used on the XM1 tank, and to define the fire control systems to be implemented in the next generation of combat vehicles.

Standardization and the NATO-MAS U.S. Army Interface

By COL Joseph J. Heinlein Jr.

During any given week there are about ten representatives of the U.S. Army en route to Brussels to attend meetings with delegations from NATO nations. This is not much per week, but it adds up to about 500 annually!

These conferences occur for the purpose of formulating defining and reaching agreement on NATO standards and forming cooperative armaments acquisition projects. Delegates are armed with information, expertise and national positions related to a myriad of RSI topics. But whom will they deal with? How will their efforts be focused? What guidelines will they follow? What is the product of their meeting?

In pursuing answers to these questions, it is necessary to convey a general picture of how NATO functions and a more detailed image of what this writer does as the U.S. Member of the Army Board, Military Agency for Standardization (MAS). Although there are several U.S. Army officers dealing in standardization assigned to NATO, I am the only purely "green suiter" in NATO, i.e., assigned to an Army organization, specifically to DARCOM.

The NATO organization within which standardization is pursued is large and complicated. It reflects the international character of the Alliance, and also its integration of political and military elements. An appreciation of these NATO aspects is essential to an understanding of how standardization is achieved.

Political and economic aspects of the Alliance, both national and international, dictate civilian, as opposed to military, managers be directly involved in standardization activity. Nonetheless, military input to the process is essential and in such areas as doctrine, tactics and procedures, it is the main ingredient in achieving interoperability. The NATO organization clearly acknowledges these civil and military roles.

Immediately subordinate to the North Atlantic Council are two major NATO organizations dealing in standardization: the Conference of National Armaments Directors (CNAD) and the Military Committee (MC), respectively on the civil side and military side of the Alliance.

As U.S. Member of the MAS Army Board, I have a responsibility to insure that certain U.S. Army interests are surfaced and coordinated on the military side of NATO. As DARCOM's "man in NATO," I have the latitude and the responsibility to develop RSI initiatives and recommend, through DARCOM, how they should interface between CNAD and MC bodies.

Both the CNAD and MC have subordinate organizations heavily involved in hammering out Standardization Agreements (STANAGs). However, their charters define different spheres of activity.

The CNAD promotes cooperation in R & D, and in procurement of future military equipment. This type of standardization planning encompasses political and economic issues which involve national governments and major industries, many of which are multi-national.

In this context, it follows that the national missions to NATO under the aegis of ministries of foreign affairs (the U.S. Mission is headed by an Ambassador and administered by the Department of State) are responsible for the activities of national delegates to CNAD groups, panels and committees.

On the military side of the NATO Headquarters, subordinate to the Military Committee, is the Military Agency for Standardization (MAS). This committee seeks to standardize military doctrine and procedures and achieve interoperability and interchangeability of *equipment already in the field*. The MAS addresses current military issues to enable NATO forces to operate effectively together.

The U.S. Army Member of the MAS Board keeps the U.S. Mission and the U.S. Delegation to the Military Committee apprised of ongoing activities in the MAS. Since both the Mission and Delegation are functionally organized, every Army interest has a niche somewhere in those organizations.

Although the point was made earlier that the CNAD is NATO's civil aspect and that the Department of State oversees U.S. involvement in CNAD activities, it should be noted that these activities are basically military in nature.

However, the military, technical, and state-of-the-art expertise involved in these issues resides for the most part within the Department of Defense.

Consequently, one finds in practice that many of the Americans working for the Department of State in the U.S. Mission are in large measure DOD civilian and military personnel. The Army, like other services, provides officers with the background and skills to fill numerous permanent positions in NATO headquarters. (The next article will address the role of the CNAD and the role of U.S. Army officers assigned to the U.S. Mission.)

Department of Army military and civilian delegates are constantly involved in meetings of "expert" panels furthering standardization. These working groups of experts composed of one to ten delegates are from each member nation. As a rule MAS representatives meet annually, and their product is a draft STANAG; the CNAD groups meet twice annually and strive for cooperative armaments acquisition projects.

The STANAG must be ratified by the majority of nations before it is promulgated as a NATO standard. Both the CNAD and the MAS organize these panels of experts along service lines for ease of management and categorizing subject matter.

It is with the working parties managed by NATO's military side that the writer, in his capacity as U.S. Member of the Army Board, finds his most detailed involvement in the standardization process.

First, as an Army Board Member, in regular deliberation with counterparts from each NATO nation, the management aspects of the working parties are thrashed out: terms of reference are developed; decisions are made to pursue projects; advice is rendered on procedures; and overall review of working party activities is ongoing.

Secondly, both the substantive issues to be addressed by delegations and the administrative aspects of their missions are coordinated by the U.S. Army Board Member's office.

Virtually any element in NATO Headquarters can sponsor a working party designed to standardize something. Furthermore, many U.S. Army delegates probably are not aware that their participation in a CNAD panel places them on NATO's "civilian side." They also don't realize that a MAS working party's efforts are

not supervised as directly by the U.S. Military Representative (the national military channel) as they are by the Military Committee (the international military channel).

The U.S. Member of the Army Board carries out the same consensus building at Army Board level with allied counterparts, among the service boards, and between NATO's civil and military elements. This is the "bread and butter" payoff for delegates at working level.

Prior coordination of issues in preparation for meetings, identifying RSI initiatives,and reporting of recommendations can facilitate and expedite efforts of U.S. Army delegations to NATO.

The consensus required for a 15 member international alliance to establish policy, agree to standards and then to insure their implementation has led to development of basic standardization principles. These are:

- Standardization is *voluntary* on the part of NATO nations and is not considered an end in itself.
- Standardization is considered essential when the implementation of operational plans depends upon it; it is considered desirable when it would enhance the implementation of operational plans and have mutual benefit to nations by economizing expenditures in support of NATO.
- NATO standardization should complement standardization among smaller groupings of nations.
- The degree of standardization will depend on circumstances, e.g., relevant only to AFSOUTH nations, or interoperability may suffice in lieu of interchangeability.

Standardization within NATO is documented and published in one of two forms: the Standardization Agreement (STANAG) and the Allied Publication (AP). The STANAG is formally coordinated among nations in a series of drafts leading to ratification or agreement by at least a majority of NATO nations.

The STANAG deals with matters of substance, either technical with regard to hardware R & D or procedural with regard to military operations. Ratification carries a commitment by the ratifying nation to implement the terms of the agreement.

It is not unusual in Europe to find brigade, battalion or even company commanders attempting to locate copies of STANAGs. They have heard perhaps from allied counterparts or from evaluations that "such and such" procedure or requirement exists because it is contained in a particular STANAG.

Requests from field units for STANAGs demonstrate a widely held misconception of how a STANAG should be implemented. Proper national and service implementation of NATO agreements precludes the requirement for forces in the field to ever have a STANAG in their possession.

All Army Board STANAGs pass through the U.S. Member's office en route to Washington for comment in draft form and for ratification in final form. Files are maintained for reference and review purposes.

A good place to start looking for an answer to a STANAG question in NATO is with the U.S. Member of the Army Board. If this office does not have the answer, it will find it.

Once the U.S. ratifies a STANAG, it is encumbent upon the responsible DOD agency or military service to incorporate its terms in orders, directives, manuals and publications. It is the national or service publications which field forces should abide by. Thus, they will be meeting standards agreed to within NATO.

These NATO standards are relevant to our forces in the field. The standardization process is based upon military requirements and procedures. Proposals addressed at NATO Headquarters seldom originate there.

Proposals spring from national delegations to various NATO forums, from major NATO commands or national commands as a result of field exercises, or technicians appreciating new technology.

Feedback is also essential in keeping the standardization effort on track. Observations and problems encountered in national and NATO military exercises must be registered at NATO Headquarters. Regular reports of exercises are elicited and briefed to insure that the "feedback loop" remains open.

It is because of the responsibilities listed above that I am assigned to DARCOM. There are also de facto responsibilities associated with assignment in NATO. These run the gamut of coordination, facilitation, and liaison on behalf of any and all U.S. Army agencies and commands.

In my capacity as U.S. Member of NATO's Army Board, I conduct quarterly liaison visits to USAREUR, visit SHAPE each month, and about every six months visit CONUS to exchange information.

Reports on progress and problems is a major aspect of the Army's mission in Brussels. Achieving an awareness of Army's needs and aims and an appreciation of how they contribute to NATO.

The Office of the U.S. Member of the Army Board in Brussels can help meet this challenge by serving any and all U.S. Army commands and agencies whose mission brings them to NATO.

The product of this frenetic activity by groups, panels, boards and meeting after meeting can be summed up in terms of STANAGs and Allied Publications. The number varies with additions and deletions occuring regularly, but currently there are some 800 agreements within the Alliance.

Given the broad spectrum of issues, procedures and equipment these agreements address, it is obvious that interoperability within the Alliance is becoming more of a reality.

In summary, the Office of the U.S. Member of the Army Board monitors U.S. representatives to MAS working party meetings, ensures timely transfer of documents back and forth between the MAS and the Army at large, maintains liaison between the Army (especially USAREUR) and the MAS, processes equipment loans and exchanges, and assists U.S. Army visitors to the MAS.

What does the Army do in Brussels? It provides the expertise, many of the ideas, and much of the work required to standardize doctrine, tactics and procedures NATO-wide.

Even though, as one Army delegate to a MAS conference put it, "we seem to be accomplishing very little, very slowly," the aggregate result of standardization activity in NATO is profound and meaningful. A successful REFORGER exercise does not just happen. Those U.S. Army delegates headed for a meeting in Brussels this week will be contribution to its success.

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Role of the U.S. Mission to NATO in Armaments Cooperation

By COL Daniel Malone & LTC Regis Reynolds

The dramatic expansion of the Warsaw Pact's conventional forces, and economic and political demands within Alliance member states have led to a declared consensus ... that defense cooperation—the pursuit of standardization and interoperability through collaborative weapons acquisition—is one of the Alliance's most important tasks as NATO enters its fourth decade.

However, the weapons acquisition process in NATO is defined by each country's military and industrial objectives. Acquisition decisions remain the prerogative of individual member states. Although NATO is trying to accelerate cooperative weapons acquisition efforts, the Alliance remains an international not supranational body.

Decisions in NATO are made on a consensus basis. Problems involved in reaching a consensus with 15 independent nations are obviously quite complex. To alleviate that problem in the area of armaments acquisition, we established special procedures so that, if two or more nations desire to band together, a NATO project can be initiated. (See *Army RDA Magazine*, March–April 1979, for a discussion of the various acquisition processes in NATO.)

The senior element representing the U.S. Government in NATO is the United States Mission to NATO (USNATO). This article describes USNATO and, more specifically, its role in armaments acquisition matters. Focus is on interrelationships between Army representatives to NATO meetings and USNATO officers.

In the preceding article by COL Joseph Heinlein, dealing with the NATO-MAS U.S. Army interface, the author gave a short explanation of the organization of NATO, so a repeat will not be included here. Sufficient to say that there are two sides to the NATO structure—military and civilian.

Cooperative armaments efforts occur on both the civilian and military sides of NATO. Near term armaments standardization efforts, mostly dealing in interoperability matters of weapons already fielded, occur in the Military Agency for Standardization, on the military side, as is described in COL Heinlein's article.

NATO accomplishes cooperative long-term R&D, and acquisition efforts under bodies on the civilian side of the Alliance, most importantly in the Conference of National Armaments Directors (CNAD). CNAD is a subordinate element of the NAC, not the Defense Planning Committee.

Although France and Greece do not participate in the integrated military structure, they do participate in NATO weapons system development and acquisition efforts in CNAD. The CNAD oversees the work of several groups including the main armaments groups, the most important for readers being the NATO Army Armaments Group (NAAG), the Tri-Service Group on Communications and Electronic Equipment, and the Tri-Service Group on Air Defense.

More than 300 officers and civilians, representing DA, DARCOM, and TRADOC travel to Brussels during each year to work on standardization in the NAAG, its subordinate panels, and subpanels. While in Brussels, all will interact with the U.S. Mission.

The U.S. Mission, headed by Ambassador W. Tapley Bennett, is a Department of State element organized to serve NATO's particular requirements. Assisting the Ambassador is the Office of the Defense Advisor, headed by Dr. Laurence Legere, senior civilian representative in Europe of the Secretary of Defense.

The Defense Advisor, in turn, is assisted by an overall Deputy, U.S. Army BG Stephen E. Nichols, and a Deputy Advisor for Research and Engineering, Mr. Robert Calaway, alter ego of the Under Secretary of Defense for Research and Engineering.

Within USNATO is the Armaments and Standardization Division, which coordinates the U.S. efforts in the various bodies of NATO dealing with long term armaments matters. (Similarly, the Communications and Electronics Division deals with those efforts in the area its name implies; however, this article will concentrate on the Armaments and Standardization Division.) As one would expect in a diplomatic mission, the function of the Armaments and Standardization Division is to support the Ambassador.

The armaments officers assist in preparing U.S. positions on armaments matters for meetings of the NAC, DPC, and a myriad of other committees. In all, there are about 300 meetings a year on the civilian side of NATO which consider armaments matters.

The armaments officers' duties include briefing Congressional delegations, representing the U.S. in NATO committees, maintaining relationships with NATO entities, and accompanying senior U.S. officials to NATO defense establishments.

Armaments officers also assist in maintaining relationships with academicians, think tanks concerned with policy on armaments cooperation, and the press.

The Armaments and Standardization Division has three major functions directly related to meetings of the main armaments groups. First, it ensures that positions proposed by U.S. elements are properly placed and supported in the NATO structure.

Second, the division is responsible that proposals presented by U.S. experts conform to national policies of munitions control, other public laws, and to the standardization initiatives of OSD, and are consistent with U.S. positions taken in other NATO fora.

Finally, the division, as eyes and ears of the U.S. in NATO Headquarters for R&D matters, attempts to discern from counterpart delegations, areas of poten-

tial armaments cooperation, or probable pitfalls, to apprise Washington of these matters, and to propose solutions.

In a reciprocal manner, DOD Directive 2010.6, establishes that the Services, through USDRE and ASD(ISA), will keep the Mission, and the American embassies in NATO capitals, "apprised of the status of current and potential weapons system developments and acquisitions or productions, and of potential standardization and interoperability issues."

The Armaments and Standardization Division is headed by an 0–6, currently Army. One officer, at the 0–5 level from the Army, Navy, and Air Force, is assigned to coordinate matters of interest to that service.

In addition to supervising the division, the division chief acts as the National Armaments Director's Representative (NADREP) to the CNAD. Meeting about once every two weeks, the NADREPs continue the work of the National Armaments Directors (U.S., Dr. William Perry, USDR&E), who meet twice a year.

U.S. representatives to NAAG meetings must appreciate how the NAAG functions and how the Army Armaments officer can help them. The NAAG recently adopted new methods of work which give priority to forming cooperative projects for weapon system acquisition.

Although these projects always were a goal, the NAAG's former modus operandi was for nations to exchange information on weapons developments, but leading to only a few projects. While some cooperative efforts began under the old method of work, the new methods should lead to a number of project groups pursuing cooperative development, production, or procurement.

U.S. representatives making presentations to panels, therefore, should have a "bottom line" to their presentation. This bottom line should offer nations an opportunity for cooperation with the U.S., something other than "the U.S. will sell, if you buy." Validly or not, other nations have criticized the U.S. for coming to panel meetings just to make sales pitches. Conversely, other nations have been criticized for attending those meetings only to learn what is new in the U.S.

Although NATO operates on a consensus basis, it is not necessary for all nations to agree to a cooperative project before it can be formed. Existing and new CNAD guidance for forming cooperative projects (now in a NATO-wide trial period although the NAAG has adopted it already) called PAPS (Periodic Armaments Planning System) provides that if more than one nation desires to form a cooperative project, they can.

The project groups report progress to NATO periodically, but remain under the direction of those nations forming the group. The PAPS process permits nations to join (or leave) the project at certain milestones as full participants or observers. PAPS can be viewed as an international weapon system acquisition process, similar in structure to the U.S. DSARC process.

The U.S. Army Armaments officer in USNATO monitors the work of the NAAG, its subordinate bodies, and most air defense activities of all Services in NATO Headquarters. His duties vary.

Prior to a meeting, representative conferees and the armaments officers should discuss expected proceedings. Following the meeting the representative should debrief the armaments officer. He will also assist the representative in writing the required reporting cable to Washington.

The cable highlights those parts of the meeting most likely to be of interest to OSD, the Army, or the State Department. Background and deciphering innuendo plays an important role.

Often, the armaments officer, in briefing/debriefing U.S. panel representatives can spotlight potential problems and solutions. He can also relate isolated facts emerging from a meeting to a scheme of actions.

U.S. Mission comments added to reporting cables alert OSD, the State Department, and the Army of specific areas of concern.

Army representatives to NAAG panel meetings and Army armaments officers are placed so that they can increase the probability for U.S. and NATO success in cooperative efforts.

NAAG panel representatives probably have the latest information on U.S. developments, and often on foreign developments.

USNATO armaments officers probably have better information on other nations' general views on cooperative efforts, relevant policy positions, and their overall cooperative procedures. This coordinated effort between the U.S. representatives and USNATO armaments officers insures that the U.S. is well represented at NATO meetings. It also provides coherence and progress in NATO cooperative armaments efforts which constitute long term goals of the United States.

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LTC REGIS J. REYNOLDS is the Army armaments officer in the U.S. Mission to NATO. He is a graduate of USMA and has a master's degree in systems analysis from the University of Rochester. LTC Reynolds has had several R&D assignments including tours with the SAM-D Project Office and the Ballistic Missile Defense Program Office.

HDL Reports on Surface Wave Acousto-Optic Technology

The tide of tomorrow's military battles may well turn in favor of the force that is armed with the most sophisticated, technologically advanced battlefield equipment, rather than the side with simple numerical superiority in men and materiel.

One example of a scientific breakthrough with far-reaching battlefield implications is the combination of surface acoustic wave device technology with optics by using acousto-optic interaction to obtain extremely powerful signal processing devices.

Enhancement of this surface wave acousto-optic technology is the aim of physicists and engineers at the Harry Diamond Laboratories (HDL), one of the seven research laboratories of the Army Electronics Research and Development Command.

Imagine the advantage a battlefield commander would have with a man-portable device that could instantly identify "friend" or "foe" radio and radar signals, simultaneously plot their locations and transmitting properties, and in some cases, their message content.

A commander who can plot, identify, and track the enemy's movement, in the air or on the ground, pinpointing his base stations, ground troops, armored forces, aircraft and missiles, has an obvious tactical superiority.

Signal recognition using high resolution spectrum analysis and correlation is a primary application of this new technology. Using the technology, the signal processors of the future will scan wide frequency ranges and simultaneously plot a large number of transmission sources.

The who, what, and where of target identification will be determined as a result of correlation between stored data and incoming transmissions. This is basically what surface wave acousto-optic technology is all about.

HDL researchers are currently experimenting with three processors. All three have important electronic/signal warfare, surveillance, and target acquisition potential. The three systems are the acousto-optic time integrating correlator, triple product convolver, and acousto-photorefractive effect memory correlator.

The acousto-optic time integrating correlator can detect a weak, broadband, noise-buried signal, either communication or radar, by using a unique combination of three different technologies, i.e., optics, surface acoustic waves, and charge-coupled devices.

The combination of technologies results in a processor that exploits the broadband capability of surface acoustic wave devices and the long integration times of charge-coupled devices to obtain processing gains in excess of a million.

Besides detecting the signal, this processor can identify the type of modulation, center frequency, bandwidth, and location of the emitter. This information is necessary for mapping of the electronic battlefield.

Another processor under development is the triple-product convolver (TPC). Real-time spectrum analysis of wide band radar and communication signals and high frequency direction finding are two applications made possible by this device.

The feasibility of the TPC to operate with multiple-input laser beams has recently been demonstrated. Program goal is to develop a large scale version that operates with up to 32 lasers simultaneously.

Follow-on efforts will aim at incorporating integrated optics techniques into the device. Eventually this processor might be the size of a small book.

The acousto-photorefractive effect memory correlator allows for the storage of radio frequency signals on the surface of a crystal for up to several months. Live signals can be instantly correlated with stored ones, thus providing a rapid identification capability.

These stored patterns are formed by non-linear interaction between propagating surface acoustic waves and very intense, short duration, infrared laser pulses. A physical model for this newly discovered phenomenon is now in the development phase.

The success of the HDL investigations will permit the Army to field compact signal processors, possibly as small as a backpack. The increased accuracy and mobility of these processors will hopefully give the Army the vital technological edge necessary to maintain battlefield superiority.

New Cap Designed For Temperate Use

Soldiers will be getting a new cap to accompany the new Woodland Camouflage Battledress Uniform. It is intended for field or garrison use in temperate climates. The cap is designed with a visor, circular top crown and detractable earflaps which are lined with flannel.

It was developed at the U.S. Army Natick (MA) Research and Development Command. The design is much like the existing style ranger cap. It is made from a tightly woven wind resistant and water repellent treated lightweight fabric with quarpel for waterproofing.

Colors in the Woodland camouflage pattern are yellow, green, dark green, brown and black. The earflap lining is olive green. The new cap will be introduced in 1981.

Contracts Exceed $21 M

AVCO Corp., Lycoming Division, has received two contracts totaling more than $21-million from the U.S. Army Troop Support and Aviation Materiel Readiness Command.

One contract, valued at $17.5-million, is for the purchase of engines used on the AG-1S Cobra aircraft. Production is scheduled to begin in August 1981 and be completed by March 1982.

The second contract, valued at $3,543,223, is for conversion kits which apply to the modernized CH-47D Chinook aircraft. Work under this contract is scheduled from March 1980 through March 1982.

NEW COMBAT BOOT, which has a suede-like appearance and is earth brown in color, is under development at the U.S. Army Natick (MA) Research and Development Command. It incorporates spike protective insole, a reinforced fiberglass toe for impact protection and won't require polish.

Natick Developing New Family of Field Medical Units

The Army has come a long way since the Korean Conflict when operating tents were used as the standard medical field facility. The MUST (Medical Unit, Self-Contained, Transportable) hospital was the first step, moving out of tents into air-supported, rigid shelters.

For more than two years now, engineers at the U.S. Army Natick (MA) R&D Command have been working on an even more modern family of field medical units.

Critical elements of the new field hospitals, such as operating rooms and intensive care units are contained in environmentally controlled tactical shelters which go up in half an hour and are constructed of aluminum over paper honeycomb. Stiffness without weight is the idea.

Each shelter will collapse to a standard container size of 8 x 20 feet which is an international shipping standard. Currently, two different models can be expanded during setup and provide space roughly equivalent to twice or three times the container size.

The shelters can be used for a variety of purposes. They are adapted with various specialized kits which will turn them into communication centers, machine shops, kitchens, etc. Such shelters are the basis in concept for housing future field hospitals. They will be standardized so military needs will be met using the same type shelters.

This is a first for all the Services to be using the same cornerstone building blocks for their hospital needs. The Navy is due to start their fleet hospital test this summer in the California desert.

In addition, the Army will continue testing in Alaska and Panama to see what effects extreme cold or humidity have on these shelters. The Air Force also will be evaluating these shelters for an air transportable hospital.

One of the advantages, according to Mr. Irving Weitzler, director of Natick's Aero-Mechanical Engineering Laboratory, is that the atmosphere of the shelters can be controlled with air conditioning and heating as a regular hospital operating room. To give mobility to these shelters, they have wheels that attach to the front and back so they can be towed, then easily set up by a few people.

All elements of these shelters are interchangeable so that air conditioning, heating and lighting equipment can be interchanged with any other shelter.

They are constructed using panels and, if damage occurs, only the damaged panels need be replaced, not the whole unit. Each shelter is equipped with black out shades so operations can continue without light being exposed to enemy observers. A switch automatically turns lights off if a door is opened. The shelters have been designed for quick packing. All equipment is developed on a prepackage concept to accommodate rapid deployment.

EXTERIOR of Tactical Shelter Hospital Operating Room

ARRADCOM Uses NMR Spectrometer

Scientists at the U.S. Army Armament R&D Command now have a nuclear magnetic resonance (NMR) spectrometer that enables them to examine the molecular structure of compounds in solid form. Until now, Army laboratories could only obtain clear, detailed (high resolution) NMR spectra of compounds in solution.

This new capability - nuclear resonance spectroscopy in the solid state - is being used by ARRADCOM personnel to examine explosives and propellants such as HMX and nitrocellulose in solid form.

"Since explosives and propellants are most often used as solids, it is important to understand the effects of the crystalline environment on the chemical behavior of these molecules," explains Dr. Suryanarayana Bulusu, a research chemist working with NMR in the Energetic Materials Division, a part of ARRADCOM's Large Caliber Weapon Systems Laboratory.

Each atomic nucleus in a compound absorbs, energy in a different radio frequency region. From the way it absorbs, scientists can get some insight into the compound's molecular structure. "The resulting spectrum is like a fingerprint of the molecular structure," says Bulusu.

When the NMR technique was first discovered in the early 50s, scientists could only study protons (hydrogen nuclei). In the last 12 years, however, it has become possible to use NMR to examine the naturally occurring, rare isotopes of carbon and nitrogen, namely, carbon-13 and nitrogen-15. These rare isotopes yield valuable structural information about organic compounds that is unobtainable from the common and more abundant cargon-12 and nitrogen-14.

The ability to study nitrogen-15 with solid state NMR is especially valuable since "the presence of nitrogen in organic explosives seems essential for their explosive properties," says Bulusu.

It is hoped the new solid NMR technique will be effective in studying compounds other than explosives and propellants, such as plastics and even complicated biopolymers like proteins which are of interest to the Army mission. Bulusu hopes to apply this technique to problems associated with the casting of Composition-B and the tendency of ammonium nitrate to absorb moisture.

INTERIOR of Tactical Shelter Hospital Operating Room

Capsules . . .

Senior Executive Service Vacancies

The following is a listing of Senior Executive Service vacancies which are or will be under active recruitment in the July-September time frame.

- Director, Systems Review and Analysis, Deputy Chief of Staff for Research, Development and Acquisition.
- Assistant Director for Research Programs, Deputy Chief of Staff for Research, Development and Acquisition.
- Chief, Laboratory and Development Command Management Office, HQ DARCOM.
- Associate Director for Systems Development, Directorate of Development and Engineering, HQ DARCOM.
- Chief, Munitions Division, Chemical Systems Laboratory, APG, MD.
- Technical Director, U.S. Army Satellite Communications Agency, Fort Monmouth, NJ.
- Technical Director, U.S. Army Satellite Communications Agency, Fort Monmouth, NJ.
- Technical Director, U.S. Army Electronics Command (ERADCOM).
- Associate Technical Director for Research and Technology, ERADCOM.
- Associate Technical Director for Production and Acquisition, ERADCOM.
- Director, Electronics Warfare Laboratory, Fort Monmouth, NJ.
- Chief, Research and Technology Division, Harry Diamond Laboratory (HDL).
- Chief, Development and Engineering Division, HDL.
- Chief, Nuclear Weapons Effects, HDL.
- Chief, Guidance Control and Analysis, U.S. Army Missile Command (MICOM), Huntsville, AL.
- Director for Ground Equipment and Missile Structure, MICOM.
- Deputy Director, Missile Intelligence Agency, Huntsville, AL.
- Director, Tank-Automotive Concepts Laboratory, Warren, MI.
- Chief Engineer, Project Manager for XM1 Tank, Warren, MI.
- Technical Director, U.S. Army Test and Evaluation Command, APG, MD.
- Director, Intelligence Production Division, U.S. Army Foreign Science and Technology Center, Charlottesville, VA.
- Director, Engineering Science Division, U.S. Army Research Office, Research Triangle Park, NC.
- Scientific Advisor (Logistic Combat Development), U.S. Army Logistics Center, Fort Lee, VA.

Individuals interested in applying for any of the above vacancies should contact, Commander, U.S. Army Materiel Development and Readiness Command, ATTN: DRCLDC, Alexandria, VA 22333. Autovon 284-9562 or (202) 274-9562.

WSMR Tests Provide Missile Plume Data

The second in a series of three Air Force rocket-borne tests was launched recently from the Naval Ordnance Missile Test Facility at White Sands (NM) Missile Range. The first in the series was launched from the same site 10 November 1977.

The tests are designed to provide Air Force and Army scientists and engineers with highly precise missile plume data essential to the design of missile detection and tracking systems.

During the tests, exhaust plumes emitting from a target rocket engine were studied from a companion spacecraft at altitudes of from 100 to 150 miles above earth. A target engine and its companion spacecraft were boosted into space by a single Aries rocket. The combined weight of the two payloads was 2,950 pounds.

Both spacecraft were equipped with attitude control systems to point them in the desired direction throughout the many complex maneuvers involved in the test. After the dual spacecraft were separated in one piece from the booster, they were pitched over to a 45-degree angle and separated by hydraulic pistons.

Both spacecraft then coasted until the target engine separated a safe distance from the sensor module. As the 7-foot-long doors on the sensor module were opening, the target engine fired at an angle of 100 degrees in a "getaway" maneuver.

The program and tests are under the direction of Mr. Adelbert McIntyre of the Air Force Geophysics Laboratory, Bedford, MA. The program is sponsored by the Air Force Space Division, Los Angeles.

In Brief . . .

Starry Discusses New Division 86 Concept

Division 86, a new concept of developing an effective Army Force structure for the 1980s, was the major subject of discussion of GEN Donn Starry, commander, U.S. Army Training and Doctrine Command, at a recent HQ DARCOM Commander's Call meeting.

GEN Starry began his presentation by stating that "we are faced today with the greatest attempt to modernize the U.S. Army since the early part of World War II." Division 86, he said, will hopefully help achieve this modernization. A target date of 1986 is used because it is the most distant projected date than we can assess the threat with reasonable accuracy.

When plans were developed in the past, Starry continued, there was really no blueprint of how we get from today to 20 years from today. However, the process is different today. We now use a Battlefield Development Plan in our forecasting.

This Battlefield Development Plan measures today's environment and what the differential might be 10 years from today. An attempt is made to reduce this differential. This Battlefield Development Plan also helps the Army modernize itself. Factors included in the Plan are future technology, resource constraints, tactics, training, and equipment.

The TRADOC commander explained that the Division 86 approach is really a road map for change. TRADOC is now working with the Army Staff to develop a transition plan to move from today to 1986. Said Starry: "we must know how to phase in new systems and phase out old ones." If we did not have a Division 86 Plan, said the General, we might end up with a 25,000 man division in 1986.

Starry indicated that studies are also being conducted relative to light divisions, corps structure and echelons above corps 86. He added that we must build in robustness and resiliency as we create new organizations. There will be many organizational changes as a result of Division 86.

The General noted that another reason why 1986 is considered important is because many new weapon systems are expected to enter the Army inventory at that time. He stated also that a validated threat is available for that period.

GEN Starry followed his formal presentation with a series of responses to audience questions. He was queried as to what the Army is doing about interoperability. Important efforts in this area, he noted, include the German Staff Talks and talks with the British. These talks are sometimes slow and frustrating, he added, but we are definitely making progress.

The subjects of other questions included the Army logistics system, the present and future status of TRADOC testing, the impact of the Rapid Deployment Force on Division 86, and GEN Starry's view of contracting out for certain Army base operations.

Conferences & Symposia . . .

Conferees Discuss Aviation MANTECH

Improved manufacturing methods, processes and equipment relative to the production of Army aircraft was discussed in depth at the 2d Army Aviation Manufacturing Technology Conference at Corpus Christi, TX.

Organized and directed by U.S. Army Aviation R&D Commander MG Story C. Stevens, the meeting was conducted by AVRADCOM in cooperation with industry, the Aviation Association of America and Corpus Christi Army Depot.

Keynote speaker Dr. Walter B. LaBerge, Principal Under Secretary of Defense for Research and Engineering, stated that until recently the U.S. had enjoyed production supremacy over other nations. However, he added that the U.S. has suffered from a productivity decline while other nations are prospering.

Major work during the conference was carried out by panels which reviewed proposed MANTECH projects submitted by industry. Panel chairmen were: Mr. Robert J. Torok, senior vice president, Production Programs, Sikorsky Aircraft, Airframe System; Mr. Richard K. May, vice president, Operations, Bell Helicopter Textron, Drive System; Mr. Don Weidhuner, senior vice president, Programs, AVCO Lycoming, Propulsion System; Mr. Kenneth Grina, vice president of engineering, Boeing Vertol Col, Rotor System; and Mr. Richard E. Kangas, manager, Mnufacturing Engineering, Hughes Helicopters, Aircraft Subsystems.

Other invited speakers were Mr. Fred Randall Jr., vice president, Subcontracts, Vought Corp. and Mr. Gerhard Neumann, vice president, Special Projects, General Electric Co.

In reviewing more than 200 projects, conferees gave primary considerations to cost reduction, application to current and future aircraft production, improved reliability and maintainability, high probability of success, and assurance of implementation on successful projects.

High priority projects were listed as those using lightweight, high strength non-metal substitutions where feasible, material reduction through the use of near-net-shape hot isostatically pressed (HIP) casting technology, superplastic forming in lieu of conventional forming operations and in other improved quality and manufacturing techniques.

A finalized MANTECH Conference Report will be issued in July. Further information concerning this conference may be obtained from Mr. Robert G. Vollmer, AVRADCOM, chief, Production Technology Branch, DRDAV-EGX, P.O. Box 209, St. Louis, MO 63166.

BRL Conference Draws Over 200

More than 200 military and civilian scientific representatives attended the 10th annual Army Armament Research and Development Command's Ballistic Research Laboratory Spring Technical Conference.

The 3-day meeting featured 32 scientific and technical presentations from each of BRL's research areas including launch and flight, vulnerability/lethality, ballistic modeling and terminal and interior ballistics.

Dr. R. J. Eichelberger, BRL's director, welcomed the audience of laboratory personnel and guests, including visiting research personnel of the Army, Navy and Air Force as well as scientific and technical personnel from the Army Research Office, Durham, NC, and the Army Materiel Development and Readiness Command, Alexandria, VA.

Smoke Symposium IV Features 36 Papers

More than 200 military, civilian, industrial and academic representatives from Australia, Canada, Denmark, France, Germany, Israel, Norway, the Netherlands, and the United Kingdom participated in Smoke Symposium IV at the U.S. Army's Harry Diamond Laboratories, Adelphi, MD.

The symposium was convened by COL Samuel L. Eure, PM Smoke/Obscurants. An annual event, it is designed to disseminate information on smoke/aerosol and electro-optical technology and development achievements, modeling, instrumentation and methodology, smoke/obscurant operational concepts and the effects of battlefield obscurants on high technology weapons systems.

Keynote speaker MG James H. Patterson, director for Battlefield Systems Integration, HQ DARCOM, discussed the role of obscurants on the battlefield. COL Eugene S. Lynch, chief of staff, HQ ERADCOM, welcomed the participants to HDL, an ERADCOM facility.

Thirty-six papers were presented on subjects such as modeling, the effects of smoke, dust and battlefield debris upon electro-optical systems; determination of obscurant characteristics; measurement of electro-optical system performance in an obscurant environment; military smokes and smoke munitions; and doctrine and training for combat in a smoke environment.

Attendees indicated that the symposium was a success in terms of types and scope of papers presented, symposium format and administration, and urged continuing the event. It is anticipated that the next smoke symposium will be highlighted by results obtained from Smoke Week III, scheduled to be held in August 1980 at Eglin Air Force Base, FL.

Smoke Week III is an exercise wherein the PM, Smoke provides a characterized obscurant environment for evaluation by electro-optical systems developers. Specifically, the developers evaluate the effects of such an environment on their systems. Proceedings of Smoke Symposium IV, classified Confidential, are available for distribution.

Career Programs . . .

Gross Chosen for CSL Executive Training

Donald Gross

Mr. Donald Gross, a chemical engineer who started his federal service career at Edgewood in 1959, has been selected to participate in the U.S. Army Armament R&D Command's Chemical Systems Laboratory (CSL) technical executive training program.

Gross enters the 6-month training period with experience in many facets of CSL's research and development programs, particularly in ground munitions and environmental technology.

He is the 36th civilian employee to participate in the executive training program, established in 1971 by Dr. B. L. Harris, CSL's deputy director. The program includes three months of training in the Office of the Deputy Director and a similar training period at HQ DARCOM in Alexandria, VA.

Gross was awarded a bachelor of science degree in chemical engineering by Drexel University in 1958. He has continued graduate study at the University of Delaware and the George Washington University.

His awards and honors include a quality step increase in 1971 for his work in the Weapons Development and Engineering Laboratories of Edgewood Arsenal and a Special Act Award in 1972 for special services he performed for the Arsenal's Manufacturing Technology Directorate.

Before starting his executive training earlier this month, Gross was assigned to the CSL's Environmental Technology Division as a lead engineer in the Army's installation restoration program.

Awards . . .

Cosgrove Receives Meritorious Decoration

DARCOM Director of Development and Engineering MG Stan R. Sheridan presents Decoration for Meritorious Civilian Service to "Tom" Cosgrove.

Mr. Thomas E. Cosgrove was recently presented with the Department of the Army's second highest award for civilian employees, the Decoration for Meritorious Civilian Service.

Cosgrove, who retired earlier this year, was cited for exceptional service to the Federal Government and to the U.S. Army Materiel Development and Readiness Command while serving as a mechanical engineer in HQ DARCOM's Development and Engineering Directorate.

An internationally renowned expert on small arms, Cosgrove was praised for his in-depth knowledge of the NATO Small Arms R & D Program. He was credited for successful efforts in the negotiation of an inter-service and international weapons systems evaluation. This work resulted in his being recognized as the "cornerstone" for DARCOM's efforts in these areas.

DARCOM Systems Analysis Awards

One individual and one group have been chosen as recipients of the FY 1979 U.S. Army Materiel Development and Readiness Command Systems Analysis Award.

Presented annually in recognition of individual and/or group achievements related to operations research/systems analysis work, the Systems Analysis Award is comprised of an engraved plaque and a citation certificate. Consideration is based on criteria in DARCOM Supplement 1 to Army Regulation 672-20.

All nominations are initially reviewed by the subordinate command and forwarded to the DARCOM incentive Awards Board for command-wide competition. Winners are then chosen by recommendations of the Board.

Mr. William T. Craddock, formerly a supervisory operations research analyst (instructor) in the Systems and Cost Analysis Department, U.S. Army Logistics Management Center, was selected as this year's individual Systems Analysis Award winner. He was cited for outstanding achievements on a major DARCOM study entitled "Impact of Incremental Changes in 7S Funding on Supply Performance (DELTA 7S). (Craddock is now employed in private industry.)

The DELTA 7S Study reportedly represents a significant advance in the state-of-the art application of analytical techniques to resource application problems. Craddock was specifically praised for his innovative approach to this study which included the techniques of regression analysis, input-output analysis, and goal programing.

Although the use of any of these analytical techniques would be significant in itself, stated Craddock's citation, the DELTA 7S Study used them all as part of an overall model. This achievement was credited to Craddock's ingenuity and resourcefulness.

Operations research analysts *Messrs. Gerard A. Zeller, Wilbert J. Brooks Jr., Raymond G. Pollard III*, and mathematician *Lawrence W. Bain Jr.*, all employees at the U.S. Army Materiel Systems Analysis Activity, are winners of the FY 1979 systems analysis group award.

The group received the award for their comparative analysis of the XM1 tank, and the older M60A1 and M60A3 tanks. This analysis was termed "unique" because it required comparisons on the basis of crew casualties and potential for reconstitution of the force.

Through the innovative efforts of the AMSSA group, the citation states, the Army was provided with a basis for quantifying the payoffs associated with improved materiel survivability of the XM1 and the new maintenance burden associated with the improvements.

Additionally, the group was cited for their efforts which supported the Cost Operational Effectiveness Analysis and follow-on production decisions on the XM1. They were also credited with substantially advancing the state-of-the-art in systems analysis of combat materiel.

Pace Awards Cite Achievements

The 1979 Pace Awards were presented at Pentagon ceremonies, earlier this year, to LTC Irvin S. Butler Jr., Office of the Deputy Chief of Staff for Research, Development, and Acquisition, and Mr. Robert F. McCoy, Office of the Deputy Chief of Staff for Logistics.

Named in honor of former Secretary of the Army Frank Pace Jr., the awards are presented annually to one civilian employee, GS-14 or below, and one military officer, lieutenant colonel or below, serving on the Department of the Army staff.

Primary consideration for the award is based on completion of a significant task or staff assignment which has brought benefit to the Army. This may include improvement in service, substantial financial savings, or a significant technological or military development.

LTC Butler was recognized for outstanding performance as the Department of the Army System Coordinator for the U.S. Roland Missile System. He served as the focal point for all activities required to move the Roland missile system from full-scale engineering development into production.

LTC Irvin S. Butler Jr.

The award citation noted that LTC Butler enabled the Army to complete the transfer of technology for a foreign designed air defense system to the U.S. and assured that the U.S. Government will be able to meet significant commitments made to NATO's Long Term Defense Plan.

LTC Butler holds a BS degree from Wofford College, a master's degree in English from the University of South Carolina, and he is a graduate of the Army Command and General Staff College.

Robert F. McCoy, principal analyst for the Army worldwide Stock Fund, was cited for significant achievements in 1979 while assigned as supply management representative, Resources and Management Directorate, DCSLOG.

Robert F. McCoy

His superb skills in the management of the Army Stock Fund, the award citation states, enabled him to create a sound program for Fiscal Year 1980 and allowed the Army Stock Fund to alleviate a funding crisis in Army operating appropriations.

McCoy, who has been a member of the HQ DA ODCSLOG staff since 1976, began his Civil Service career in 1965. He completed Supply Management Intern School in 1967, and has been employed with the Mobility Equipment Command (now TSARCOM) with the Army Stock Fund at HQ USAREUR.

Army Selects 22 Top ISEF Winners

Twenty-two winners of Department of the Army Superior and Meritorious Achievement Awards were selected from more than 400 finalists at the 31st International Science and Engineering Fair, St. Paul, MN. Deputy Chief of Staff for Research, Development, and Acquisition LTG Donald R. Keith presented awards to Army recipients.

Winners included one primary and an alternate chosen for the annual "Operation Cherry Blossom" trip to the Japan Student Science Awards exhibit in Tokyo next January, and one primary and one alternate for the London International Youth Science Fortnight.

Sponsored by Science Service, a nonprofit institution whose objective is to stimulate interest in scientific research, the annual ISEF culminates competition among high school students in more than 200 local, state and regional fairs, including some in foreign countries.

Exhibits of student research projects encompassed behavioral and social sciences, biochemistry, botany, chemistry, earth and space sciences, engineering, mathematics and computers, medicine and health, microbiology, physics and zoology.

Operation Cherry Blossom winner is William F. Doyle, Centennial H.S., Ellicot City, MD. His research, in the physics category, was titled "Quantative Analysis of Photographic Characteristics Using Video Techniques."

In addition to the Japan trip, Doyle's awards also included a $100 check from the Association of the U.S. Army, a Certificate of Achievement, a gold medallion, and an expense-paid trip and a scholarship to the 12th International Summer Science Institute of Weizmann Institute of Science in Rehovat, Israel (presented by the American Committee for the Weizmann Institute of Science).

Army alternate for the Japan trip is Barry Scott Berman, Merritt Island H.S., FL. He was selected by the Army panel of judges as a superior award winner for his project "Alpha$_2$ Macroglobulin: An Immunoregulator."

London International Youth Science Fortnight winner is Mary B. Fisk, East Central H.S., San Antonio, TX. She was selected for the expense-paid London trip for her exhibit "Determining the Psychological Pain Tolerance in Light and Dark-Eyed Individuals."

Stephanie Jo Cootware, North Fort Myers (FL) H.S., was chosen as alternate for the trip to London. She was named a superior award winner for her exhibit "The Effects of BHT and $NaNO_3$ on the Teeth."

Army Superior Awards also went to Catania M. Gregory, Overton H.S., Memphis, TN; Pamela L. Epstein, Merritt Island H.S., FL; Karen K. Ware, Skyline H.S., Dallas, TX; James A. Zigan, South Ripley Jr.-Sr. H.S., Versailles, IN; Randall Moore, Hillcrest H.S., Springfield, MO; Kenneth Haase Jr., Richard Montgomery H.S., Rockville, MD; and Shelia S. David, Pioneer H.S., Ann Arbor, MI.

Meritorious Awards went to Penny S. Denison, Delta H.S., Delta, CO; Calvin Ho, Parick Henry H.S., San Diego, CA; James P. Linton, Reading H.S., Reading, PA; Barbara G. Wilkins, Springdale H.S., Springdale, AR; Brian Curran, Charles Page H.S., Sank Springs, OK; Thomas L. Evans, Lampeter-Strasburg H.S., Lampeter, PA; Brian R. Greene, Stuyvesant H.S., New York, NY; David P. Lazarek, Marquette H.S., Michigan City, IN; Ernesto Graham, Jose de Diego H.S., Mayaguen, PR; Mary Elizabeth Whitaker, Menchville H.S., Newport News, VA; Guido M. Zimmer, Niceville H.S., Niceville, FL.

2 Aviation Engineers Get MCS Decorations

Two Army civilian aviation research engineers were awarded the Army's second highest award, the Decoration for Meritorious Civilian Service. The awards were presented by MG Story C. Stevens, commander, U.S. Army Aviation R&D Command (AVRADCOM).

Dr. Irving C. Statler, director, Aeromechanics Laboratory, Army Research and Technology Laboratories, AVRADCOM, was cited for his "significant contributions to advancing the state-of-the-art of the rotorcraft technology base, with specific emphasis on improvements applicable to the U.S. Army Aviation Research and Development Command."

Mr. John L. Shipley, chief, Army Aeronautical Research Group, Structures Laboratory, U.S. Army Research and Technology Laboratories, was cited for "significant contributions to the advancement of Army's helicopter research capability."

The Aeromechanics Laboratory is located at the NASA Ames Research Center, Moffett Field, CA, and the Structures Laboratory is located at the NASA Langley Research Center, Hampton, VA.

Abbott Becomes Mitchell Award Winner

Mr. Thomas J. Abbott, a DA civilian employee for more than 25 years and an industrial engineer assigned to the U.S. Army Armament R&D Command's Chemical Systems Laboratory (CSL), Aberdeen Proving Ground, MD, has been selected as the 1980 James P. Mitchell Award recipient.

Abbott, chief of CSL's Industrial Engineering Branch, is the first person to receive the Mitchell Award, established to recognize persons who have demonstrated initiative, creativity and innovative abilities in a support capacity over a span of several years.

COL John D. Spence, CSL's commander/director, made the presentation before a large group of the lab's top military and civilian administrators and employees. He praised Abbott for his efforts related to the development, preparation and justification of CSL's engineering projects. He was also cited for his technical administration of industrial engineering programs.

Personnel Actions . . .

Albertson Appointed to Advisory Body

COL John N. Albertson Jr.

COL John N. Albertson Jr., commander and director of the U.S. Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, MD, has been appointed an ex officio member of the National Advisory Research Resources Council of the National Institutes of Health.

COL Albertson received a diploma in music from the New Haven Conservatory of Music of Yale University and was a concert pianist on tour until an accident cut short that career. He attended the University of Connecticut where he earned bachelor degrees in bacteriology and chemical engineering. He holds graduate degrees in chemistry from St. Joseph's College and in microbiology from Hahnemann Medical College, both in Philadelphia.

He is also a graduate of specialized courses at the Medical Field Service School, the U.S. Army Command and General Staff College, and the Industrial College of the Armed Forces.

Listed among his previous assignments are commander, 127th Medical Company, Munich, Germany; chief of the Medical and Biological Science Branch, Pentagon; commander, 9th Medical Laboratory, Long Binh, Vietnam; executive officer, Walter Reed Army Institute of Research; executive officer, Armed Forces Institute of Pathology, and chief of staff of the Army Medical R&D Command.

COL Albertson has authored more than 25 technical articles, principally in the areas of structure and physiology of the mycobacteria, mycoplasma-virus interactions and dynamics and cell-material adhesion mechanics.

A senior parachutist, his awards include the Legion of Merit, two Meritorious Service Medals, and the U.S. Army Commendation Medal. He has been listed in *American Men in Science* since 1960 and in *Who's Who* since 1969.

McDonald Picked as Communications DC

COL Payton R. McDonald Jr. has been appointed as deputy commander/deputy project manager for the U.S. Army Communications Systems Agency/Project Manager DCS (Army). He succeeds COL Harvey W. Johnson.

COL McDonald was previously assigned as assistant deputy director, Switching Systems, Plans and Programs Directorate at the Defense Communications Agency. He has served overseas as battalion commander, Heidelberg Signal Operations Battalion, Germany; and as chief of the Communications-Electronics Plans Division, USAREUR Headquarters.

He has also served in Hawaii with the field office of the UNICOM/STARCOM Project Manager (now known as USACSA) and the 11th Infantry Brigade. He has been a deputy division chief and contracting officer representative for the Chicago Procurement District.

COL Payton R. McDonald

COL McDonald graduated from the University of Alabama with a BS degree in industrial management and a master's degree in business administration. He has also completed the Command and General Staff College. His awards and decorations include the Bronze Star, the Defense Meritorious Service Medal, the Meritorious Service Medal with two Oak Leaf Clusters, and the Army Commendation Medal.

Frick Becomes Switched Systems Deputy

COL James A. Frick

COL James A. Frick has assumed duties as deputy project manager for Switched Systems for the U.S. Army Communications Systems Agency/Project Manager DCS (Army). He succeeds COL Payton R. McDonald Jr. who has been reassigned as deputy commander/deputy project manager of the agency. COL Frick had been deputy PM for R&D Systems since July 1979.

Graduated from the U.S. Military Academy, COL Frick holds an MS degree in electrical engineering (solid state devices) from the University of Arizona at Tucson. He is a graduate of the U.S. Army Command and General Staff College and the U.S. Army War College, and has attended the U.S. Army War College.

From August 1976 through June 1978, COL Frick served as strategic research analyst, SSI, U.S. Army War College. Prior to that assignment he was commander, USACC-Mediterranean, 5th Signal Command, Camp Darby, Italy.

From July 1972 through November 1974, he served as electronic engineering officer, C-E Systems Division, Office of the Assistant Chief of Staff for Communications-Electronics, Department of the Army. COL Frick also served in Vietnam as commander, 205th Assault Support Helicopter Company and signal officer for the 12th Combat Aviation Group.

He is a recipient of the Bronze Star Medal, the Meritorious Service Medal with Oak Leaf Cluster (OLC), the Air Medal with 19 OLC, and the Army Commendation Medal with three OLC.

Fondren Chosen as ADCC Deputy PM

The U.S. Army Communications Research and Development Command, Fort Monmouth, NJ, has announced the appointment of Mr. William A. Fondren as deputy project manager for the Air Defense Command and Control Systems Project Office, Redstone Arsenal, AL.

Fondren will assist ADCC Project Manager COL David L. Wyatt in carrying out his responsibilities for the development of command and control systems in support of Air Defense Systems.

Fondren, who served in the U.S. Marine Corps, received his bachelor's degree in mechanical engineering from Auburn University in 1960. The first three years of his professional career were with private industry before he began federal employment in 1963 as a test engineer with the Hawk Project Office of the U.S. Army Missile Command (MICOM).

He has held various senior engineering positions in project management at MICOM and the U.S. Army Ballistic Missile Defense Systems Command and later became deputy project manager for Kuwait/Jordan Missile System at MICOM until 1979.

Fondren continued as chief of the Kuwait/Jordan Program Management Office after merger with Hawk Project Office until assuming the duties of deputy project manager, Air Defense Command and Control Systems Project Office.

William A. Fondren

Marangola Named TMDS Product Manager

The U.S. Army Communications Research and Development Command (CORADCOM) has announced the assignment of LTC Joseph C. Marangola as product manager for Test, Measurement and Diagnostic Systems (TMDS). He succeeds LTC Robert Ammerman Jr.

The DARCOM TMDS development program is designed to meet immediate and long-term user needs for maintenance of current and future Army weapons and equipment systems in the field.

LTC Marangola was graduated from St. Bonaventure University in 1962, and commissioned in the Regular Army. He attended the Guided Missile Systems Officers' course at Fort Bliss, TX, and later received a master's degree in electrical engineering from the University of Texas.

In 1975 he graduated from the Command and General Staff College and was assigned to Korea as the Battalion S3 of a Nike Hercules ADA Battalion. Upon returning from Korea in 1976, he spent a year with Sperry-Gyroscope in the Training-With-Industry Program.

In December 1977, he was stationed at Redstone Arsenal, AL, where he served as PM staff officer in the High Energy Laser Project Office prior to his new assignment.

Among LTC Marangola's decorations and awards are the Bronze Star Medal, Meritorious Service Medal with Oak Leaf Cluster (OLC), the Army Commendation Medal with OLC, Air Medal and Parachute Badge.

LTC Joseph C. Marangola

GENERAL OFFICE REASSIGNMENTS

The following is a list of general officer reassignments which may be of interest.

MG Donald W. Babers
From: ***Project Manager, XM1***
To: ***Commander, CERCOM***

MG John K. Stoner
From: ***Commander, CERCOM***
To: ***Retired List***

MG Duard D. Ball
From: ***Commander, White Sands Missile Range***
To: ***Project Manager, XM1***

MG Robert L. Herriford
From: ***Assistant DCSLOG, HQDA***
To: ***Director, Procurement and Production, HQ DARCOM***

MG Emil L. Konopnicki
From: ***Assistant DCSLOG, HQDA***
To: ***Commander, TSARCOM***

MG Richard H. Thompson
From: ***Commander, TSARCOM***
To: ***Assistant, DCSLOG, HQDA***

MG Robert L. Moore
From: ***Chief of Staff, HQ DARCOM***
To: ***Commander, MICOM***

MG Alan A. Nord
From: ***Director, Supply and Maintenance, DCSLOG, HQDA***
To: ***Commander, White Sands Missile Range***

MG Louis Rachmeler
From: ***Commander, MICOM***
To: ***Retired List***

MG Jere W. Sharp
From: ***Director, Procurement and Production, HQ DARCOM***
To: ***DCSLOG, HQDA***

BG Lawrence F. Skibbie
From: ***Deputy Director, Materiel Plans and Programs, ODCSRDA***
To: ***Director, Combat Support Systems, ODCSRDA***

BG Henry Doctor Jr.
From: ***Assistant Division Commander, 24th Infantry Division***
To: ***Director, Personnel and Force Development, HQ DARCOM***

BG William H. Schneider
From: ***Director, Personnel, Training and Force Development, HQ DARCOM***
To: ***Chief of Staff, HQ DARCOM***

BG (P) James P. Maloney
From: ***Deputy Director, Combat Support Systems, Office, DCSRDA***
To: ***Director, Weapons Systems, Office, DCSRDA***

BG John M. Brown
From: ***Assistant Division Commander, 2d Infantry Division, Eighth U.S. Army***
To: ***Deputy Director, Materiel Plans and Programs, Office, DCSRDA***

BG James F. McCall
From: ***Chief, Procurement Programs and Budget Division, Materiel Plans and Programs Directorate, Office, DCSRDA***
To: ***Comptroller, HQ DARCOM***

DEPARTMENT OF THE ARMY

Headquarters
U.S. Army Materiel Development & Readiness Command
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